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Transboundary Waters Assessment Programme (TWAP) Assessment of Governance Arrangements for the Ocean

Volume 1 • Large Marine Ecosystems



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Technical Series 119

Transboundary Waters Assessment Programme (TWAP) Assessment of Governance Arrangements for the Ocean

Volume 1 **Transboundary Large Marine Ecosystems**

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Preface

This report is an output of the Large Marine Ecosystems component of the Global Environment Facility (GEF) Transboundary Waters Assessment Programme (TWAP)(2013-2015). TWAP conducted indicator-based assessments for transboundary water systems in five categories: aquifers, rivers, lakes, Large Marine Ecosystems (LMEs) and Open Oceans. These included assessment of governance arrangements and overall architecture for transboundary systems. This report covers the arrangements for LMEs, while its companion (Volume 2) covers arrangement for Open Ocean with a focus on Areas Beyond National Jurisdiction (ABNJ). Each report is summarised as a chapter in the overall assessment report for the respective water category (Open Ocean and LME).

The database of agreements that formed the basis of this report is available online as part of the GEOWOW One Shared Ocean initiative. [One Shared Ocean](#), hosted by the IOC-UNESCO International Oceanographic Data and Information Exchange (IODE), will provide a focal access point for ocean scientists and policy makers to retrieve and share data. In the course of preparing this work, a separate assessment was carried out for each transboundary LME. These are compiled into an Annex, which is available as a separate document entitled 'Individual governance architecture assessment for fifty transboundary Large Marine Ecosystems'.

The authors would like to express their thanks and to acknowledge the contributions of those who provided technical assistance and expert judgement in the development of this report. Special thanks to Ms. Katherine Blackman for her assistance with data collection. Thanks also to Stephen Olson and Jakob Granit for their valuable comments of this report. Additional thanks to all of the individual LME experts who were generous with their time and provided feed-back on drafts of the individual LME assessment reports. We are grateful to UNESCO-IOC for the opportunity to carry out this work.

We take this opportunity to let readers know that this report covers primarily the extent to which arrangements are in place and appear to conform to widely accepted governance norms. It does not assess the performance or effectiveness of these arrangements. Assessment of the performance or effectiveness of these arrangements and how these relate to the presence of 'good governance' characteristics should be the next stage of this work.

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Summary

This report evaluates the structure or architecture of formally-established transboundary governance arrangements that address issues affecting water quality, fisheries, biodiversity and habitat destruction in Large Marine Ecosystems (LMEs). While there are currently 66 LMEs that have been identified globally based on criteria of productivity, trophic relationships, bathymetry and hydrography (Sherman 1994), priority is given in this report to the 50 LMEs shared by more than one coastal country.

Using the TWAP Level 1 Governance Assessment Methodology (Jeftic et al. 2011), the assessment is conducted by: (1) identifying the list of transboundary issues identified in documents and websites for each LME; (2) exploring the entire set of arrangements present within an LME to determine those addressing the identified issues, their geographic area of competence and the interrelations among them;¹ (3) assessing the level of completeness of each arrangement in each LME; and (4) assessing the degree of integration among them. In addition, analyses were conducted to: (5) assess the level of engagement of each country in each binding and non-binding agreement present in each LME to address the identified transboundary issues; and (6) assess the 'fit' or appropriateness of the arrangements in terms of area of competence to address the identified transboundary issues.

In order to classify transboundary issues identified within the LMEs, a total of 10 different subcategories relating to fisheries, pollution and biodiversity were identified. Of these, 5 subcategories were related to fisheries (highly migratory, within the EEZ, in areas beyond national jurisdiction (ABNJ), in both EEZ and ABNJ and specific species), two to pollution (land-based sources and marine based sources) and three were related to biodiversity (general, specific and habitat). Using these 10 subcategories, a total of 359 transboundary issues were identified in the 50 LMEs with some 347 arrangements in place for addressing them. These arrangements comprised a total of 86 binding agreements that required ratification, accession, approval or acceptance by countries eligible to participate in them and 17 non-binding, collaborative agreements. The apparent discrepancy in the number of arrangements and agreements is explained by recognizing that there are cases where the area of competence of a given agreement covers more than one LME.

Three key indicators are used to provide a preliminary assessment of the status of each LME in terms of the ability of the current governance arrangement to address its key transboundary issues:

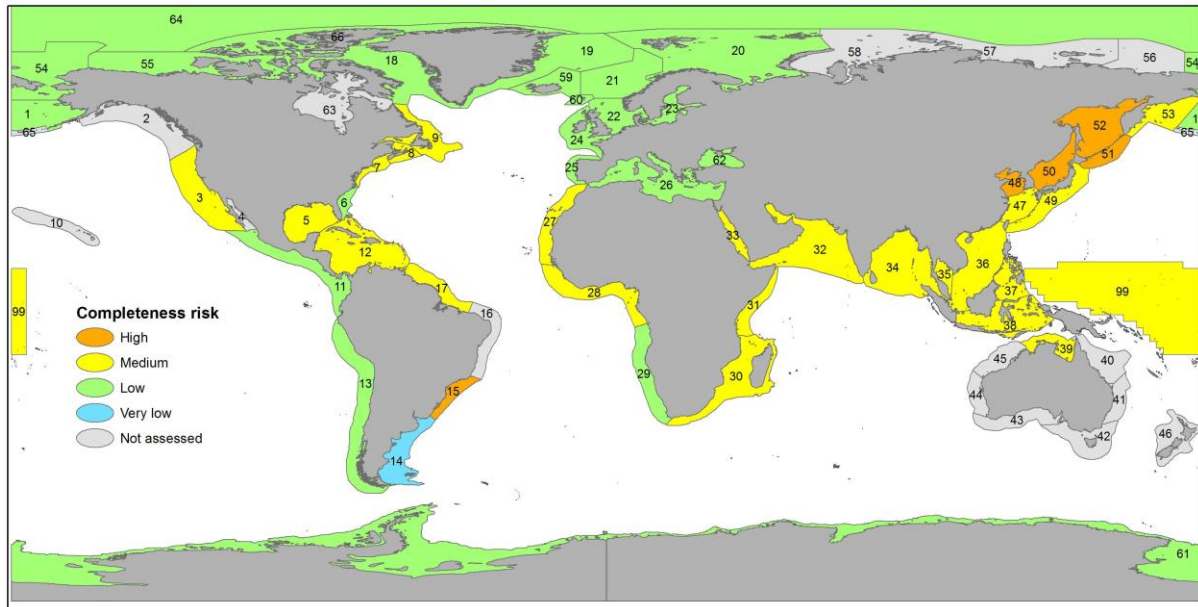
- Level of completeness of the policy cycles for all arrangements addressing identified transboundary issues in an LME;
- Level of integration of organizations involved in arrangements for all transboundary issues in an LME; and,
- Level of engagement of each country in an agreement addressing a given transboundary issue in an LME.

In order to link assessed scores for the three indicators to a perceived level of risk, a five-point score was developed by the LME component of the TWAP-FSP (2013-2015) as provided below:

Risk level	Completeness Range	Integration Range	Engagement Range
1 –Very low	80-100%	0.80-1.0	80-100%
2 - Low	60-80%	0.6 -0.8	60-80%
3 - Medium	40-60%	0.4-0.6	40-60%
4 - High	20-40%	0.2-0.4	20-40%
5 – Very High	0-20%	0.0-0.2	0-20%

¹ Data collection covered all available documentation up to March 31, 2014.

Level of completeness - The overall comparison of level of completeness with assessed scores and corresponding level of perceived risk for the 50 LMEs is illustrated in the figure below (Figure 6 in the report). The figure illustrates the global distribution with one LME being assessed as having a very low level of risk for completeness, 22 LMEs scoring low level of risk, 22 LMEs scoring medium and five LMEs assessed as having a high level of risk. None of the LMEs were found to have a very high level of risk. The numbers on the map refer to the identification of LMEs by numbers, as provided at <http://lme.edc.uri.edu/LMEWeb/downloads/LME66.pdf>.



Global distribution of levels of completeness and perceived risk for 50 multi-country LMEs.

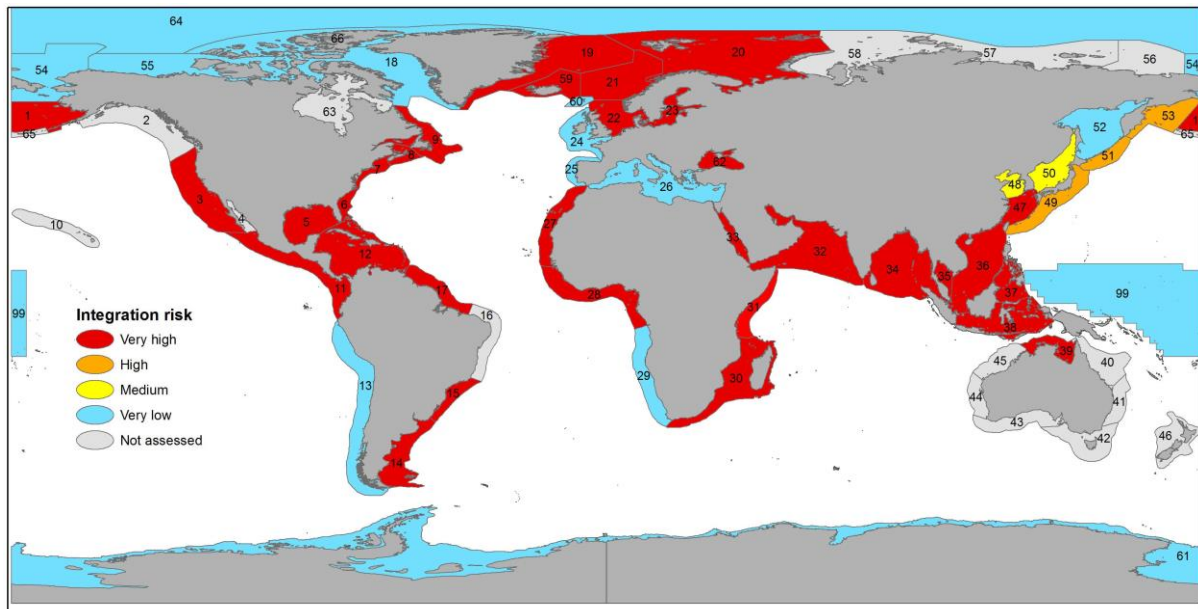
Probing the data further, the analysis revealed the absence of agreements addressing key transboundary issues in 5 of the 13 geographic regions (South-East Atlantic, South-West Atlantic, North Atlantic, North-East Pacific and South-East Asia), pointing to potential areas that may have an even greater priority for intervention in LME-level governance. Furthermore, at the issues level, fisheries arrangements accounted for 38% of the 359 issues and showed the highest level of completeness. Pollution arrangements accounted for 37% of the transboundary issues and had the second highest level of completeness while biodiversity arrangements accounted for 29% and showed the lowest level of completeness.

The analysis of completeness score and risk ranking provides a tool by which LMEs can be monitored over time and as agreements and their arrangements are added or strengthened. The current literature on governance architecture suggests that effort should be made to increase the level of completeness of the policy cycle for any agreement. This is seen as critical as it strengthens and facilitates the flow of valuable data and information into the analysis and advice stage of the cycle which in turn provides the structures that contributes to informed decision-making, implementation and review.

Level of integration – An index for the overall level of integration across all of the arrangements within an LME that address the identified transboundary issues was calculated as part of the TWAP Level 1 Governance Assessment Methodology (Jeftic et al. 2011). The integration score for any LME was calculated based on averaging the integration scores for all arrangements in the LME and ranged between 0 and 1. Whenever an overarching arrangement was in place in the LME, the LME received a score of 1. The figure below (Figure 13 taken from the body of the report) shows the assessed integration scores and perceived level of risk for each of the 50 LMEs, based on collaboration across organizations involved in arrangements addressing transboundary issues in each LME. The numbers on the map refer

to the identification of LMEs by numbers, as provided at <http://lme.edc.uri.edu/LMEWeb/downloads/LME66.pdf>.

The global distribution of LMEs based on integration showed 14 LMEs as having the highest level of integration thereby corresponding to being assessed as having a very low level of risk, two with a medium level, 3 with a high risk ranking and the remaining 31 as having the highest level of risk based on extremely low integration across the organizations in place to address fisheries, biodiversity and pollution issues at the transboundary level.



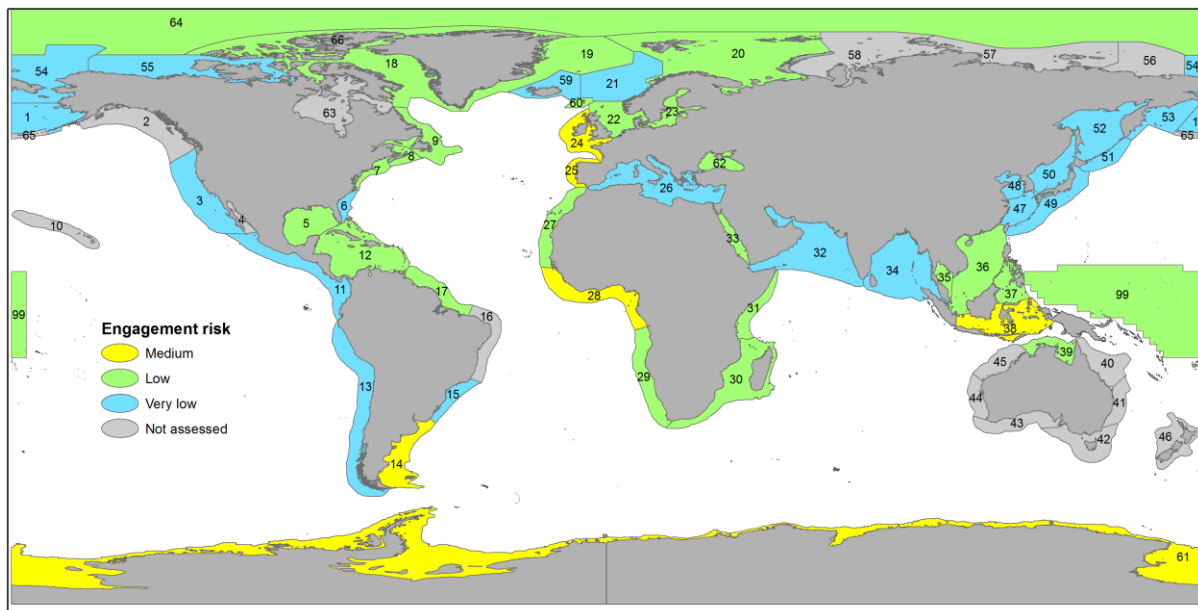
Global distribution of levels of integration and perceived risk for 50 multi-country LMEs

There is no *a priori* criterion for the extent of clustering that would be considered optimal. Nonetheless, the assumption underpinning the scoring was based on an expectation that without considerable attention to linkages and interaction among arrangements, it would be difficult to have the integrated approach within a system that would be needed to achieve EBM. At the other end of the scale, in a system with highly diverse issues, one would not normally expect to find them all covered by the same responsible bodies. In fact, depending on complexity and capability, it may be more effective and flexible for arrangements to have common responsible organizations at policy setting stages, but different responsible organizations at technical and operational policy cycle stages. The results for integration across the LMEs provide some evidence that both scenarios are in play.

Level of engagement – The number of eligible countries engaging in relevant agreements addressing identified transboundary issues in a given LME was calculated as a percentage to determine an engagement level across all eligible countries in the LME. Furthermore, the analysis examined whether the nature of the agreement, i.e. binding or non-binding, had any effect on engagement levels by countries. The analysis revealed that fewer LMEs were committing to higher levels of engagement for binding agreements than for non-binding agreements. This may be explained by the higher level of accountability expected for binding agreements as compared to a non-binding agreement.

The figure below (Figure 15 taken from the body of the report) shows both the assessed engagement scores and perceived level of risk. It illustrates that none of the LMEs were assessed to have engagement scores resulting in very high or high risk levels. The numbers on the map refer to the identification of LMEs by numbers, as provided at <http://lme.edc.uri.edu/LMEWeb/downloads/LME66.pdf>.

Twenty-one LMEs were characterised as having a very high level of engagement corresponding to an assessment of potential risk as being very low. Five LMEs were found to have engagement levels resulting in a potential risk ranking of medium and 24 LMEs were found to have engagement levels resulting in a low ranking of risk.



Global distribution of levels of engagement and perceived risk for 50 multi-country LMEs

Probing the data further, all binding agreements had examples in which none of the countries in a particular LME were engaged, highlighting the need to further assess the reason for the lack of engagement. Furthermore, binding agreements for fisheries, pollution and those that were more of a generic type of agreement (such as the Regional Seas Conventions) had the greatest diversity in levels of engagement, ranging from no engagement by countries in a given agreement for the LME to 100% engagement. Overall, non-binding biodiversity agreements had the highest level of engagement among countries in the relevant LMEs.

The results obtained from the assessment of engagement speaks to the need to understand why there is the sense amongst the drafters of policy instruments that binding agreements are preferred over non-binding ones even in the face of a lower level of engagement by countries. The literature on governance complexity would suggest that rather than generalising that one form of agreement is better over another, a far more effective, albeit demanding, approach is to examine the context specificity of each LME or groupings of LMEs, prior to establishing the nature of agreements set up to address transboundary issues. Such an approach should also be informed by current thinking on governance which highlights the fact that 'governance is more than just government'. It should also include an examination of the cultural, geopolitical and socio-economic factors, among others, that may influence the architecture of governance responses in some LMEs, (e.g. those in South-East Asia and the Caribbean) where the preferred choice seems to follow a more collaborative, networked approach.

The analysis of engagement identified some instances in which countries within an LME were ineligible to participate in an agreement addressing an issue in the LME. This ranged from just a single country in a given LME to as much as 20 countries, depending on the specific agreement. In many of these instances, the explanation was evident, in part due to the sub-LME nature of the agreement. However, it would seem appropriate for efforts to be made to examine the consequences of all such omissions identified in this analysis and if deemed negative, to avoid such situations from occurring by rectifying existing agreements and ensuring new agreements prevent such situations from arising. Where relevant, input from LME-level experts should be sought on this issue.

Appropriateness or ‘fit’ of arrangement - The analysis of ‘fit’ of areal extent of governance arrangements addressing transboundary issues in the LMEs assessed the degree to which these instruments, and the mechanisms developed to implement them, take LMEs as management units into account. The majority of the arrangements (90%) were deemed to be supra-LME in scope, either inclusive of but extending beyond the boundaries of the LME or covering only a part of the LME while extending to other areas outside of the LME. Furthermore, there were examples at the other end of the spectrum in which agreements were restricted to subregions within LMEs.

In the case of supra-LME agreements, the potential exists for countries outside of a given LME to be able to exercise influence, either directly or indirectly, at a level that is contrary to the needs of those within the LME. This appears to be the case in the Caribbean LME where the needs of the countries in terms of management of ‘regional’ pelagic species by ICCAT are superseded, if not undermined, by those outside of the region who see little value in addressing these species. This suggests the need for potentially allowing lower level, nested governance mechanisms within these supraregional agreements that would serve the needs of those parties to the agreement at the LME level. Again, this provides a cautionary reminder of the limitations of the ‘one size fits all’ approach when it comes to dealing with the level of complexity inherent in ocean systems. The challenge associated with ‘fit’ is also demonstrated at the sub-LME level where only some countries within the LME may be entitled to participating in particular subregional agreements.

Probing the data further, the analysis revealed that pollution agreements were most likely to have areas of competence that exactly matched the areal extent of the LME. The majority of fisheries agreements had areas of competence that were either larger than the LME or offset to include areas outside of the LME. While this can be explained as reflecting the biology and migratory range of the species being addressed in arrangements for highly migratory species, it does not appear to reflect transboundary fisheries issues for species found within a single LME. For the 6% of fisheries arrangements that had areas of competence focusing only on part of the relevant LME, a feasible explanation may be due to the target species being distributed subregionally. No fisheries arrangement was an exact match with an LME.

The observation that the majority of arrangements assessed are larger than and/or offset from LMEs calls for reflection on the role of LMEs in the overall arrangements for governance of the oceans. LMEs appear as a level between national and the large-scale regional clusters described by Mahon et al. (in press). It appears that there may often be a sub-LME level as well, when issues requiring governance involve only a subarea of the LME or a subset of the countries within an LME. Thus for oceans, the scale gradation would be: global>regional cluster> LME>sub-LME> national> local. The relative emphasis on these will vary among regions and will also lead to an emphasis on rationalizing roles and responsibilities as well as linkages within the nested system.

The analysis of the three indicators of completeness, integration and engagement to assess the structure of governance arrangements addressing transboundary issues in LMEs, along with the preliminary assessment of ‘fit’, is a preliminary step towards understanding:

- the extent to which governance issues are covered (thereby allowing identification of gaps);
- the match between governance arrangements and issues;
- the extent to which arrangements extend outside the LME;
- the extent to which issues are covered by multiple arrangements that could result in conflict; and,
- the extent to which there is integration among arrangements either through existing institutions and organizations or through specific integrating mechanisms.

The analysis is considered preliminary for three main reasons: 1) the number of issues identified are based on available published literature, possibly resulting in some newly emerging issues and even existing issues not being captured in the analysis; 2) it focuses exclusively on formal agreements (binding and non-binding) that are currently in place for addressing these identified transboundary issues in the LMEs; and 3) the data collection process is entirely secondary in nature, based on desk-top research, although efforts are made for expert judgment to inform the findings and conclusions reached.

Nonetheless, this analysis has identified the potential for assessing governance arrangements in LMEs in a number of ways. From a substantive perspective, this assessment appears to be supportive of the conclusion of heterogeneity among LMEs. At the same time, it is suggestive of some aspects of commonality across LMEs, particularly those relating to the level of completeness of policy cycles to facilitate 'good' governance. The level of engagement by countries which affect or are affected by transboundary issues within the LME also appears to be a cross-cutting factor for 'good' governance. However, this indicator may be driven by the binding or non-binding nature of an agreement, the type of issue that the agreement is established to address and the area of competence or 'fit' of the agreement for 'good' governance to be realised.

In addition to its substantive contribution in preliminarily identifying the status of baseline governance indicators across LMEs, the potential of this LME level governance arrangements assessment to inform process may prove to be equally valuable. First, it would be of benefit to determine whether actors involved in addressing these issues at the transboundary level see the potential of the TWAP Level 1 Methodology as providing the context or framework within which a structured discussion about governance arrangements within their LME can take place. Second, by using a common framework and methodology, key actors within each LME can have a more informed perspective of their LME's position relative to other LMEs and to the broader suite of both regional and global governance mechanisms in place for addressing similar issues. This could potentially serve to facilitate learning across relevant LMEs from exposure to both failure and successes in governance processes being used.

In summary, while assessing indicators of governance arrangements are possible and progress can be made towards enhancing these by direct intervention by GEF and other donor agencies, it is essential to reiterate that governance success requires a detailed understanding of the complexity of the system to be governed. Any preliminary conclusion of ranking of any indicator that assigns a potential level of risk for any LME must be seen as simply a flag to determine whether the assessment points to the need for intervention or whether the identified ranking is in fact appropriate for the system. Overall, what we learned is that it is really complex to assess the governance systems of LMEs which are based on an ecosystem management approach rather than being drawn "according to legal, political, or economic facts" (Rothwell and Stephens 2010).

The LME approach is the pathway towards sustainable use of marine ecosystems provided the interaction between the various players becomes much stronger amongst the various science sectors and between scientists and stakeholders, the general public and the national and international administration. Partnership and communication are required on all levels and on all geographical scales. What is lacking is not so much the money but rather the political will and the vision of enthusiastic and competent experts on the way to apply the LME concept for the sustainable development of the use and conservation of the marine environment in many parts of the World Ocean.

1. Introduction

Large marine ecosystems (LMEs) have been defined as relatively large regions of coastal oceans on the order of 200,000 km² or greater, characterized by distinct bathymetry, hydrography, productivity and trophically-dependent populations (Sherman 1994). Given the generally higher primary productivity of these marine areas as compared with the open ocean and their close proximity to continental and island land masses, LMEs have been found to account for some 80% of the world's annual fish catch, estimated at some 70 billion dollars (Sherman and Hempel 2009). However, it is also as a result of their proximity to human habitation and associated terrestrial and marine-related economic activity that these large areas of coastal ocean space are being negatively affected by increasing land and marine-based sources of pollution, habitat modification and over-fishing.

Over the past 30 years, the LME concept has been used to investigate the problems affecting the world's coastal marine ecosystems and has had a global impact on how initiatives to address these problems are defined, developed and funded. The concept has focused attention on the world-wide need to address marine ecosystem issues at a geographical scale that is appropriate to major marine biophysical processes (Hennessey and Sutinen 2005, Sherman and Hempel 2009). As such, the LME concept has provided a rallying point for countries to cooperate in dealing with problems relating to the utilization of transboundary resources. It has been supported financially by a number of international and multilateral funding mechanisms such as the Global Environment Fund (GEF).

As of August 2013, sixty-six LMEs have been proposed as ecologically rational units of ocean space in which ecosystem-based management (EBM) can be applied (Figure 1). This attention to LMEs has been underlain by the LME approach which is based on five modules: productivity, fish and fisheries, pollution and ecosystem health, socioeconomics and governance (Sherman 1999, Duda and Sherman 2002). As usually presented, these modules provide a framework for an indicator-based approach to assessing and monitoring LMEs. Some modules have received more attention both in their conceptualization and practical implementation than others, with the socioeconomics and governance module being the least well-developed (Sherman et al. 2005). To address this deficiency, greater focus has been placed in developing mechanisms to assess both socio-economic and governance characteristics of LMEs (Olsen et al. 2006, Fanning et al. 2007, Hoagland and Jin 2008, Mahon et al. 2010, Jeftic et al. 2011).

1.1 The GEF IW TWAP and the Large Marine Ecosystem Assessment

The GEF International Waters Programme (GEF-IW) supports projects and other activities aimed at improving the capacity of transboundary water systems to deliver ecosystem goods and services. This programme has been active for over 20 years with considerable investments in these water systems (Duda and Hume 2013). The aim of the GEF-IW Transboundary Waters Assessment Programme Full-size Project (TWAP FSP) (2013-2015) is to produce the first truly global assessment of all five categories of transboundary water systems: (1) aquifers, (2) lake/reservoir basins, (3) river basins, (4) large marine ecosystems, and (5) open ocean. This will be accomplished by applying the methodologies developed during the TWAP Medium-sized Project (2009-2010) (Jeftic et al. 2011). At the same time, TWAP will formalize the network of partners involved in the full-sized project to establish a basis for the conduct of future periodic assessments. A primary purpose of the TWAP FSP (2013-2015) is to assist the Global Environment Facility (GEF) and other international organizations in priority-setting by providing a baseline and priorities for intervention. The main assessment report will provide a baseline for future periodic assessments.

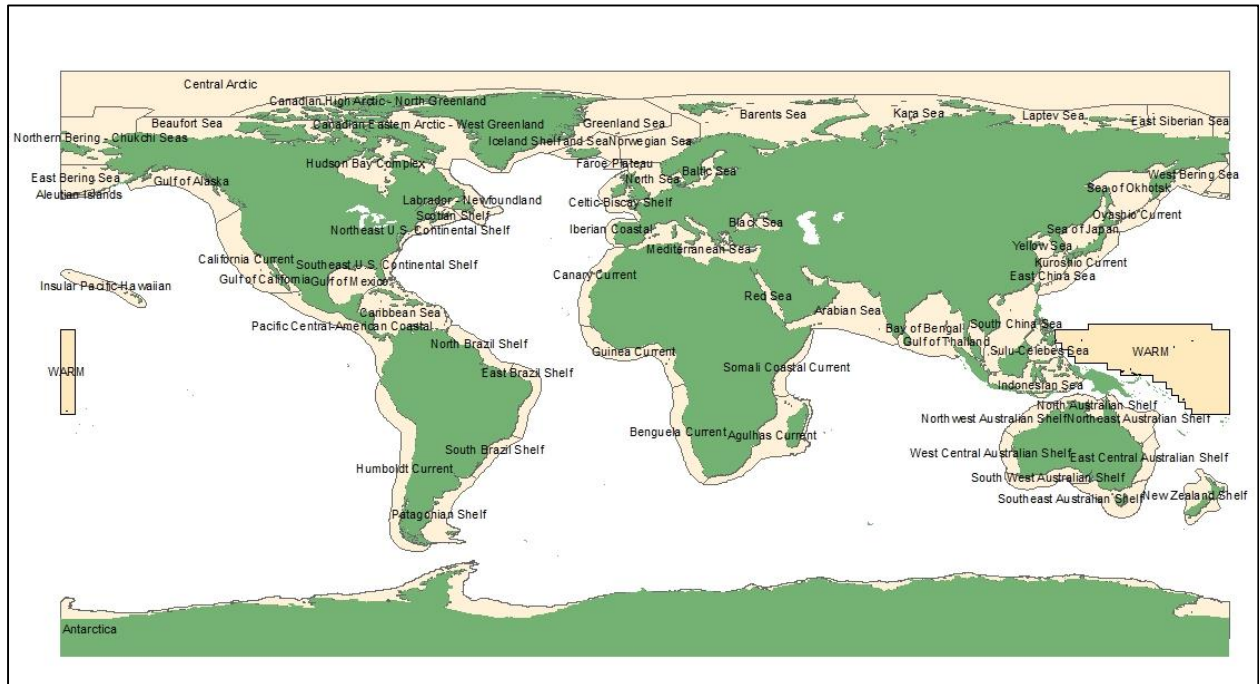


Figure 1. Large marine ecosystems of the world

As noted in the introduction, overfishing, habitat destruction and pollution have been identified as among the priority environmental issues in LMEs generally and by GEF LME projects specifically. The overall large marine ecosystems assessment focuses on these themes as well as on socioeconomics and governance. For each theme, a number of indicators and metrics are being used in the global baseline comparative assessment of LME status, future trends and associated drivers, and the consequences for humans.

This component of the TWAP FSP (2013-2015) looks at the assessment of governance at the level of the LME. It recognizes that effective governance is fundamental to achieving healthy ecosystems (inclusive of people), and in this context, has a direct effect on the sustainability of ecosystem goods and services, in addition to other politically negotiated goals. Governance affects what activities people pursue and with what intensity, and if or how value derived from natural systems reaches human communities. As a first step in understanding governance at the LME level, this component of the LME assessment evaluates the formally-established transboundary governance arrangements that are relevant to these key issues: water quality, fisheries, biodiversity and habitat destruction. These transboundary arrangements may occur at a level within the LME, at the level of the entire LME or include all or a part of the LME while extending beyond the boundary of the LME. Arrangements that are unique to a particular country within an LME are not considered in this assessment.

It is important to note that the assessment is intended to look only at transboundary governance arrangements and their associated structure or architecture, defined by Biermann and Pattberg (2012) as the set of commonly-shared principles, institutions and practices that affect decision-making. Due to resources constraints, it does **not** examine the outcome or impacts of decision-making, i.e. the effectiveness of the governance process, important as the assessment of these may be. Further. The study acknowledges that several LMEs have used the GEF International Waters (GEF-IW) transboundary diagnostic analysis (TDA) and strategic action programme (SAP) processes, identified as an innovative approach introduced by the GEF as a global scale framework for prioritizing and implementing ecosystem based governance. While this study recognizes this approach by the GEF in a subset of the LMEs examined, the focus in the TWAP Level 1 governance assessment is on assessing the LMEs

at the level of formally-established transboundary governance arrangements. As such, the analysis does not include SAPs as formal international agreements because they are project outputs with a determinate time-frame. However, it does include assessing any permanent formal outputs of the SAP, such as a transboundary agreement establishing a Commission.

1.2 Assessing governance arrangements and effectiveness - where governance structure fits in

The assessment of governance arrangements and their effectiveness is a complex and multifaceted task (Young 2013). One perspective is that it can be broken into three components (Young 1999). The first of these is 'outputs', which are the agreements that are put in place to achieve governance. The second is 'outcomes' which represents changes in the behaviour of people that are the target of the agreement. The third is 'impact' which represents changes in the state of the system that is the target of the agreement. These can be assessed separately, and in sequence, as it is likely that there will be time lags in changes in these components. This perspective is consistent with the formulation of the GEF IW programme approach to evaluation of its projects and intervention, which has been based on three categories of indicators: (1) process indicators, (2) stress reduction indicators and (3) environmental status indicators (Duda 2002).

Mahon and colleagues (2011a) expressed concern that the GEF IW approach is missing four categories of indicators that are critical for the assessment of effective governance for sustainable development. They argued that for the indicator scheme to be in accord with current thinking regarding the objectives for sustainable development, there is the need to include new categories of indicators for participation, social justice and human well-being that are in tandem with those for the environment (Mahon et al. 2011a)(Figure 2). They also argue that there is the need for a category of governance structure or architecture, the assessment of which should precede the assessment of the governance process. This is considered to be particularly important in the case of multilevel, nested systems such as those that are the focus of international environmental governance (Fanning et al. 2007, Biermann 2007). Consistent with this perceived need, this report is primarily concerned with assessing the structural arrangements for governance at the LME level.

1.3 Scope of the LME governance assessment

Current research suggests that an understanding of the suite of transboundary arrangements relating to a given LME may provide considerable insight into understanding how best to approach LME-level governance in an integrated and coordinated fashion. To that end, the Terms of Reference (TOR) for the LME governance assessment focused on conducting a governance architecture or structure assessment for each transboundary LME (two or more coastal countries) with an emphasis on those LMEs in which at least one of the coastal countries are GEF-eligible. The TOR indicated that the assessment of the targeted LMEs is to be conducted using the TWAP Level 1 Governance Assessment Methodology (Jeftic et al. 2011, Mahon et al. 2011b). In addition to assessing the 36 multi-country, GEF-eligible LMEs, this analysis also includes the additional 14 multi-country LMEs whose coastal countries are not GEF-eligible.² By assessing the current suite of arrangements addressing the key issue areas for each LME included, an assessment of gaps and weaknesses relating to the governance structure for the LME can be obtained.

² Given the focus of the governance arrangements assessment for key transboundary issues within a given LME, the analysis does not include the remaining 16 of the world's LMEs that are bordered by a single-country, regardless of their GEF eligibility

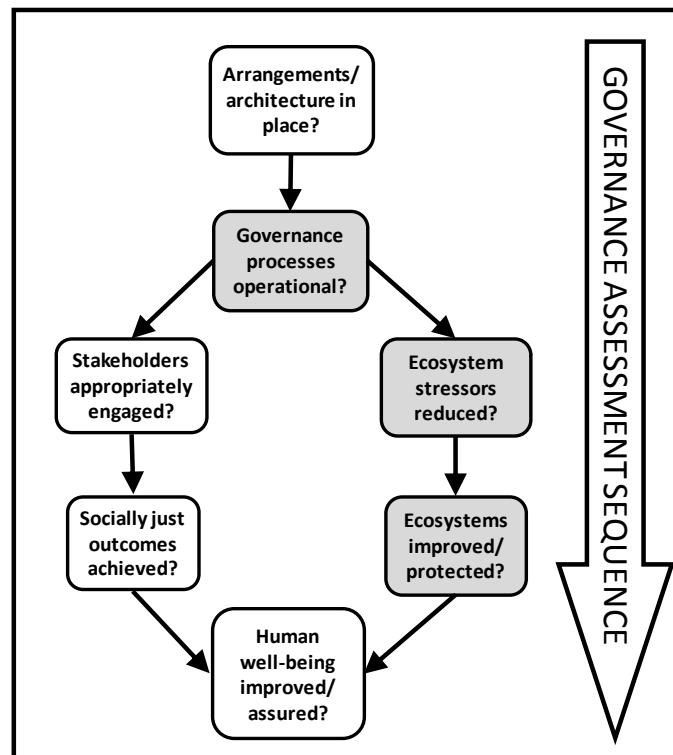


Figure 2. The expanded GEF IW indicator framework. The original GEF IW indicator categories (Duda, 2002) are shaded in gray. The additional indicator categories are unshaded. (Source: Mahon et al. 2011a)

This aim is approached by first exploring the entire set of arrangements present within an LME to determine the issues they cover, their geographic area of competence and the interrelations among them.³ Fanning and colleagues (2007) developed a conceptual model or Large Marine Ecosystem Governance Framework based on nested policy cycles at multiple levels (local to global) with vertical and horizontal linkages providing the basis for interplay. The policy cycles comprised five stages considered to be important for adaptive governance (development and provision of advice, decision-making, implementation, review and generation and management of data and information). For two stages, advice and decision-making, it is considered important that there be the requisite level of capacity at both the policy level and the management/planning or operational level. While for conceptual simplicity the model depicts complete policy processes within levels, the reality is that policy, management planning, and implementation decisions for a particular issue may take place at different levels within the governance system as illustrated by Fanning et al. (2013).

This assessment of governance arrangements for LMEs includes an evaluation of the extent to which the stages of the policy process are in place for each arrangement, i.e. the level of completeness of the policy cycle. This evaluation is based on criteria which are considered to reflect 'good governance'. It must be emphasised that while the presence of policy processes that meet good governance criteria might be expected to result in better outcomes and impacts (the ultimate tests of effective governance), a causal link between good governance processes and effective governance has not been conclusively demonstrated in the literature. The criteria for good governance that are used to evaluate the policy processes for the arrangements are largely based on operational principles, such as transparency, accountability, participation, and efficiency that are considered desirable and appear in the preambles to many multilateral environmental agreements.

³ Data collection covered the period up to March 31, 2014.

2 Methodology

The Transboundary Waters Assessment Programme methodology for governance is part of an overall methodology that is being developed by the TWAP (Jeftic et al. 2011). The objective of TWAP is to develop scientifically credible methodologies for conducting a global assessment of water systems for the five transboundary water categories and to catalyse a partnership and arrangements for conducting such a global assessment. As such, a key outcome of the TWAP Level 1 Governance Assessment methodology is to develop the approach in a way that it can be applied by key stakeholders within the water system as a form of self-assessment.

The Level 1 Governance Assessment evaluates: (1) whether the critical transboundary issues are covered by governance arrangements that have full policy cycles, and (2) the level of integration across the different arrangements in place to address these concerns (Mahon et al. 2011b). It is expected to reveal the extent to which the issues are covered, whether there are gaps or overlaps in coverage and the nature of the arrangements that are in place.

In addition to analyzing LMEs using the TWAP Level 1 governance assessment methodology, two additional analyses relevant to governance architecture were conducted. These were (1) the level of country commitment and buy-in, that is, their level of engagement in agreements pertaining to issues within the LME and (2) the assessment of the 'fit' of each arrangement affecting the LME to the areal extent of the LME. A separate volume is provided containing individual chapters of the desk-top research documentation on the assessment for the four types of analyses for each of the 50 LMEs analysed for this report.⁴ All four types of analysis contribute to an increased understanding of how the structure of governance arrangements can contribute to enhancing the goal of improving overall human well-being (Figure 2).

2.1 Terminology

For the purposes of this LME governance arrangements assessment, the following key terms deserve explanation:

- **Agreement** refers to the actual multilateral documentation pertaining to any of the [key focus areas of the assessment, namely pollution, fisheries, biodiversity and habitat modification](#), that has direct relevance to the LME. The term 'agreement' is limited to the content of the actual document outlining the goals, objectives and clauses detailing the terms and conditions of the agreement.

While all agreements used in this analysis are formal documents, some are binding (e.g. International Convention for the Conservation of Atlantic Tunas (ICCAT) while others are non-binding (e.g. the agreement establishing the Caribbean Regional Fisheries Mechanism). Non-binding agreements are indicative of a commitment to collaborate on the part of those signing the agreement.

- **Arrangement** refers to both the formal documentation and the institutional structures that have been put in place to implement an agreement.

On the basis of the above two definitions, all regional agreements such as regional fisheries conventions and Regional Seas Programme conventions are included, as are commissions, secretariats and coordinating bodies established to implement binding and non-binding multilateral agreements. Additionally, all other multilateral agreements that include all or a portion of an LME addressing specific fisheries (such as a particular species), marine-sources of pollution (such as oil spills) and biodiversity arrangements that

⁴ Input from knowledgeable experts on as many of the LMEs assessed as is possible within the project timeframe was solicited on the accuracy of the information and to identify any gaps in data collection.

are either general in nature or target the conservation and protection of specific species and their habitat, are included. Global arrangements that cover all LMEs are not included but provide a common context for regional arrangements.

- **‘Good’ versus ‘effective’ governance**

This assessment of governance arrangements for LMEs includes an evaluation of the extent to which the stages of the policy process are in place for each arrangement (level of completeness), whether opportunities exist to facilitate ecosystem-based management (level of integration) and whether or not countries are engaging in existing agreements that are put in place to address transboundary issues (level of engagement). This evaluation is based on criteria that are considered to reflect ‘good governance’. The criteria for good governance that are used to evaluate the policy processes for the arrangements are largely based on operational principles, such as transparency, accountability, participation, and efficiency that are considered desirable and that appear in the preambles to many multilateral environmental agreements. For example, having clearly specified processes and mechanisms across the different policy cycle stages (e.g. from data and information to analysis and advice to decision making to implementation, to monitoring and evaluation) is seen as likely to improve transparency, accountability, and ease with which stakeholders can engage with the process. Ultimately, these characteristics can be expected to produce better governance results, and are often cited as being desirable characteristics of governance processes, of value in their own right (Lemos and Agrawal, 2006; Lockwood et al. 2010). However, the state of governance research is such that it is not possible to conclude clearly that these characteristics are necessary for governance to be effective. As such, it must be emphasized that while the presence of policy processes that meet good governance criteria might be expected to result in better outcomes and impacts, the ultimate test of effective governance, a causal link between good governance processes and effective governance has not been demonstrated in the literature.

- **Policy Cycle** refers to the iterative process by which decision making is undertaken (Fanning et al. 2007). A generalized cycle includes the provision of relevant data and information that is then analyzed and allows advice to be fed to those making decisions. These decisions are then implemented, monitored and then evaluated to determine the level of success in addressing the problem for which the cycle was initiated.

Typically, the decision making process has a policy level stage where policy level advice and decisions are distinct from the operational or management level advice and decisions. As such, the assessment of the completeness of the policy cycle involves assessing seven stages of the policy cycle, two each for policy and operational level analysis and advice, two each for policy and operational level decision making, and a single stage for implementation, monitoring and evaluation and data and information

- **Risk** refers to the perceived level of the LME governance indicator to negatively affect processes leading to ‘good’ governance.

For this assessment, the three indicators of governance arrangements were assessed based on a percentage score (completeness and engagement indicators) or a decimal score ranging from 0 to 1 (integration). For comparison purposes, these scores were converted to correspond to five categories of risk ranging from very low, low, medium, high to very high. Given the generalized assumptions that the more complete governance processes are, the more countries are actively engaged in participating in agreements to address transboundary issues within the LME and the more integrated organizations involved in implementing these agreements are, the more likely processes that meet good governance criteria will be in place, the risk categories were inversely related to the scores attained. However, while the five risk categories from very high to very low risk were

assigned to assessed scores for each indicator ranging from very low (0-20%) to very high (80-100%), it is important to stress that the assigned risk category does not necessarily correspond to information on the level of degradation of the LME based on the governance arrangements in place. This is because the level of degradation and impact on the state of the LME reflect the performance of governance arrangements and, as has been clearly identified previously in this report, this study does not focus on assessing governance effectiveness but rather the structure or architecture of the governance arrangements to facilitate good governance. As such, caution must be exercised by the reader in ensuring any conclusions reached as a result of the assigned risk category is limited to those regarding good governance criteria and a recognition that governance assessment is necessarily context-driven.

- **Transboundary Issue** refers to an area of concern (e.g. over-exploitation of fish stocks, marine-based pollution or loss of biodiversity) that has been identified and documented as affecting more than one country within a given LME and which should be addressed by a clear and distinct policy process.

2.2 Assessment of system governance arrangements

Several steps are required to determine the governance arrangements in place for a particular water system (Table 1). The whole architecture is considered to be greater than the sum of its parts, especially for integration of governance at the transboundary level. This process, as summarized in Table 1, provides a picture of:

- The extent to which transboundary governance issues are covered, thereby allowing for gaps to be identified;
- the match between governance arrangements and issues;
- the extent to which arrangements extend outside the system;
- the extent to which issues are covered by multiple arrangements that could result in conflict; and,
- how well arrangements are clustered or integrated to make the best use of existing institutions and organizations.

The process is used to reduce the governance architecture for each system to a set of scores for completeness of arrangements for transboundary issues (see Table 2). The final outputs of the methodology are two indices (System architecture completeness index and System priority for intervention index). These will be derived from separate assessments of the issue specific arrangements as shown in Table 3. The assessment of completeness of an arrangement for an issue (Table 3) is based upon whether there are organizations with responsibility for the various stages of the policy cycle for that issue.

Table 1. Steps required to assess governance architecture in a system to be governed

Step	Key points
Identify system to be governed	Begin with a clear definition of the system to be governed. Geographical boundaries of the system and the countries involved in the transboundary system must be clearly identified. In the case of this assessment for the TWAP, the system to be governed is considered to be the entire LME.
Identify issues to be governed	In some IW systems such as LMEs, the issues will already have been identified through a TDA and may have been further explored through Causal Chain Analysis (CCA). Issues may have both a topical and a geographical component.

Identify arrangements for each issue	Determine the extent to which each issue is covered by an identifiable arrangement that is specific to the issue, whether formal or informal. The aim will be to evaluate the extent to which the arrangement comprises a complete policy cycle with the potential to function in three modes (Kooiman 2003): (1) The meta-mode (articulation of principles, visions and goals); (2) the institutional mode (agreed ways of doing things reflected in plans and organizations; and, (3) the operational mode. It also examines the extent to which these modes may operate at different scale levels within the same arrangement, hence the need for linkages within arrangements.
Identify clustering of arrangements within institutions	Examine the way that arrangements are clustered for operational purposes and/or share common institutions/organisations at different levels. Similar issues may be covered by similar arrangements. There may be efficiency in clustering these arrangements. Alternatively, clustering may occur at higher levels for policy setting or institutional efficiency, but be separated at lower levels.
Identify linkages	Identify actual and desirable linkages within and among arrangements and clusters.

Table 2. LME governance architecture – System summary

IW category:		Total number of countries:	System name:		Region:
Complete these columns then assess issues using the arrangements tables (Table 4)			After completing the arrangements tables, complete these columns		
Trans-boundary issue ¹	Number of countries involved ²	Collective importance for countries involved ³	Completeness of governance arrangement ⁴	Priority for intervention to improve governance ⁵	Observations ⁶
1					
2					
...n					
	System architecture completeness index ⁷ >>				<< System priority for intervention index ⁸

Notes for Table 2

¹**Issues:** For the assessment, the following categories of issues have been identified: Fisheries – HMS (highly migratory species), Fisheries – EEZ (within the exclusive economic zone), Fisheries – Specific (addressing specific species other than tunas), Fisheries – ABNJ (areas beyond national jurisdiction other than highly migratory species); Fisheries – EEZ/ABNJ (both within the EEZ and ABNJ); Pollution – MBS (marine-based sources); Pollution – LBS (land-based sources); Biodiversity – Specific (particular species), Biodiversity – General, Biodiversity – Habitat. Ideally, these issues should be identified and quantified in a TDA. If not, other documented sources and experts knowledgeable about the system may have to identify them.

²**Number of countries involved:** Indicates how many of the total number of countries are involved in the particular issue.

³**Collective importance for countries involved:** This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

⁴**Completeness of governance arrangement % (category):** The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table (see Table 3). This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

⁵**Priority for intervention to improve governance:** This priority is calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

⁶**Observations:** This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

⁷**System architecture completeness:** Average for issues.

⁸**System priority for intervention:** Average for issues.

The approaches to evaluating the arrangements may vary among systems and arrangements, ranging from highly expert judgment-based to being based on extensive desk-top analysis of multilateral agreements, protocols, institutional constitutions and other instruments, supported by sound science and knowledge of stakeholder opinion. This allows for considerable flexibility in approach within each system, but will also mean that the final summaries for the systems will be based on widely ranging degrees of analysis. For this reason, it is important that there be provision in the system for extensive annotation in foot or endnotes, so that the user can understand what went into each analysis.

Table 3. LME governance architecture – Summary for individual issue-specific arrangements

Arrangement:		Issue:			
Policy cycle stage (governance function) ¹	Responsible organisation or body ²	Scale level or levels ³	Completeness score ⁴	Other key organisations ⁵	Observations ⁶
Policy analysis and advice					
Policy decision-making					
Planning analysis and advice					
Planning decision-making					
Implementation					
Review and evaluation					
Data and information					
Overall total and % completeness ⁷ >>					
Notes for Table 3 ¹ Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the planning/management level. ² Responsible organisation or body: Organisation or organisations responsible for the function should be listed here ³ Scale level or levels: These are the institutional scale level or levels at which the function is performed (national, subregional, regional or LME wide level, supra-regional or larger than but inclusive of the LME) ⁴ Completeness: Rate on a scale of 0 – 3 based on the policy cycle stages scoring criteria (see Table 5) ⁵ Other key organisations: Identification of other organisations with a shared interest in the issue ⁶ Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation. ⁷ Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.					

2.2.1 Systems to be assessed

As management units, LMEs cover all of the world's coastal oceans and are designated based on the criteria of bathymetry, hydrography, productivity and trophically-dependent populations. Currently, 66 LMEs have been identified as illustrated in Figure 1. For the purposes of this assessment, the LMEs are categorised according to whether or not they have two or more coastal countries bordering the LME and whether or not at least one of the coastal countries is GEF-eligible⁵. LMEs in which one country had a marine domain of over 99% of the LME were treated as single country LMEs. As shown in Table 4, these four categories comprise: (a) 36 multi-country, GEF-eligible LMEs; (b) 14 multi-country, non-GEF-eligible LMEs; (c) 5 single country GEF-eligible LMEs; and (d) 11 single country non-GEF-eligible LMEs. Based

⁵The identification of GEF Eligible countries was derived from the drop down list of countries on the GEF website (see http://www.thegef.org/gef/gef_projects_funding). It includes Russia, China and Brazil which both contribute to and receive GEF funds.

on the TOR, the focus of this assessment is on those multi-country LMEs that are in category (a) and category (b).

Table 4. Breakdown of LMEs by GEF eligibility and number of countries

	Include GEF-eligible countries	No GEF-eligible countries
Multi-country LMEs	36 Agulhas -Somali Current, Arabian Sea, ATSEA-North Australian Shelf, Baltic Sea, Barents Sea, Bay of Bengal, Benguela Current, Black Sea, California Current, Canary Current, Caribbean Sea, Central Arctic Ocean , East Bering Sea, East China Sea, Guinea Current, Gulf of Mexico, Gulf of Thailand, Humboldt Current, Indonesian Sea, Mediterranean, Kuroshio Current, North Bering - Chukchi Sea, North Brazil Shelf, Oyashio Current, Pacific Central American Coastal, Pacific Warm Pool, Patagonian Shelf, Red Sea, Sea of Japan, Sea of Okhotsk, South Brazil Shelf, South China Sea, Southeast U.S. Continental Shelf, Sulu-Celebes Sea, West Bering Sea, Yellow Sea	14 Antarctica, Beaufort Sea, Canadian Eastern Arctic - West Greenland, Canadian High Arctic North Greenland Shelf, Celtic-Biscay Shelf, Faroe Plateau, Greenland Sea, Iberian Coastal, Iceland Shelf, Newfoundland-Labrador Shelf, North Sea, Northeast U.S. Continental Shelf, Norwegian Sea, Scotian Shelf
Single Country LMEs	5 East Brazil Shelf, East Siberian Shelf, Gulf of California, Laptev Sea, Kara Sea	11 Aleutian Islands, East Central Australian Shelf, Gulf of Alaska, Hudson Bay Complex, Insular Pacific Islands, New Zealand Shelf, Northeast Australian Shelf, Northwest Australian Shelf, Southeast Australian Shelf, Southwest Australian Shelf, West Central Australian Shelf

For all LMEs, data on the spatial extent of the area was collected in square kilometres as well as the breakdown of the LME in terms of the percent area covered by High Seas and each coastal country's maritime domain, based on the equidistant EEZ boundaries from marineregions.org . This division of the LME was important to identify not only the extent of the maritime domain of those coastal countries bordering the LME but also to capture those countries with a maritime domain that may not have a coast within the LME area. From a governance structure perspective, this information was considered potentially important as those countries lacking a shoreline within the LME could be potentially marginalized during the development and subsequent implementation of governance arrangements or alternatively, may choose to limit their level of commitment to arrangements affecting all or some of the transboundary issues affecting the well-being of the LME.

2.2.2 Identification and categorisation of issues

For each of the 50 multi-country LMEs, a number of sources were reviewed to identify key transboundary issues. Key among these were the relevant individual chapters from the UNEP Regional Seas Report and Studies No. 182, edited by Sherman and Hempel (2009) entitled "The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas", GEF documents such as any Project Documents (PRODOCs),

Transboundary Diagnostic Analyses (TDAs), Strategic Action Programmes (SAPs) and project terminal evaluations for those LMEs that have received GEF funding, Global International Waters Assessment (GIWA) regional reports, and LME specific reports. In addition, an array of primary and grey literature, websites and consultation with experts for individual LMEs were used to identify key transboundary issues. References used are provided in the individual reports for the 50 LMEs provided in a separate volume to this report.

In terms of the suite of transboundary issues identified as key areas of concern for LMEs, the following categories and associated subcategories were used to identify issues having direct relevance to pollution, fisheries, biodiversity and habitat modification in a given LME. These included five distinct subcategories for fisheries issues, two distinct subcategories for pollution issues and three distinct subcategories for biodiversity issues.

- Fisheries – HMS (highly migratory species)
- Fisheries – EEZ (within the exclusive economic zone)
- Fisheries –ABNJ – (in areas beyond national jurisdiction)
- Fisheries – EEZ-ABNJ (include both the EEZ and the area beyond national jurisdiction)
- Fisheries – Specific (specifically identified species)
- Pollution – MBS (marine-based sources)
- Pollution – LBS (land-based sources)
- Biodiversity – General
- Biodiversity – Habitat
- Biodiversity – Specific (particular species)

2.2.3 Identification of relevant LME arrangements

The approach taken to the assessment was to compile a database of all the transboundary arrangements relating to fisheries, pollution and biodiversity that could be found for the LMEs and to categorise them using the same categories discussed in section 2.1.2 to identify issues of concern. Given the encompassing nature of global arrangements, these were not duplicated for the LME Governance Arrangements Assessment since they were already captured in the similar governance assessment for ocean areas beyond national jurisdiction (ABNJ) and were not specific to any particular LME. Furthermore, any transboundary arrangement whose area of competence covered less than one percent of the LME was not included in the analysis.

Relevant agreements were sought in the literature and on the internet where several databases of international agreements can be found⁶. The process of identifying agreements was similar to that described in the Methodology section for the TWAP report entitled “Assessment of Governance Arrangements for Ocean Areas Beyond National Jurisdiction” (Mahon et al. in press). In fact, the agreements researched for the LME assessment and those for the ocean areas beyond national jurisdiction assessment form a common database. For each of the agreements included in the database, a variety of information was sought and compiled. The first part of each database record includes basic background information on the

⁶ e.g., ECOLEX <http://www.ecolex.org/start.php> , National University of Singapore <http://cil.nus.edu.sg/2009/cil-documents-database/> , University of Oslo, Faculty of Law, treaty database <http://www.jus.uio.no/english/services/library/treaties/>

agreement. The second part of the database record includes information aimed at evaluating the policy process that is intended to give effect to the agreement.

The primary sources for this information were the actual conventions and agreements, rules of procedure for the organizations and secretariats for the agreements, and organizational websites. Other documentation and websites were explored when all the desired information could not be found in these sources. The arrangements database includes those arrangements that were in effect as of March 31, 2014 for the identified transboundary issues. The database is in the form of an Excel spreadsheet with the key information in the cells. Comment boxes are used to record details, such as excerpts from agreements that are considered necessary context for what was included in the table cells.

2.2.4 Completeness scoring criteria for policy cycle stages

Scoring criteria were used to assign each identified arrangement relevant to an LME with a score for each of seven policy cycle stages for that agreement: (1) Provision of policy advice, (2), Policy decision-making, (3) Provision of management advice, (4) Management decision-making, (5) Management implementation, (6) Management review, and (7) Data and information management (Table 5).

In this assessment the advisory and decision-making stages of the policy cycle are each considered in two modes -- policy mode and management mode -- making a total of seven stages to be assessed. The provision of each of these policy cycle stages is considered to be an important component of the institutional arrangements needed for good governance (Fanning et al. 2007, Mahon et al. 2013). The scores in each case ranged from 0 to 3 and are intended to reflect the institutional strength of the arrangement for transboundary governance at that particular policy cycle stage. An overall policy cycle completeness score is derived from the sum of scores of the individual stages and expressed as a percentage.

Table 5. Scoring Criteria for Policy Cycle Stages for Each Arrangement

Policy Cycle Stage	Scoring Criteria
Advisory mechanism (policy and planning/management)	0 = No transboundary science policy mechanism, e.g. COP self advises ¹ 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process 3 = Science-policy interface clearly specified in the agreement
Decision-making (policy and planning/management)	0 = No decision-making mechanism ² 1 = Decisions are recommendations to countries 2 = Decisions are binding with the possibility for countries to opt out of complying 3 = Decisions are binding
Implementation	0 = Countries alone 1 = Countries supported by secretariat 2 = Countries and regional/global level support ³ 3 = Implemented through a coordinated regional/global mechanism ⁴
Review	0 = No review mechanism 1 = Countries review and self-report 2 = Agreed review of implementation at regime level 3 = Agreed compliance mechanism with repercussions
Data and information:	0 = No DI mechanism 1 = Countries provide DI which is used as is 2 = DI centrally coordinated, reviewed and shared ⁵ 3 = DI centrally managed and shared
Notes for Table 5 ¹ Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.	

² This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

³ This means support from regional programmes or partner organizations arranged via secretariat

⁴ For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

⁵ For both 2 and 3 scores, data are checked for quality and consistency. The difference is that for a score of 3, there is a centralised place where all the data can be found, whether as actual data or metadata.

2.2.5 Integration versus an integrating mechanism

The assessment of integration among the arrangement is based on the extent to which issue specific arrangements in a system share a responsible body at various policy cycle levels. This can be determined directly by comparing the arrangements summaries (Table 3). The integration score can thus range from zero where each arrangement has a totally separate set of responsible bodies, to one, where all arrangements share the same responsible bodies at every level. While the methodology provides for an overall level of integration among arrangements in the LME, there is no *a priori* criterion for the extent of clustering that would be considered optimal. However, one would expect that without considerable attention to linkages and interaction among arrangements, a score of zero would make it difficult to have an integrated approach within a system. At the other end of the scale, in a system with highly diverse issues, one would not normally expect to find them all covered by the same responsible bodies. One could posit that it would be desirable to have arrangements share common responsible organizations at policy setting levels, but that having different responsible organizations at technical and operational policy cycle stages could be more effective and even more flexible.

In addition to evaluating the level of clustering or integration among the stages of the policy cycle for the different issue specific arrangements, an assessment was made as to whether there was a demonstrated attempt by the countries in the region to develop and support an overarching integrating mechanism for the issues associated with fisheries, pollution and biodiversity in the LME. If such an integrating mechanism was present, this was noted and an integration score of one was assigned to the LME, regardless of the calculated score across all of the arrangements as it could be argued that the presence of such a mechanism would facilitate an integrated approach within the LME.

2.3 Country-level engagement in transboundary agreements

Two variables, the nature of the agreement (in terms of whether it is a non-binding agreement facilitating collaboration or one of a binding nature requiring formal approval by the country) and the level of engagement of member countries in these agreements were considered important aspects of LME governance. The nature of each agreement was obtained by reviewing the text of the agreement. To provide a measure of the actual level of country engagement in each transboundary agreement relevant to a given LME, the status of each country for each agreement was researched and the highest level of engagement possible for each agreement was assessed. For binding agreements, countries that have demonstrated the highest level of engagement possible through ratification, accession, approval or acceptance, were considered to be 'bound' by the agreement. For non-binding agreements, countries providing evidence of their intent to fully participate in such agreements were considered 'committed' to the agreement.

In some cases, the identification of the engagement status of a country in a particular agreement may reveal a situation in which the country's lack of involvement was not as a result of a lack of interest but rather a condition arising from the articles of the agreement that prevented it from becoming a member. While this is not expected to be a frequent occurrence,

it was deemed important to distinguish this situation from one in which the country was eligible to be engaged but chose not to do so.

2.4 'Fit' of agreements and geographical extent of issues

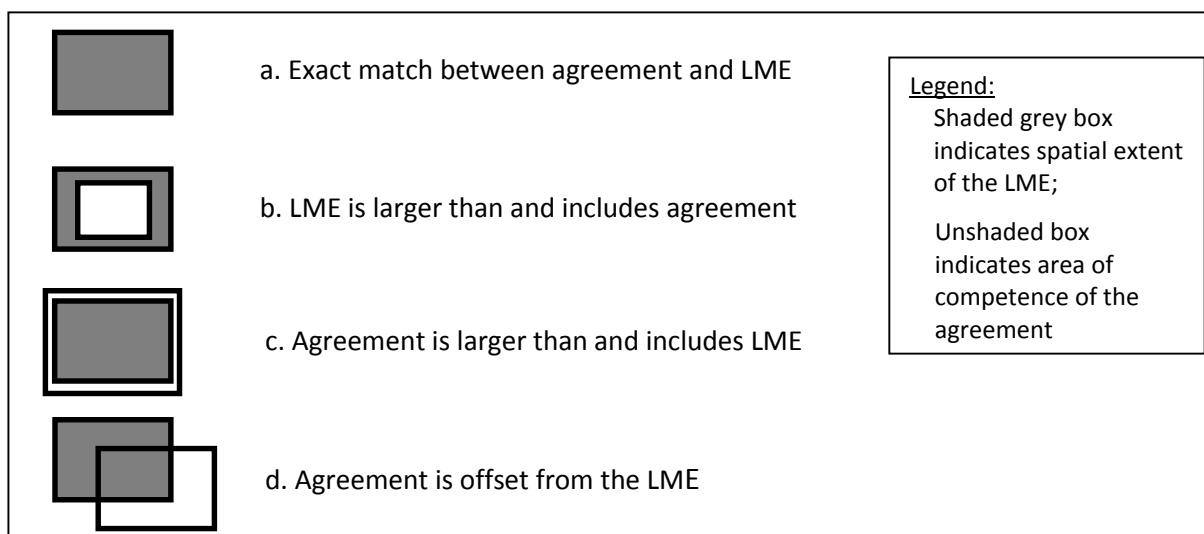
For large scale systems-to-be-governed such as LMEs, the 'fit' of area of competence of the transboundary agreement to the area of the issue is a primary governance architecture concern (Young 2002, Young et al. 2007). This is analysed for the LME governance assessment based on the response to the following question: Given the current assumption that the LME is an appropriate ecological entity for ocean management, how well do the agreements match the LME spatially? In the case of LMEs, this will depend largely on the areas of competence for the agreements.

For each of the agreements identified as relevant to a given issue in a particular LME, shape files are used to calculate the area of overlap between the LME and the agreement. In situations where the area of competence of the agreement covers less than one percent of the LME a decision was made to not include that agreement in the analysis for that LME.

For agreements whose area of competence include more than one percent of the LME, Figure 3 provides a simple summary of the four categories of 'fit' that can be encountered.

In the case of an exact match occurring, the agreement is referred to as 'LME' in scope. When the LME is larger than the agreement, the agreement is referred to as 'sub-LME' in scope. Agreements that extend beyond the geographic area of the LME, to cover similar issues in adjacent areas, as may be the case with some UNEP Regional Seas arrangements or some of the highly migratory fisheries arrangements are referred to as supra-LME. In such situations, there is the need to consider whether the larger agreement has a mechanism to deal with the governance issues at the appropriate lower geographic scale. Finally, an agreement that is offset from the LME, meaning that it cannot fully address it, is a special case of a supra-LME agreement since it extends beyond the boundaries of the LME but does not include the entire LME. The degree of offset can be a significant factor affecting governance. If it results in a missing country that is only a small part of the issue relative to the others, the issue may be well governed without its involvement, but the principle of inclusivity would be compromised. If, on the other hand, it results in one or a number of key countries in the LME being unable to fully participate in an agreement for a key transboundary issue in the LME, the architecture of the agreement may severely compromise governance effectiveness.

Figure 3. Range of possible 'fit' between the spatial boundary of the LME and any given agreement



The categories of 'fit' described above are simple governance structure indicators. They can be refined to reflect actual areas involved. This lack of 'fit' has been identified as a frequently occurring problem leading to dysfunctional governance (Young 2002, Young et al. 2007). Identification of a lack of appropriate 'fit' can lead to recommendations on how to remedy the situation if deemed necessary and provide a basis for a discussion of the problem.

2.5 Database analysis

The variables that were identified for data collection for this assessment of LME governance architecture that were either numeric or could be categorised were converted into an SPSS database for analysis. This facilitated the preparation of tabular and graphical summaries.

2.6 Spatial analyses

GIS shape files representing the area covered by each LME and the majority of identified transboundary agreements were acquired. These shape files were used to estimate the extent of spatial overlap for the regional arrangements. They were also used to develop a web-based interface where users can visually explore the spatial interrelationships among the arrangements, and see the extent of coverage of each LME by the agreements. Three additional areas that are not included in the GIS shape files of LMEs available from NOAA were used in the analysis. For the purposes of TWAP, the WPWP is defined as the WARM ocean province of Longhurst (1998) (Honey and Sherman 2013). Whereas Honey and Sherman (2013) argue that the WPWP is not an LME, GEF documents refer to it as one. For the Agulhas Somali Currents LME (ASCLME), two areas were included in the analysis. The first is the combined areas of these two LMEs, and the second is the more extensive Agulhas Somali Currents management area being used by the project. For the North Australian Shelf LME (NASLME), two areas were also considered, the area of the original LME, and the more extensive area of the Arafura Timor Seas (ATSEA) project.

3 Results

As noted above, the analysis for this report on LME Governance Arrangements focused on the 50 multi-country LMEs, their transboundary issues as relating to fisheries, pollution and biodiversity and the suite of governance arrangements currently in place to address these issues. The details of the analysis for each of the 50 LMEs are provided in a separate volume.

3.1 System identification and country membership

The identified 50 LMEs are located in 13 geographic regions of the globe, comprising some 152 distinct countries and range in membership from 2 to 26 countries (Table 6). In terms of the same country being a member in multiple LMEs, the United States, Denmark and Russia lead by each being members of some 10 different LMEs. The number of LMEs in each region ranged from one, primarily those regions in the Pacific, to 11 in the North Atlantic (East and West).

Although characterised as areas of coastal oceans, all but three of the 50 LMEs analysed include areas of High Seas⁷, with the exception of the Gulf of Thailand, Norwegian Sea and the Faroe Plateau. This is potentially significant from a governance arrangements perspective as the high seas are generally governed by a different set of rules from those governing the EEZs of coastal states. Table 6 also indicates the amount of High Seas area for each LME. While more than half of the LMEs have less than 2% of the area as High Seas, 13 of the LMEs

⁷ High Seas is the legal term for waters beyond the zones of national jurisdiction: parts of the sea that are not included in the EEZ, in the territorial sea or in the internal waters of a State, or in the archipelagic waters of an archipelagic State (UNEP, 2010).

have High Seas covering more than 10% with one, the Central Arctic LME, having 66% of its area as High Seas. In terms of actual area covered, the Pacific Warm Pool has the largest area under high seas with some 2.4 million km², amounting to approximately 19% of the LME. The potential to develop and support governance mechanisms for pollution, biodiversity and fisheries that consider both high seas and EEZ areas is a topic that warrants further investigation and is identified in the report on governance arrangements in areas beyond national jurisdiction (Mahon et al. in press).

Table 6. Breakdown of multi-country LMEs by countries and region

LME #	LME Name	Region (# of LMEs)	Countries comprising the LME	# of countries	Area of High Seas (km ²) (% of LME)
1	East Bering Sea	North Polar Region (10)	Russia, United States	2	171,317 (13.4%)
18	Canadian Eastern Arctic - West Greenland		Canada, Denmark	2	27,702 (2%)
19	Greenland Shelf		Denmark, Iceland, Norway	3	none
20	Barents Sea		Denmark, Norway, Russia	3	53,237 (2.9%)
53	West Bering Sea		Russia, United States	2	13,314 (1.8%)
54	Northern Bering – Chukchi Seas		Russia, United States	2	292,169 (21.9%)
55	Beaufort Sea		Canada, United States	2	144,613 (13.4%)
59	Iceland Shelf		Denmark, Iceland, Norway	3	1,467 (0.3%)
64	Central Arctic Ocean		Canada, Denmark (Greenland), Norway, Russia	4	2,285,594 (66%)
66	Canadian High Arctic North		Canada, Denmark	2	20,167 (3.5%)
61	Antarctica	Antarctic Region (1)	Not applicable		12,000 (0.4%)
7	Northeast U.S. Continental Shelf	North Atlantic (11)	Canada, United States	2	3,410 (1.1%)
8	Scotian Shelf		Canada, France	2	2,547 (0.9%)
9	Newfoundland-Labrador Shelf		Canada, France	2	113,274 (12.6%)
21	Norwegian Sea,		Denmark, Norway, Iceland, United Kingdom	4	230,720 (20.6%)
22	North Sea		Belgium, Denmark, France, Germany, Netherlands, Norway, Sweden, United Kingdom	8	1,378 (0.2%)
23	Baltic Sea		Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia, Sweden	9	2,683 (0.7%)
24	Celtic-Biscay Shelf		France, Ireland, United Kingdom	3	26,460 (3.5%)
25	Iberian Coastal		France, Portugal, Spain	3	604 (0.2%)
26	Mediterranean Sea		Albania, Algeria, Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Monaco, Morocco, Serbia-Montenegro, Slovenia,	21	6,227 (0.2%)

LME #	LME Name	Region (# of LMEs)	Countries comprising the LME	# of countries	Area of High Seas (km ²) (% of LME)
			Spain, Syria, Tunisia, Turkey, United Kingdom		
60	Faroe Plateau		Denmark, United Kingdom	2	none
62	Black Sea		Bulgaria, Georgia, Romania, Russia, Turkey, Ukraine	6	575 (0.1%)
5	Gulf of Mexico	West Central Atlantic (4)	Cuba, Mexico, United States	3	41,639 (2.7%)
6	South-East US Continental		Bahamas, United States	2	1,334 (0.5%)
12	Caribbean Sea		Antigua and Barbuda, Bahamas, Barbados, Belize, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, France, Grenada, Guatemala, Haiti, Honduras, Jamaica, Mexico, Netherlands, Nicaragua, Panama, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago, United Kingdom, United States, Venezuela	26	18,249 (0.6%)
17	North Brazil Shelf		Barbados, Brazil, France, Guyana, Suriname, Trinidad and Tobago, Venezuela	7	51,724 (4.9%)
27	Canary Current	South-East Atlantic (3)	Cape Verde, Gambia, Guinea-Bissau, Morocco, Mauritania, Portugal, Senegal, Spain,	8	6,084 (0.5%)
28	Guinea Current		Angola, Benin, Cameroon, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Liberia, Nigeria, Republique du Congo, Sao Tome and Principe, Senegal, Sierra Leone, Togo	17	213,888 (11.1%)
29	Benguela Current		Angola, Democratic Republic of the Congo, Namibia, South Africa	4	149,024 (10.2%)
14	Patagonian Shelf	South-West Atlantic (2)	Argentina, Uruguay, United Kingdom	3	21,126 (1.8%)
15	South Brazil Shelf		Brazil, Uruguay	2	2,732 (0.5%)
3	Californian Current	North-East Pacific (1)	Mexico, United States	2	671,711 (30.3%)
11	Pacific Central American Coast	East Central Pacific (1)	Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, México, Nicaragua, Panamá, Perú	10	22,888 (1.1%)
13	Humboldt Current	South-East Pacific (1)	Argentina, Chile, Peru	3	290,359 (11.3%)
48	Yellow Sea	West Pacific (5)	China, North Korea, South Korea	3	2,827 (06%)
49	Kuroshio Current		Japan, Philippines, Taiwan	3	34,000 (2.6%)
50	Sea of Japan		Japan, North Korea, Russia, South Korea,	4	378 (<0.1%)

LME #	LME Name	Region (# of LMEs)	Countries comprising the LME	# of countries	Area of High Seas (km ²) (% of LME)
51	Oyashio Current		Japan, Russia	2	10,557 (2%)
52	Sea of Okhotsk		Japan, Russia	2	38,618 (2.5%)
99	Pacific Warm Pool	Pacific Islands (1)	Fiji, France, Indonesia, Kiribati, Marshall Islands, Micronesia, Nauru, Tokelau, Palau, Papua-New Guinea, Philippines, Solomon Islands, Tonga, Tuvalu, United States, Vanuatu	16	2,406,982 (18.8%)
35	Gulf of Thailand	South-East Asia (6)	Cambodia, Malaysia, Thailand, Vietnam	4	none
36	South China Sea		Brunei-Darussalam, China, Indonesia, Malaysia, Philippines, Singapore, Taiwan, Vietnam	8	40,573 (1.3%)
37	Sulu-Celebes Sea		Indonesia, Malaysia, Philippines	3	10,679 (1%)
38	Indonesian Sea		Timor-Leste, Indonesia	2	20,705 (0.9%)
39	North Australian Shelf/Arafura-Timor Seas		Australia, Indonesia, Papua-New Guinea, Timor-Leste	4	6,444 (0.8%)
47	East China Sea		China, Japan, South Korea, Taiwan	4	4,074 (0.5%)
30	Agulhas-Somali Current	Indian Ocean (4)	Comoro Islands, France, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia, South Africa, Tanzania	10	142,274 (4.1%)
32	Arabian Sea		Bahrain, Djibouti, India, Iran, Iraq, Kuwait, Maldives, Oman, Pakistan, Qatar, Saudi Arabia, Somalia, United Arab Emirates, Yemen	14	1,245,574 (31.6%)
33	Red Sea		Djibouti, Egypt, Eritrea, Israel, Jordan, Saudi Arabia, Sudan, Yemen	8	3,549 (0.8%)
34	Bay of Bengal		Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka, Thailand	8	954,738 (25.9%)

3.2 Issues and arrangements identification

Using the 10 subcategories identified for the 3 categories of transboundary issues (fisheries, pollution and biodiversity), Table 7 provides a breakdown of the total number of issues for all LMEs.

A total of 359 transboundary issues requiring governance arrangements were identified across the 50 LMEs, covering the three categories of issues and their subcategories. Arrangements were in place for 347 issues. The 12 issues not addressed were related to pollution (both marine and land-based) and biodiversity.

Issues relating to both marine-based and land-based sources of pollution were the most prevalent identified for LMEs, with a total of 71 and 61 respectively and were present in all of the LMEs. The number of arrangements addressing these issues was 66 and 56 respectively,

with no identifiable transboundary arrangement for either land-based sources or marine-based sources of pollution in the California Current, Newfoundland and Labrador Shelf, Northeast United States, Scotian Shelf or South Brazil Shelf LMEs.

Each of the five LMEs lacking pollution arrangements has only two coastal countries. For the South Brazil Shelf LME, the Scotian Shelf LME, The Newfoundland and Labrador Shelf LME and the Northeast United States Continental Shelf LME, the majority of the maritime domain in the LME, sometimes as much as 99%, rests with one of the two countries. As such, it may be interpreted that pollution issues are dealt with by this country. This analysis suggests that while no further action may be necessary, the two countries involved should be made aware of this situation. In contrast, the two countries in the California Current LME have an array of non-governmental and multi-partnered organizations that work on pollution issues. While no identifiable transboundary agreement was found to prevent or address land-based or marine-based sources of pollution, the two countries have a long history of working together and in fact, each has an operational plan for mobilizing action to address marine spills once an incident has occurred in each other's EEZ that could potentially threaten the other's maritime and coastal environment.

In terms of transboundary fisheries issues, a total of 137 Issues were identified among the 50 LMEs, with 43 issues relating to highly migratory species (HMS - tunas and tuna-like species) being most prevalent. In total, these HMS issues were covered by five distinct and ratifiable conventions, namely the Convention on the Conservation of Southern Bluefin Tuna (CCSBT), Inter-American Tropical Tuna Convention (IATTC), International Convention for the Conservation of Atlantic Tuna (ICCAT), Indian Ocean Tuna Convention (IOTC) and the Western Central Pacific Tuna Convention (WCPTC). In terms of other fisheries related issues, 36 arrangements addressed EEZ fisheries, 34 were species-specific, 21 were straddling and 3 were concerned with fisheries in areas beyond national jurisdiction.

Some 88 arrangements governing aspects of biodiversity were identified for a total of 90 transboundary issues across the 50 LMEs. Two LMEs, the Canary Current and the East China Sea LMEs had no identifiable transboundary arrangement for addressing biodiversity concerns although they were identified as a transboundary issue for both LMEs. Among the biodiversity issues, 43 were species-specific concerns, 33 were of a general nature and 14 were habitat-related.

In terms of individual LMEs, the Greenland Sea LME led the way with some 13 transboundary issues identified as areas of concern, followed closely by the Barents Sea, Central Arctic Ocean, North Sea and the Bay of Bengal. The major concerns in the five LMEs focused on all three categories of issues, although the subcategory in the fisheries relating to ABNJ was absent in all of them. As well, habitat-specific concerns as a subcategory of biodiversity were absent in all of these LMEs except for the Bay of Bengal. Given the size of high seas in the Central Arctic, the lack of any arrangement for ABNJ fisheries could create a potential area of concern if fisheries activities increase in this region due to climate change effects. Likewise, given the almost one million km² of high seas in the Bay of Bengal, the absence of arrangements specifically dealing with fisheries in ABNJ, potentially points to a need by the countries in the LME to address this issue. At the other end of the spectrum, the Sea of Okhotsk LME in the West Pacific had only two transboundary issues identified, one each dealing with land-based and marine-based sources of pollution.

Table 7. Breakdown of transboundary issues across all multi-country LMEs

Region	LME	Issue										Total
		Biodiversity			Fisheries					Pollution		
		General	Habitat	Specific	ABNJ	EEZ	ABNJ-EEZ	HMS	Specific	LBS	MBS	
North Polar Region (10 LMEs)	East Bering Sea	1						1	3	1	1	7
	Canadian Eastern Arctic - West Greenland	1				1		1	2	1	1	7
	Greenland Shelf	2		1		1	1	1	2	2	3	13
	Barents Sea	2		2			1	1	1	2	2	11
	West Bering Sea	1		1						1	1	4
	Northern Bering – Chukchi Seas	1		1					1	1	1	5
	Beaufort Sea	1								1	1	3
	Iceland Shelf	2					1	1	2	2	2	10
	Central Arctic Ocean	2		2			1	1	1	2	2	11
	Canadian High Arctic North	2					1	1	2	2	2	10
Antarctic	Antarctica	1		1			1	1		2	2	8
North Atlantic (11 LMEs)	Northeast U.S. Continental Shelf						1	1	2	1	1	6
	Scotian Shelf					1		1	2	1	1	6
	Newfoundland-Labrador Shelf						1	1	2	1	1	6
	Nowegian Sea						1	1	2	2	2	8
	North Sea			1		1	1	1	2	2	3	11
	Baltic Sea	1		1					1	1	1	5
	Celtic-Biscay Shelf			1		1	1	1	2	1	2	9
	Iberian Coastal			1		1	1	1	2	1	2	9
	Mediterranean Sea	1	1				1	1		1	4	9
	Faroe Plateau						1	1	2	2	2	8
	Black Sea		1	1		1		1		1	1	6
West Central Atlantic (4 LMEs)	Gulf of Mexico		1	1		1	1	1		1	1	7
	South-East US Continental			1				1		1	1	4
	Caribbean Sea	1		1		3	1	1		1	1	9
	North Brazil Shelf	1		1		2	1	1		1	1	8
South-East Atlantic (3 LMEs)	Canary Current	2				2		1		1	1	7
	Guinea Current	1				2		1		1	1	6
	Benguela Current		1		1	1		1		1	1	6
South-West Atlantic (2 LMEs)	Patagonian Shelf		1	1		1		1	1	1	1	7
	South Brazil Shelf			1				1		1	1	4
North-East Pacific (1 LME)	Californian Current			1				1	2	1	1	6
East Central Pacific	Pacific Central American Coast		1	1		3		1		1	2	9

(1 LME)												
South-East Pacific (1 LME)	Humboldt Current	1		1	1	1		1		1	2	8
West Pacific (5 LMEs)	Yellow Sea	1	1			1				1	1	5
	Kuroshio Current							1		1	1	3
	Sea of Japan	1	1			1				1	1	5
	Oyashio Current					1				1	1	3
	Sea of Okhotsk									1	1	2
Pacific Islands (1 LME)	Pacific Warm Pool	1				1		1		1	1	5
South-East Asia (6 LMEs)	Gulf of Thailand		1	1		1		1		1	1	6
	South China Sea		1	1			1	1		1	1	6
	Sulu-Celebes Sea		1	1		1		1		1	1	6
	Indonesian Sea		1	1		1		2		1	1	7
	North Australian Shelf/Arafura-Timor Seas	1		1		1		1		1	1	6
	East China Sea	1				1		1		1	1	5
Indian Ocean (4 LMEs)	Agulhas-Somali Current	1		1	1	1		1		1	1	7
	Arabian Sea	2		1		1		1		2	2	9
	Red Sea	1		1				1		1	1	5
	Bay of Bengal		2	1			2	1		2	2	10
Total # of issues		33	14	43	3	36	21	43	34	61	71	359
Total # of arrangements in place		31	14	43	3	36	21	43	34	56	66	347

A summary figure showing the frequency distribution of the LMEs by number of issues is provided in Figure 4. This figure illustrates a typical normal distribution with the majority of the LMEs having six, seven or eight transboundary issues relating to fisheries, pollution and biodiversity and their subcategories. It also shows that every LME had at least two identified transboundary areas of concern and one with as many as thirteen.

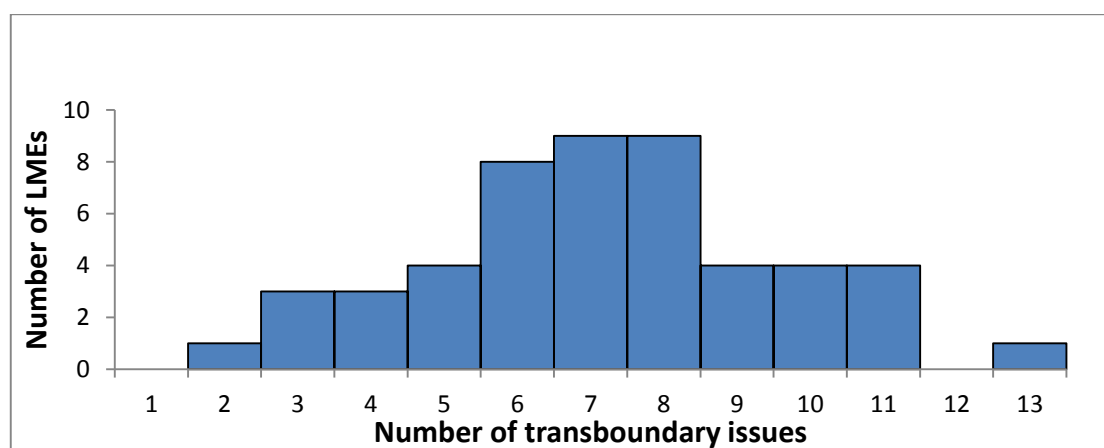


Figure 4. Frequency distribution of LMEs by number of transboundary issues

3.3 Assessment of arrangements

The assessment of the completeness level of the 347 arrangements in place for governing the 359 transboundary issues across all LMEs was analysed as follows:

- by individual LME

- by issues
- by regions
- by policy cycle stage scores
- by policy cycle stage levels

3.3.1 Assessment of completeness at LME level

The governance assessment conducted for each of the 50 LMEs provided an average of the overall level of completeness for all arrangements relevant to the three categories of transboundary issues and their subcategories that were in each LME. The frequency distribution of percent completeness by LMEs is depicted in Figure 5 and ranged from 20% to 90%.

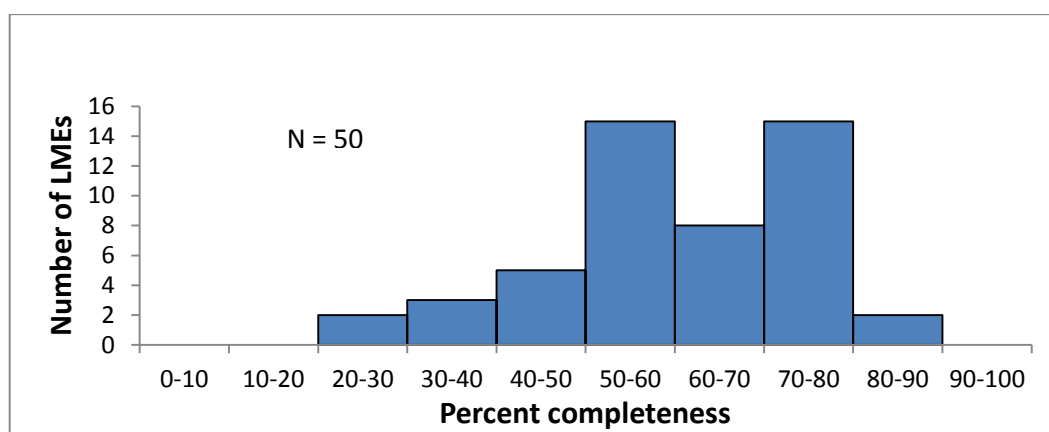


Figure 5. Frequency distribution of LMEs by average percent completeness of all arrangements in each LME

Table 8 provides the detailed list of each LME's overall completeness score based on averaging the completeness scores for all arrangements relevant to the transboundary issues for that LME and the perceived risk level associated with the assessed score.

The completeness indicator ranged from 0-100% (lowest level of completeness to highest completeness). The ranking of risk of the LMEs as illustrated in column 5 of Table 8 was based on a five level scale to indicate the potential need for intervention, based on the TWAP Level 1 Governance Assessment methodology and highlights a perceived level of risk:

Risk level and Ranking	Completeness Indicator Range
1 – Very low (VL)	80-100%
2 – Low (L)	60-80%
3 – Medium (M)	40-60%
4 – High (H)	20-40%
5 – Very High (VH)	0-20%

Table 8. Average completeness score and potential risk level for transboundary arrangements in LMEs

LME #	LME Name	# of Arrangements	Engagement (%)	Ranking of Risk	Level of Risk
50	Sea of Japan	5	30	H	4
51	Oyashio Current	3	30	H	4
48	Yellow Sea	5	33	H	4
15	South Brazil Shelf	4	36	H	4
52	Sea of Okhotsk	2	38	H	4
47	East China Sea	5	43	M	3
32	Arabian Sea	9	45	M	3
27	Canary Current	7	46	M	3
30	Agulhas -Somali Current	7	47	M	3
7	Northeast US Continental Shelf	6	49	M	3
3	California Current	6	50	M	3
9	Newfoundland-Labrador Shelf	6	50	M	3
8	Scotian Shelf	6	50	M	3
36	South China Sea	6	50	M	3
37	Sulu-Celebes Sea	6	50	M	3
35	Gulf of Thailand	6	50	M	3
34	Bay of Bengal	10	50	M	3
99	Pacific Warm Pool	5	51	M	3
39	North Australian Shelf	6	51	M	3
38	Indonesian Sea	7	52	M	3
33	Red Sea	5	52	M	3
28	Guinea Current	6	54	M	3
49	Kuroshio Current	3	56	M	3
17	North Brazil Shelf	8	58	M	3
5	Gulf of Mexico	7	58	M	3
12	Caribbean Sea	9	60	M	3
53	West Bering Sea	4	60	M	3
23	Baltic Sea	5	61	L	2
11	Pacific Central American Coastal	9	65	L	2
6	Southeast U.S. Continental Shelf	4	65	L	2
55	Beaufort Sea	3	67	L	2
13	Humboldt Current	8	68	L	2
54	North Bering - Chukchi Sea	5	69	L	2
61	Antarctica	8	70	L	2
1	East Bering Sea	7	70	L	2
18	Canadian Eastern Arctic - West Greenland	7	72	L	2
22	North Sea	11	73	L	2
64	Central Arctic Ocean	11	73	L	2
25	Iberian Coastal	9	74	L	2
24	Celtic-Biscay Shelf	9	74	L	2
20	Barents Sea	11	74	L	2
19	Greenland Sea	13	74	L	2
21	Norwegian Sea	8	76	L	2
60	Faroe Plateau	8	77	L	2
62	Black Sea	6	77	L	2
66	Canadian High Arctic North Greenland Shelf	10	77	L	2
26	Mediterranean	9	78	L	2
59	Iceland Shelf	10	78	L	2
29	Benguela Current	6	80	L	2
14	Patagonian Shelf	7	82	VL	1

As noted earlier in the explanation of terminology, risk, as used in this assessment of completeness, refers to the perceived level of the indicator to negatively affect the practice of good governance, characterised by processes that support such principles as inclusivity, transparency, efficiency, adaptive management, accountability, etc. The interpretation of the assessed level of completeness of the seven stages of the policy cycle for each arrangement in the LME into a perceived level of risk to governance must be limited to one addressing the presence of these characteristics of good governance. The completeness scores and the corresponding inverse risk level cannot be used to inform whether or not the governance arrangements within a given LME are having a direct effect on the achievement of stated outcomes for governance (such as changing behaviour that alters the state of degradation of the LME). This requires the assessment of governance effectiveness which has not been undertaken in this assessment.

An immediate observation from the table is that all of the LMEs in the two polar regions score a low ranking of perceived risk for completeness for all of the arrangements in place in the region to address transboundary areas of concern relating to fisheries, pollution and biodiversity, followed closely by the LMEs in the North Atlantic. Similarly, the table highlights that all of the LMEs in Southeast Asia and the Indian Ocean received a medium ranking. The LMEs with the lowest estimated level of risk due to the completeness assessment was found in the Southwest Atlantic (Patagonian Shelf LME). In contrast, four of five LMEs in the Western Pacific received a low completeness score and hence were assessed as having a high level of risk associated with this indicator.

The overall comparison of level of completeness with assessed scores and corresponding level of perceived risk for the 50 LMEs, identified by LME number, is illustrated in Figure 6. The figure shows the global distribution across the assessed LMEs with one LME being assessed as having a very low level of risk for completeness, 22 LMEs scoring low level of risk, 22 LMEs scoring medium and five LMEs assessed as having a high level of risk. None of the LMEs were found to have a very high level of risk. The overall global average for the completeness score for the 50 LMEs that were assessed was 59%, corresponding to a ranking of Medium, suggesting considerable room for improvement in the design of arrangements in terms of the completeness of the stages of the policy cycle to address key transboundary areas of concern.

3.3.2 Assessment of completeness by issues

The level of completeness for the arrangements addressing each of the 359 issues was further analysed based on their ability to address the specific suite of transboundary issues that were identified for the LMEs.

3.3.2.1 *The issue category level*

Figure 7 illustrates the range in completeness by number of arrangements at the level of each of three categories of transboundary issues, namely fisheries, pollution and biodiversity. Fisheries arrangements accounted for 137 of the 359 issues and showed the highest level of completeness.

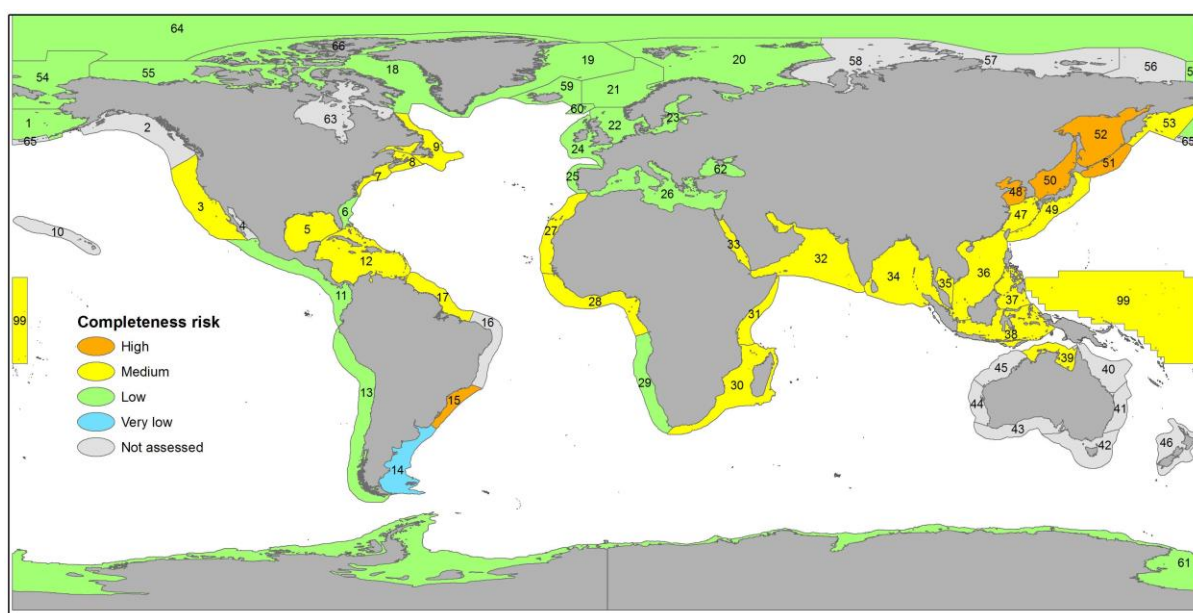


Figure 6. Global distribution of levels of completeness and perceived risk for 50 multi-country LMEs.

Arrangements aimed at addressing pollution issues at the transboundary level, regardless of which of the two subcategories they applied to, showed the second highest level of completeness. As mentioned earlier, 5 LMEs accounted for 10 of the 132 pollution issues but had no formal transboundary arrangements in place for addressing them.

As a general observation, the biodiversity related arrangements showed the lowest level of completeness. As was the case for pollution, there were also LMEs with no formal transboundary arrangements in place for addressing general biodiversity concerns. As such, only 88 arrangements were identified for addressing the 90 issues relating to biodiversity in the 50 LMEs.

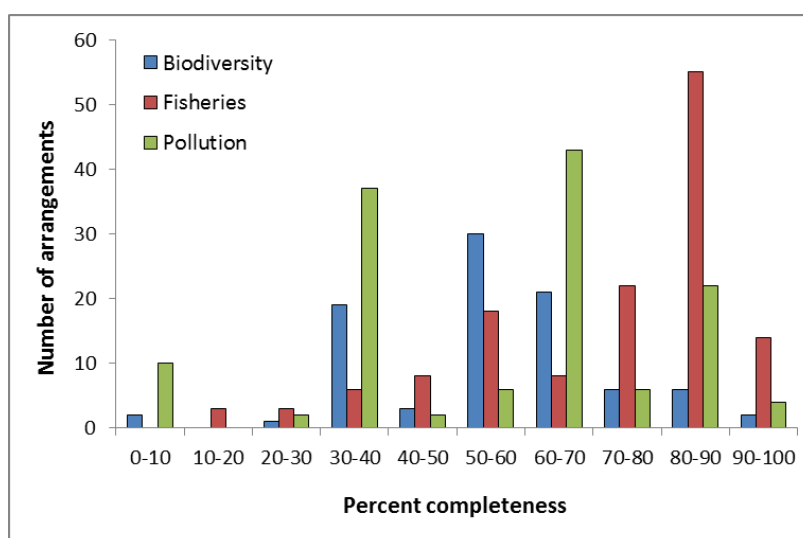


Figure 7. Completeness distribution of fisheries, pollution and biodiversity arrangements across all LMEs

3.3.2.2 The subcategory level

The data were further probed to assess whether particular subcategories of the three categories of issues shown in Figure 7 had any influence on the level of completeness found for the arrangement. The results of this analysis are represented by the 'Box and Whiskers' plot in Figure 8. As illustrated by Figure 8, the 43 arrangements relating to the highly migratory species (HMS) subcategory showed the highest level of overall completeness with a range of 67% to 90% and a median of 86%, indicating more than half of the arrangements had a completeness score between 86% and 90%. While the 34 arrangements for the fisheries specific subcategory showed a wider range from 57% to 95%, the median was much lower than for highly migratory species at 66%, indicating a greater range in level of completeness for the agreements in the upper two quartiles. The 36 arrangements relating to transboundary fisheries within the EEZs of countries showed the greatest diversity among all of the fisheries issue subcategories in terms of level of completeness, ranging from 14% to 95%, with a median of 71%.

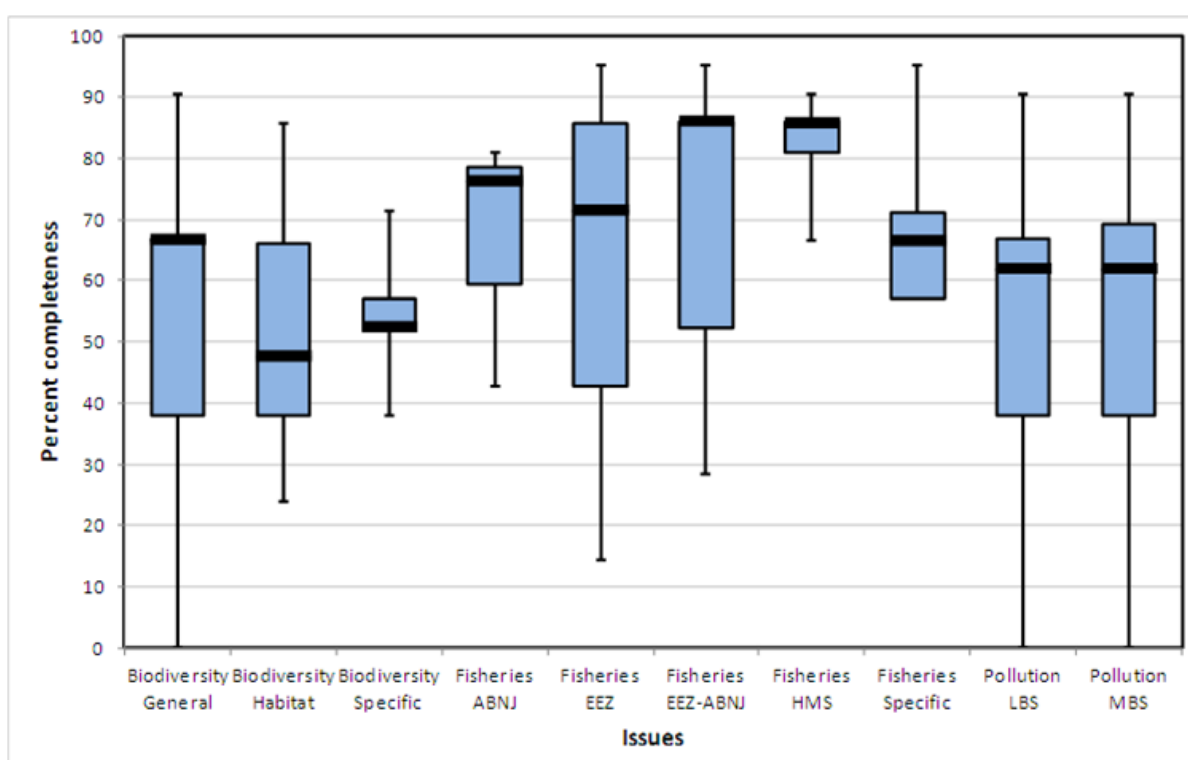


Figure 8. 'Box and Whiskers' plot showing range and median of percent completeness of arrangements for each of the 10 subcategories of issues. (The 'whiskers' define the range of completeness level for arrangements in each subcategory while the blue highlighted 'box' shows the median as represented by the black line, separating the second and third quartiles.)

In terms of the arrangements in place for addressing the 71 LBS and 61 MBS pollution agreements, the plot shows a similar spread in overall level of completeness from 0% to 90% as well as between the 2nd and 3rd quartiles for these arrangements. With similar medians as well at 62%, there was essentially no difference in terms of level of completeness of policy cycles for arrangements in place to address land-based sources of pollution as compared to marine-based pollution. The plot also highlights the already mentioned point that there were situations in which no arrangements were present in LMEs to address land-based sources of pollution and marine-based sources of pollution.

In contrast to the pollution arrangements, there are considerable differences among the three biodiversity subcategories (general, habitat and specific). For the 33 general issues,

completeness ranged from 0%-90% with a median of 67%, indicating half of the arrangements had completeness levels between 68% and 90%. For both the habitat and the specific arrangements, the medians were approximately the same at 48% and 52% respectively. However, the range for the 14 habitat arrangements was considerably wider at 24% to 86%, as compared to the range for the 43 specific arrangements between 38% and 71% completeness. A distinctive feature of the specific subcategory was the aggregation of the level of completeness for arrangements in the 2nd and 3rd quartiles around the median. As for pollution, it is also worth noting that the plot highlights situations in which no arrangements were present in LMEs to address biodiversity (general).

3.3.3 Assessment of completeness by regions

As with the assessment of completeness by subcategories of issues discussed in section 3.3.2.2, a 'Box and Whiskers' plot was used to assess the level of completeness of arrangements for LMEs within 13 geographic regions (Figure 9). Table 7 in section 3.2 of this report provides the identification of the LMEs in each region as well as the types of issues present in each LME in each region.

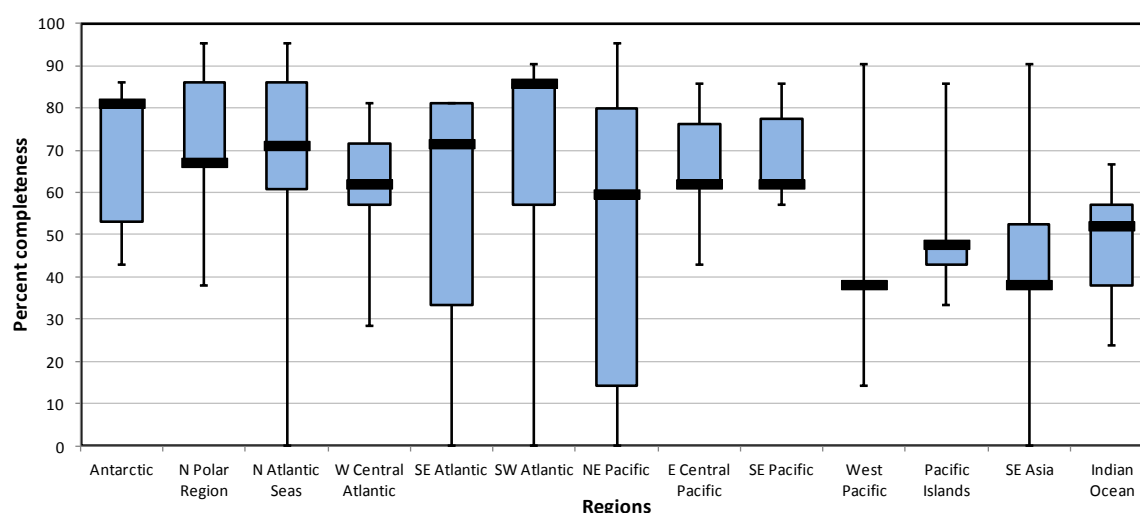


Figure 9. 'Box and Whiskers' plot showing range and median of completeness of arrangements in percent for each of the 10 subcategories of issues for LMEs grouped into geographic regions. (The 'whiskers' define the range of completeness level for arrangements in each subcategory while the blue highlighted 'box' shows the median as represented by the black line, separating the second and third quartiles.

A scan of the plot suggests that for arrangements relevant to transboundary issues within the West Pacific and Pacific Islands regions, the level of completeness tends to be similar, with arrangement scores in the 2nd and 3rd quartiles clustering around the median. In contrast, the arrangements relevant to the North-East Pacific and the North Atlantic show the greatest diversity as well as not having arrangements in place to address at least one category of transboundary issues since the completeness range extends 0% to 95%. A similar situation arises for the set of arrangements in the South-East Atlantic with the exception that the highest level of completeness only reaches 81% with limited diversity in the agreement scores in the 3rd and 4th quartile.

Arrangements relevant to the North Polar, East Central Pacific, South-East Pacific and South-East Asia Regions all have scores in the 2nd quartile clustering close to the median with a diversity of scores comprising the 3rd quartile. In contrast, the arrangements in the Antarctic and South-West Atlantic show the reverse with 3rd quartile scores clustering around the median, with a diversity of scores for arrangements in the 2nd quartile.

From a governance assessment perspective, the 'Box and Whiskers' plot highlights the potential priority areas for intervention based on both existing arrangements whose completeness scores indicate a possible need for attention as well as those issue areas that lack arrangements. The absence of arrangements addressing key transboundary issues that were identified in the documentation analyzed were noted in 5 of the 13 geographic regions (South-East Atlantic, South-West Atlantic, North Atlantic, North-East Pacific and South-East Asia), pointing to potential areas that may have an even greater priority for intervention in LME-level governance. It is also important to recognize that there may also be situations where transboundary issues exist but are not documented and as such, the gaps in governance arrangements may be even larger.

3.3.4 Assessment of completeness of policy cycle stage scores

The analysis of policy cycle scores by issue shows some differences in strength among the issues (Figures 10a - g). For both the policy and management advice stages (Figures 10a and 10c), the distribution of scores appears similar among issues, although these stages of the policy cycles score a bit higher for fisheries and pollution than for biodiversity. This may be due to the number of regionally-enforced agreements for fisheries and pollution that have a clearly defined science-policy mechanism as compared to biodiversity mechanisms in which the science-policy interface is identifiable but generally not specified in the agreement.

For decision-making (Figures 10b and 10d), fisheries arrangements clearly scored highest, whereas decisions made for pollution are primarily recommendations for contracting parties and biodiversity mechanisms were mostly either recommendations or decisions that contracting parties could choose to opt out of. In contrast, 56% of the fisheries arrangements had no involvement in implementation which is predominantly at the level of contracting parties, scoring the lowest among the three categories of issues for this stage (Figure 10e). However, while biodiversity and pollution arrangements were considerably more likely to have secretariat support (score of 1), in terms of regional level assistance for implementation, fisheries arrangements did score a full 10% more than biodiversity arrangements and 5% more than pollution arrangements, even with the latter's expected assistance from Regional Seas Programmes. The high number of fisheries arrangements with a score of two is attributed to the regional-level support in place for highly migratory and ABNJ species.

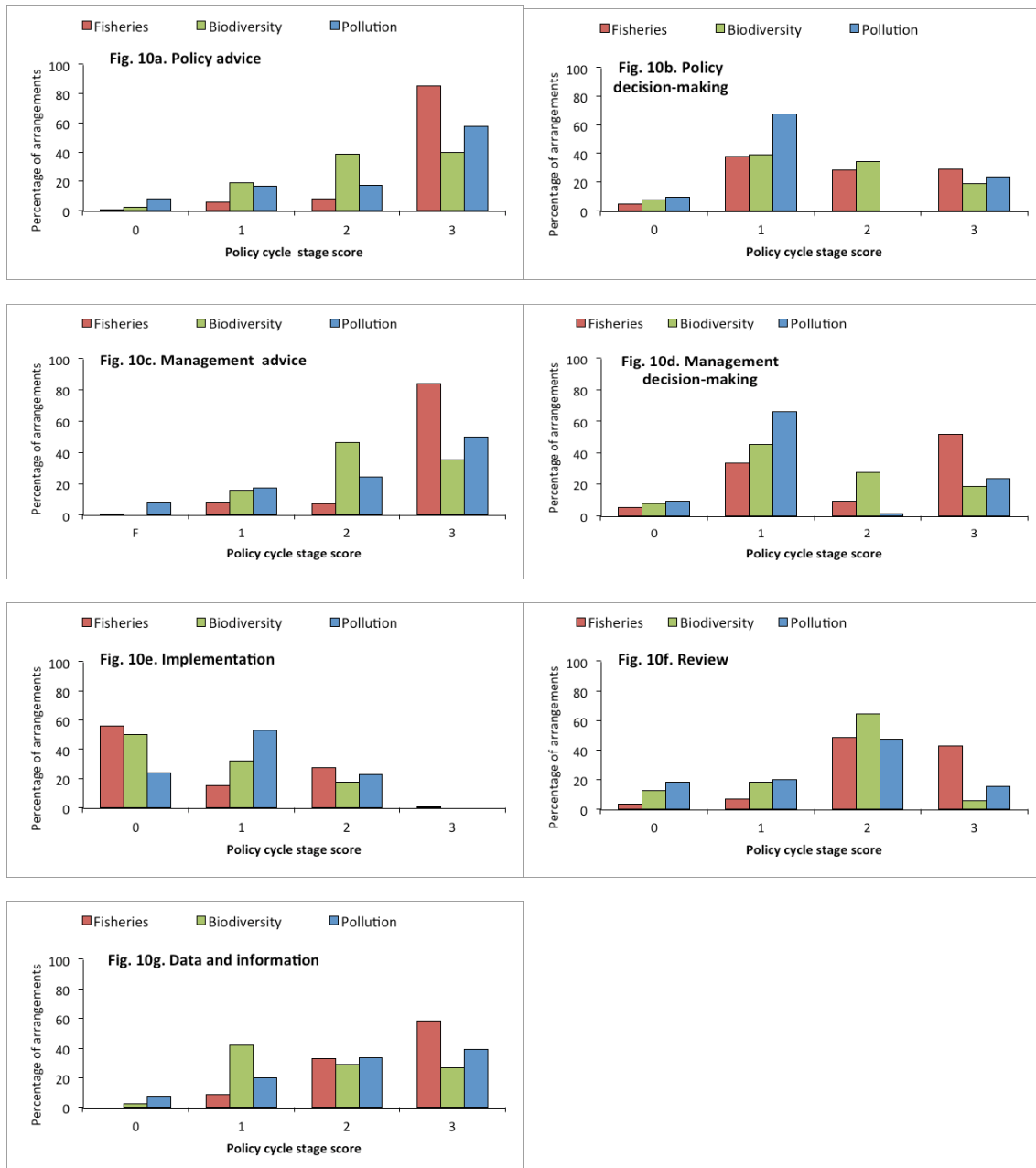


Figure 10. The distribution of scores for each of the seven policy cycle stages for arrangements addressing fisheries, pollution, and biodiversity across all LMEs. (See Table5 for the scoring criteria).

The distribution of scores for review mechanisms at the regional level shows that the majority of the arrangements, regardless of issues, have regional review (score of 2) included in the agreements, but few pollution and biodiversity arrangements have review mechanisms with built-in repercussions for non-compliance (score of 3) (Figure 10f). In contrast, almost half of the fisheries agreements specified fisheries data and information mechanisms that included centralised review and checking of the data prior to distribution for use by contracting parties. This allowed for the highest scores to be obtained for these arrangements, probably because for transboundary stocks, there is the need to bring data together into a single dataset if meaningful analysis is to be carried out.

Biodiversity and pollution arrangements displayed the full array of mechanisms from no data and information requirements all the way through to a small fraction of the arrangements

requiring data and information to be centrally collected and managed (Figure 10g). However, national reporting and compilation of national reports to be used without additional quality control at the regional level appeared to predominate among the arrangements for biodiversity issues while the majority of fisheries and pollution agreements focus on regional level review. This is likely due to the accepted inherent transboundary nature of the pollution and fisheries whereas data and information for biodiversity issues, particularly habitat-related, may be perceived as more likely to be dealt with at a national level.

The differences among policy cycle stages and issues shown in Figure 10 are thought to provide insight into where attention should be focussed in order to promote good governance. For fisheries, attention to collaboration in implementation of measures is clearly needed. For pollution the analysis points to the need for strengthening agreement in the area of accountability since few of these arrangements have any repercussions associated with lack of compliance. For biodiversity, the high proportions of agreements show both limited accountability requirements and the lack of regional data and information, posing a serious shortcoming to addressing this issue at the LME level.

3.3.5 Assessment of policy cycle stage levels

The analysis conducted to identify the jurisdictional level(s) at which different stages of the policy cycle occur was based on the concept that nesting and interplay are often closely connected with particular stages of the policy cycles. As discussed by Fanning et al. (2013) for the Caribbean LME, linkages within and between different stages of the policy cycle are critical components of an effective marine resource governance system.

This analysis focuses on the seven stages of the policy cycle in which policy level advice and decision-making stages are distinguished from the planning or management level stages of advice and decision-making. It illustrates the current diversity and jurisdictional levels of involvement by organisations at the national, sub-LME (comprising only a portion of the LME), LME-wide and supra-LME (larger than but inclusive of the LME) levels, or any combination thereof⁸, at each stage of the policy cycle for all arrangements relevant to the fisheries, biodiversity and pollution transboundary issues in the LMEs (Figures 11a-g).⁹

For both the policy advice stage (Figure 11a) and the planning advice stage (Figure 11c), the levels of institutional involvement of the organizations were very similar. Overwhelmingly, supra-LME and LME level organisations accounted for policy advice and planning advice in almost 90% of all arrangements. However, a noticeable increase from two percent to six percent in the joint participation of national and supra-LME level organizations in providing advice at the planning level was observed. This suggests a possible growing interest in national players to interact with supra-LME organizations at the operational advice stage of the policy cycle for some of the arrangements.

⁸ A total of nine combinations were identified by reviewing the arrangements. These were as follows: (i) national; (ii) national and sub-LME levels; (iii) sub-LME level; (iv) national and LME levels; (v) LME level; (vi) national and supra-LME levels; (vii) national, sub-LME and supra-LME levels; (viii) LME and supra-LME levels; (ix) supra-LME level.

⁹ While each pie chart in the figure includes all nine combinations of jurisdictional levels in the legend, those with a 0% score were not included.

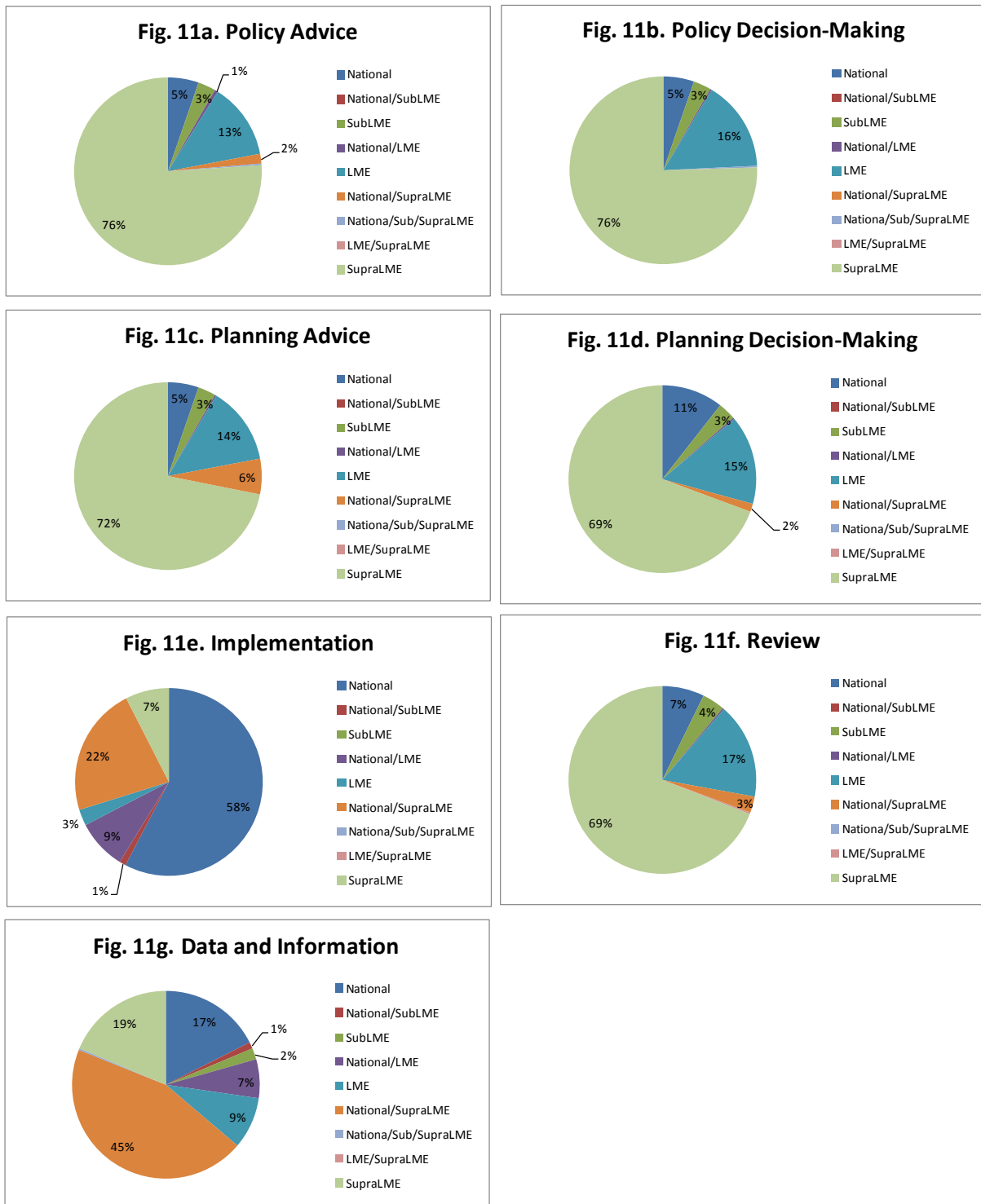


Figure 11. Jurisdictional level of organizations involved in the seven stages of the policy cycle for arrangements addressing fisheries, biodiversity and pollution transboundary issues in multi-country LMEs.

In terms of decision-making, a similar pattern of involvement is seen across the institutional levels for both policy level and planning level decisions, with the supra-LME and LME-level organizations taking the lead (Figures 11b and 11d). However, not surprisingly, the percent of involvement of national level institutions in planning type decisions increased to 11% as compared to the 5% involvement at the policy level decision-making stage. This increase is

consistent with the increased level of involvement observed by national players in analysis and advice for planning.

Figure 11e shows the dominance at the national level for organizations involved in implementation across all arrangements identified to address transboundary areas of concern. This is expected but is in stark contrast to the results obtained for the review stage of the policy cycle where the level of involvement drops off to a mere seven percent and organizations at institutional levels above the national level account for 89% of the involvement in the review stage (Figure 11f). This is an interesting finding from a governance perspective as it highlights the importance of a bi-directional, nestedness approach that connects institutions for implementation with those involved in review. In its absence, countries that assume the responsibility for implementation may not be seeing themselves accountable for reviewing how well they are doing in terms of implementation.

For the data and information stage of the policy cycle, all possible combinations of institutional levels are present with the national, LME and supra-LME levels playing the most significant roles (Figure 11g). This is very promising from a governance perspective as it suggests that almost all holders of data and information, irrespective of their institutional level, are contributing to this stage of the policy cycle. It also speaks to the level of integration across institutional levels that have been observed empirically at this stage of the policy cycle. The challenge remains to determine if such cooperation and collaboration across institutional levels are necessary at each stage of the policy cycle and if so, how it can be achieved.

3.4 Integration of Governance Arrangements across LMEs

A score for the level of integration across all of the arrangements within an LME that address the identified transboundary issues was arrived at by a two-step process. The integration score for any LME ranged between 0 and 1.0 (Figure 12). The first step was to determine whether there was a demonstrated attempt by the countries in the region to develop and support an overarching integrating mechanism for the issues associated with fisheries, pollution and biodiversity in the LME. If so, the LME was given a score of 1 for integration. If not, the second step was to assess the degree of integration across all of the arrangements within the LME based on the extent to which the arrangements had common responsible organizations.

At the first step, an integration score of 1.0 was given to 14 LMEs in which an integration mechanism could be identified. This was most noticeable for the six LMEs located primarily beyond the Arctic Circle in the North Polar Region where the Arctic Council was assessed as serving the role of an overarching integrated mechanism. It was also noticed in Antarctica, with the Antarctic Treaty System, in the Benguela Current LME with its Commission and the Humboldt Current LMNE in which the Permanent Commission for the South Pacific connects the work of the Lima Convention with that of the living marine resources Convention and its action plan. Integrating mechanisms were also found in the Mediterranean Sea LME with its Mediterranean Commission for Sustainable Development, in the LMEs whose countries are in the European Union and the Pacific Warm Pool with its Pacific Islands Forum and Council of Regional Organisations of the Pacific.

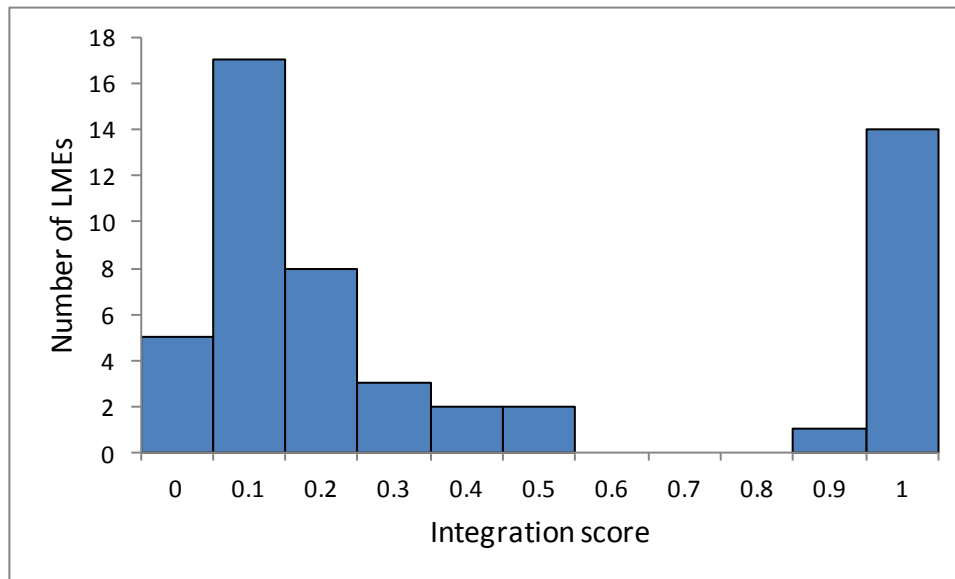


Figure 12. Distribution of integration scores across LMEs based on scoring of individual arrangements

Table 9 provides a list of each LME's overall final integration score based on an overarching integrating mechanism being present. The converting of integration scores into a five-category ranking of risk from very low to very high was based on the same assumptions as that made earlier for the completeness indicator. As such, the scores and the corresponding inverse risk level cannot be used to inform on the effectiveness of governance but only whether or not characteristics of good governance, specifically the principles of integration, collaboration and efficiency, were present among the arrangements. The global distribution of LMEs based on integration showed 14 LMEs as being in the highest category of integration, corresponding to being assessed as having a very low level of risk, two with a medium level, three with a high risk ranking and the remaining 31 as having the highest level of risk based on extremely low integration scores across the organizations in place to address fisheries, biodiversity and pollution issues at the transboundary level.

Ranking of the LMEs as illustrated in Table 9 was assessed on a five level scale to indicate the potential need for intervention, based on the TWAP Level 1 Governance Assessment methodology and a perceived level of risk:

Risk level and Ranking	Integration Indicator Range
1 – Very low (VL)	0.80-1.0
2 – Low (L)	0.6 -0.8
3 – Medium (M)	0.4-0.6
4 – High (H)	0.2-0.4
5 – Very High (VH)	0.0-0.2

Table 9. Average integration score and potential risk level for transboundary arrangements in LMEs

LME #	LME Name	# of Arrange-ments	Integration (%)	Ranking of Risk	Level of Risk
15	South Brazil Shelf	4	0	VH	5
7	Northeast US Continental Shelf	6	0	VH	5
3	California Current	6	0	VH	5
9	Newfoundland-Labrador Shelf	6	0	VH	5
8	Scotian Shelf	6	0	VH	5
47	East China Sea	5	0.1	VH	5
32	Arabian Sea	9	0.1	VH	5
30	Agulhas -Somali Current	7	0.1	VH	5
36	South China Sea	6	0.1	VH	5
37	Sulu-Celebes Sea	6	0.1	VH	5
35	Gulf of Thailand	6	0.1	VH	5
34	Bay of Bengal	10	0.1	VH	5
39	North Australian Shelf	6	0.1	VH	5
38	Indonesian Sea	7	0.1	VH	5
23	Baltic Sea	5	0.1	VH	5
11	Pacific Central American Coastal	9	0.1	VH	5
1	East Bering Sea	7	0.1	VH	5
22	North Sea	11	0.1	VH	5
20	Barents Sea	11	0.1	VH	5
19	Greenland Sea	13	0.1	VH	5
21	Norwegian Sea	8	0.1	VH	5
62	Black Sea	6	0.1	VH	5
59	Iceland Shelf	10	0.1	VH	5
27	Canary Current	7	0.2	VH	5
33	Red Sea	5	0.2	VH	5
28	Guinea Current	6	0.2	VH	5
17	North Brazil Shelf	8	0.2	VH	5
5	Gulf of Mexico	7	0.2	VH	5
12	Caribbean Sea	9	0.2	VH	5
6	Southeast U.S. Continental Shelf	4	0.2	VH	5
14	Patagonian Shelf	7	0.2	VH	5
51	Oyashio Current	3	0.3	H	4
49	Kuroshio Current	3	0.3	H	4
53	West Bering Sea	4	0.3	H	4
50	Sea of Japan	5	0.5	M	3
48	Yellow Sea	5	0.5	M	3
52	Sea of Okhotsk	2	0.9	VL	1
99	Pacific Warm Pool	5	1	VL	1
55	Beaufort Sea	3	1	VL	1
13	Humboldt Current	8	1	VL	1
54	North Bering - Chukchi Sea	5	1	VL	1
61	Antarctica	8	1	VL	1
18	Canadian Eastern Arctic - West Greenland	7	1	VL	1
64	Central Arctic Ocean	11	1	VL	1
25	Iberian Coastal	9	1	VL	1
24	Celtic-Biscay Shelf	9	1	VL	1
60	Faroe Plateau	8	1	VL	1
66	Canadian High Arctic North Greenland Shelf	10	1	VL	1
26	Mediterranean	9	1	VL	1
29	Benguela Current	6	1	VL	1

Figure 13 shows the global comparison of the assessed integration scores and perceived level of risk for each of the 50 LMEs, based on collaboration across organizations involved in arrangements addressing transboundary issues in each LME.

It is important to stress that the assessment of integration focused on linkages between organizations in place to address agreements relating to transboundary areas of concern. As such, LMEs in which a single country has marine jurisdiction over the majority of the LME and is addressing these concerns at the national level will score low in terms of integration. This suggests that caution must be used in assuming that a very high or high risk ranking necessitates immediate intervention. Rather, its value is in providing a flag to probe the absence of these linkages further so as to understand the context for the assessed integration score.

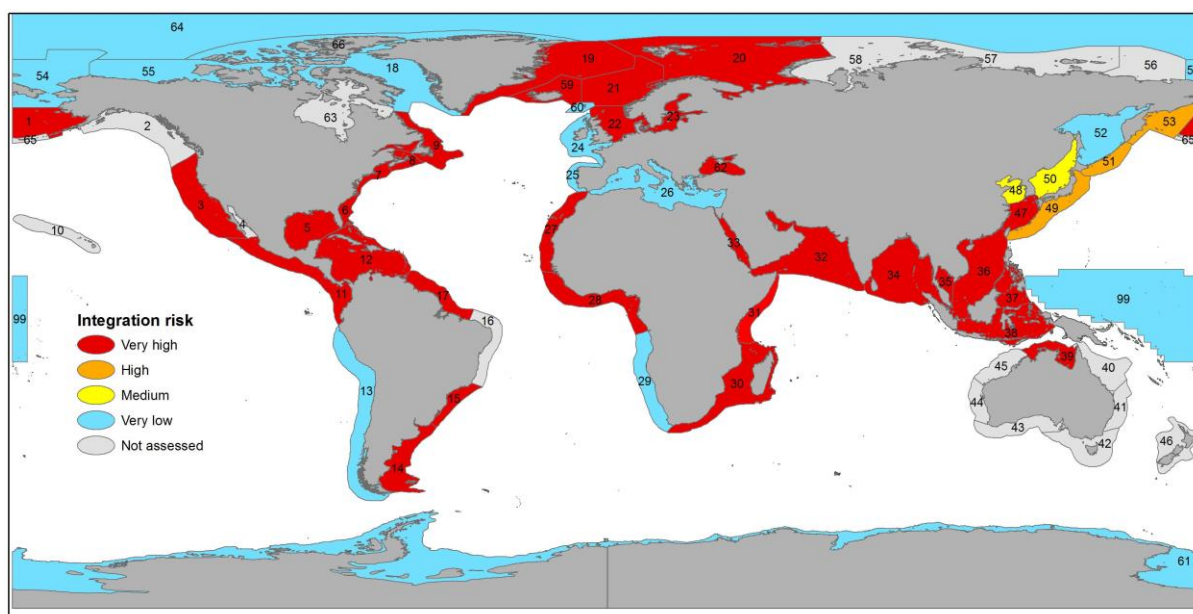


Figure 13. Global distribution of levels of integration and perceived risk for 50 multi-country LME

3.5 Assessing country engagement in transboundary agreements

The level of country engagement in agreements relevant to transboundary issues in each LME was assessed as an indicator of good governance and specifically addressed principles of inclusivity, participation and accountability. All countries eligible to participate in an agreement were evaluated in terms of whether or not they had committed to the highest level of engagement possible for the agreement. For binding agreements, this included evidence of ratification, accession, acceptance or approval while for non-binding agreements, evidence of a willingness to collaborate and participation in the agreement indicated engagement. Finally, countries in any LME that were not eligible to be part of the agreement were flagged as a possible cause of governance dysfunctionality. Appendix 1 provides a list of all agreements identified as relevant to the transboundary issues identified for each of the 50 LMEs.

3.5.1 Overall engagement level in relevant agreements by LMEs

For all 50 LMEs, a total of 103 agreements were identified, comprised of 17 individual non-binding, collaborative agreements and 86 binding agreements (including protocols). The analysis revealed that 32 of the 50 LMEs had both binding and non-binding agreements present, 17 LMEs only had binding agreements in place while one LME only had a non-binding agreement. Recognising that the same agreement may be present in more than one

arrangement, the analysis determined the 17 non-binding agreements to be found in 70 arrangements across 33 LMEs while the 86 binding agreements were identified in 272 arrangements across 49 LMEs.

Figure 14 shows the average percentage engagement by countries in agreements for each of the 50 LMEs, separately for binding and non-binding agreements. The figure illustrates that fewer LMEs are committing to higher levels of engagement for binding agreements than for non-binding agreements. This may be explained by the higher level of accountability expected for binding agreements as compared to a non-binding agreement.

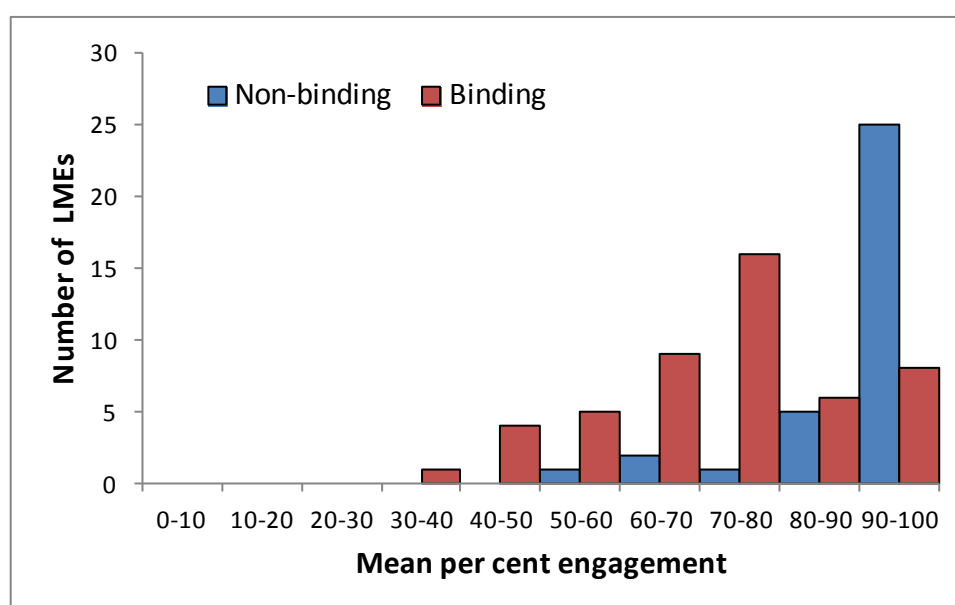


Figure 14. Level of overall country engagement in binding and non-binding agreements by number of LMEs.

Table 10 shows the average level of engagement in per cent for each of the 50 LMEs, based on the level of each country's commitment to each relevant agreement in the LME.

The engagement indicator ranged from 0-100% (lowest level of engagement to highest engagement). The converting of integration scores into a five-category ranking of risk from very low to very high was based on the same assumptions as that made earlier for the completeness and integration indicators. As such, the scores and the corresponding inverse risk level cannot be used to inform on the effectiveness of governance but only whether or not characteristics of good governance, specifically the principles of inclusivity, participation and accountability, were present among the arrangements. Ranking of the LMEs as illustrated in column five of Table 10 was based on a five level scale to indicate the potential need for intervention, based on a perceived level of risk:

Risk Level and Ranking	Engagement Range
1 –Very low	80-100%
2 – Low	60-80%
3 - Medium	40-60%
4 - High	20-40%
5 – Very High	0-20%

Table 10. Average engagement score and potential risk level of relevant arrangements for transboundary issues in each LME

LME #	LME name	Number of arrangements	Engagement score (%)	Risk rank
25	Iberian Coastal	9	41	Medium
38	Indonesian Sea	7	56	Medium
14	Patagonian Shelf	7	58	Medium
61	Antarctica	8	59	Medium
24	Celtic-Biscay Shelf	9	59	Medium
23	Baltic Sea	5	61	Low
22	North Sea	11	62	Low
8	Scotian Shelf	6	63	Low
9	Newfoundland-Labrador Shelf	6	63	Low
99	Pacific Warm Pool	5	64	Low
33	Red Sea	5	65	Low
36	South China Sea	6	68	Low
12	Caribbean Sea	9	68	Low
30	Agulhas-Somali Current	7	69	Low
37	Sulu-Celebes Sea	6	71	Low
29	Benguela Current	6	71	Low
60	Faroe Plateau	8	71	Low
17	North Brazil Shelf	8	74	Low
62	Black Sea	6	74	Low
19	Greenland Shelf	13	75	Low
20	Barents Sea	11	75	Low
66	Canadian High Arctic North	10	75	Low
7	Northeast U.S. Continental Shelf	6	75	Low
35	Gulf of Thailand	6	75	Low
64	Central Arctic Ocean	11	78	Low
28	Guinea Current	6	78	Low
27	Canary Current	7	80	Low
18	Canadian Eastern Arctic - West Greenland	7	80	Low
39	North Australian Shelf/Arafura-Timor Seas	6	80	Low
6	South-East US Continental	4	81	Very low
5	Gulf of Mexico	7	81	Very Low
21	Norwegian Sea,	8	83	Very Low
47	East China Sea	5	83	Very Low
48	Yellow Sea	5	83	Very Low
26	Mediterranean Sea	9	85	Very Low
11	Pacific Central American Coast	9	85	Very Low
32	Arabian Sea	9	86	Very Low
34	Bay of Bengal	10	87	Very Low
50	Sea of Japan	5	88	Very Low
13	Humboldt Current	8	88	Very Low
3	Californian Current	6	89	Very Low
59	Iceland Shelf	10	90	Very Low
1	East Bering Sea	7	93	Very Low
54	Northern Bering – Chukchi Seas	5	100	Very Low
49	Kuroshio Current	3	100	Very Low
53	West Bering Sea	4	100	Very Low
55	Beaufort Sea	3	100	Very Low
15	South Brazil Shelf	4	100	Very Low
51	Oyashio Current	3	100	Very Low
52	Sea of Okhotsk	2	100	Very Low

Figure 15 illustrates the global distribution of assessed engagement scores and perceived levels of risk for the 50 LMEs that were evaluated for this report.

Overall, none of the LMEs were assessed to have engagement scored that resulted in an assessment of very high or high risk levels. Twenty-one LMEs were characterised as having a very high level of engagement corresponding to an assessment of potential risk as being

very low. Five LMEs were found to have engagement levels resulting in a potential risk ranking of medium and 24 LMEs were found to have engagement levels resulting in a low ranking of risk.

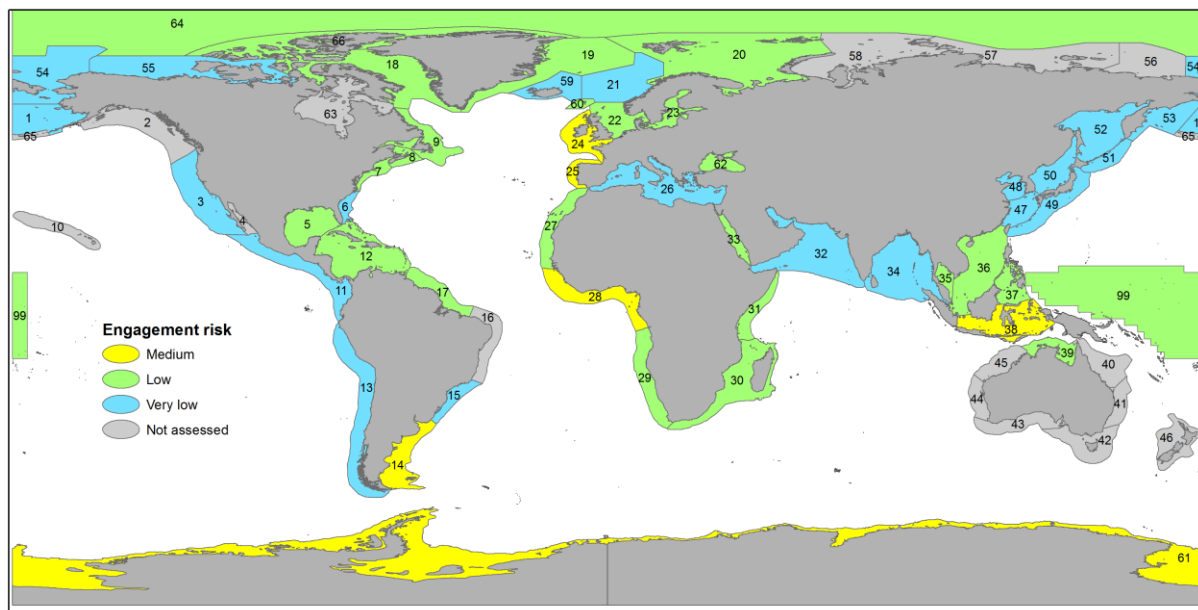


Figure 15. Global distribution of levels of engagement and perceived risk for 50 multi-country LMEs

The summary data for engagement by countries in each LME for each of the relevant arrangements, both binding and non-binding, is provided in Appendix 2.

3.5.2 Overall engagement level in issue-identified arrangements by LMEs

Figure 16 illustrates the overall level of participation by countries comprising each LME, regardless of type of involvement, for issue-identified and general agreements. Of 342¹⁰ arrangements for governance of the three transboundary issues, 144 were related to Fisheries, 44 were related to Pollution and 63 to Biodiversity. In addition, 91, including the Regional Seas Conventions, were designated as 'General' as they covered more than one of the above categories of issues.¹¹

As shown in the 'Box and Whiskers' plot for all 50 of the LMEs (Figure 16), all four categories (the three issue categories and the general category) had LMEs in which none of the countries was participating in one or more of the arrangements as well as arrangements in which all of the relevant countries were participating.

¹⁰ Recall that the number of arrangements exceeds the actual number of agreements. This is because agreements whose area of competence span multiple LMEs are therefore present in the arrangements of two or more LMEs. For example, the LBS protocol of the Cartagena Convention is present in arrangements in the Gulf of Mexico, Caribbean, South-East US Continental Shelf, and Northeast Brazil Shelf LMEs, so this single agreement is present in four different LME arrangements. Additionally, some countries (e.g. Indonesia or Colombia) are in several LMEs so their engagement in a given agreement is represented in the arrangements for that agreement in each of those LMEs.

¹¹ This additional breakdown of the 'general' category was used to distinguish issue-specific agreements from those that were tending towards EBM by including more than one issue. From a governance perspective, obtaining preliminary insight into how countries engaged in these different types of agreements was seen as potentially important.

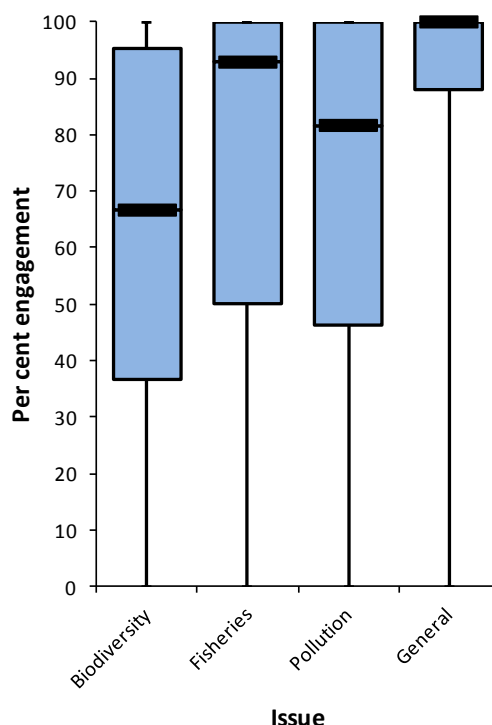


Figure 16. Level of overall engagement in agreements in different arrangements by category of issues

Most noticeable from the figure is the difference in median for biodiversity arrangements from those for fisheries, pollution or the general category. In the former case, half of the arrangements had engagement levels above 67% while for the latter three categories, engagement for more than half of the arrangements were at engagement levels above 81% for pollution, 92% for fisheries and an astounding 100% for the general category. This analysis highlights that while the diversity in the level of engagement for these three issues was extremely small for the arrangements scoring above the median, it was significantly larger for those with scores below the median, potentially flagging these arrangements for further attention. In other words, engagement is a skewed distribution with a tail towards lower values.

The data were further examined by the nature of agreement (i.e. binding or non-binding) for each of the four categories of issues illustrated in Figure 16. The results of this analysis are shown in Figure 17 while the breakdown of the number of arrangements containing agreements by categories and nature of the agreement is provided in Table 11. It was noted that all of the agreements addressing pollution were binding. Regardless of the issue, all binding agreements had LME level arrangements examples in which none of the countries were engaged, highlighting the need to further assess the reason for the lack of engagement.

In the case of biodiversity arrangements, there was essentially no difference between the levels of engagement by countries in the 44 binding versus 19 non-binding arrangements. In contrast, fisheries engagement levels by countries differed significantly between binding and non-binding arrangements. Some 127 binding fisheries arrangements had engagement levels ranging from 0% by countries in a given LME to 100%, with over half of these binding arrangements having engagement levels of over 80%. The 17 non-binding fisheries arrangements showed a range in engagement levels from 83% to 100%, with some 14 of the 17 arrangements having 100% engagement levels.

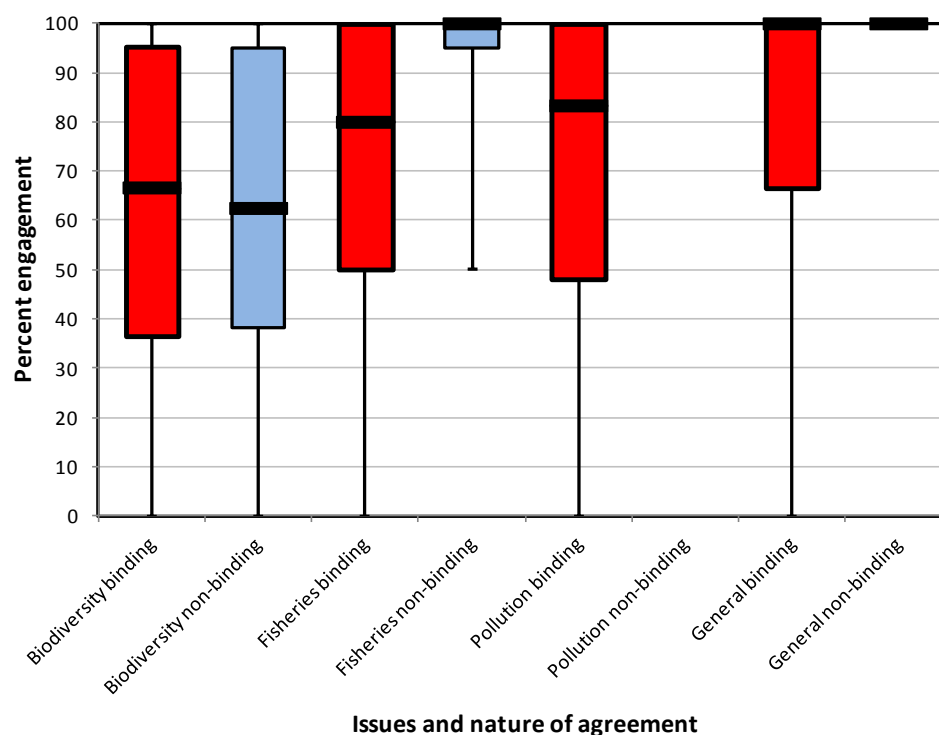


Figure 17. Percent engagement by countries in binding and non-binding agreements relevant to categories of transboundary issues in LMEs

For the 44 binding pollution arrangements, the analysis showed a similar result as that obtained for binding fisheries arrangements, with more than half having engagement levels over 81%. As noted, none of the pollution agreements were non-binding which is explained by the fact that the majority of these are protocols under Regional Seas Conventions. This explanation is also applicable for the 57 General binding arrangements where most of the agreements are Regional Seas Conventions. All of the 34 non-binding general arrangements showed 100% engagement levels suggesting the need to thoroughly understand the generic and context-specific factors that may be accounting for this success. When this is coupled with the high level of engagement in non-binding fisheries agreements by countries, it provides empirical support to the notion that “softer” collaborative arrangements may play an important potential role in achieving regional level governance outcomes. However, confirmation will require an assessment of the nature of the performance outcomes arising from these different types of agreements which is not possible to determine at this time.

Table 11. Number and nature of agreements in arrangements relevant to transboundary issues in LMEs

Category	Number of times binding agreements were present	Number of times of non-binding, collaborative agreements were present	Total number of times agreements were present
Biodiversity	44	19	63
Fisheries	127	17	144
Pollution	44	0	44
General (including Regional Seas Conventions)	57	34	91
Total	272	70	342

3.5.3 Countries ineligible to participate in agreements

The analysis of countries ineligible to participate in agreements showed this occurring in 25 of the 50 LMEs, ranging from just one country being ineligible to as much as 20 countries, in the case of the Caribbean, not being able to participate in sub-regional Central American fisheries agreement. In many of these instances of ineligibility, the explanation was mainly due to the sub-LME nature of the agreement or the small degree of overlap between two adjacent LMEs that had different arrangements in place for addressing similar transboundary issues. This was generally was not anticipated to lead to significant governance challenges.¹²

While ineligibility of some countries within a given LME to participate in arrangements addressing transboundary areas of concern has the potential to influence governance effectiveness as a result of this structural aspect, care must be taken to understand the underlying reasons for ineligibility.

3.6 Assessing 'fit' of arrangements for governance of transboundary issues

The analysis of 'fit' of areal extent of governance agreements addressing transboundary issues in the LMEs, assesses the degree to which these instruments and the arrangements developed to implement them take LMEs as ecosystem management units into account. This is illustrated in Figure 18 which shows the percent of all arrangements which are in each of the four categories of 'fit'. The results indicate that 90% of all arrangements had an area of competence that exceeded the size of the LME or were offset.

To ascertain whether arrangements relating to one particular category of issue (i.e. fisheries, pollution or biodiversity) or a more general type of arrangement that was not specific to any one issue, influenced the 'fit' of the agreement to the LME, the data were further analysed as illustrated in Figure 19. This analysis revealed that pollution arrangements were most likely to have areas of competence that exactly matched the areal extent of the LME but this still only accounted for 19% of all the pollution arrangements.

¹² Two LMEs are the Pacific Central American Coast LME which includes a portion of the area of competence of the Lima Regional Seas Convention and the Arabian Sea LME into which a portion of the Jeddah Regional Seas Convention extends. In both instances, it is likely that the ineligibility of the countries did not pose a significant threat to the governance structure due to the small area of overlap. Another example not likely significant due to the small area of interest was the Guinea Current LME in which two countries (Angola and Equatorial Guinea) were ineligible to be a party to Convention Concerning the Regional Development of Fisheries in the Gulf of Guinea and the Regional Fisheries Committee for the Gulf of Guinea (COREP).

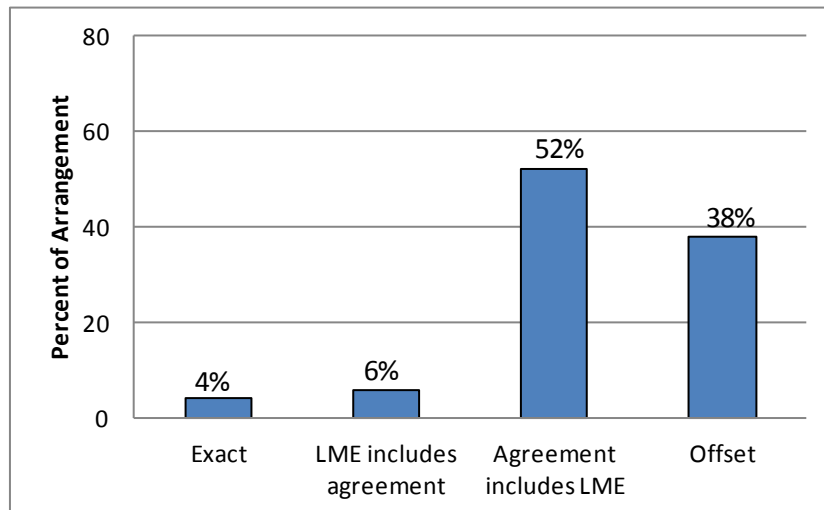


Figure 18. Area of competence or ‘Fit’ of all arrangements to areal extent of LME

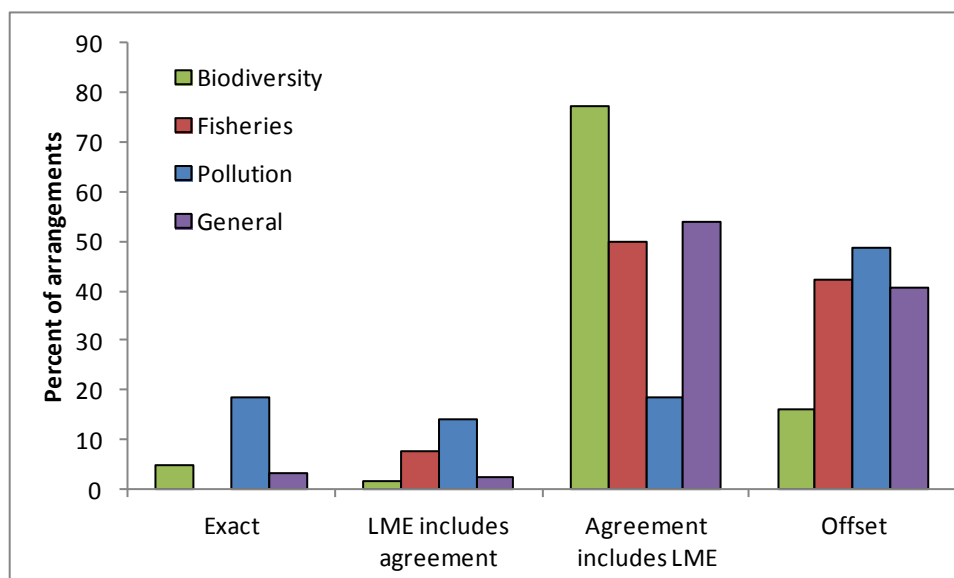


Figure 19. Area of Competence or ‘Fit’ of Arrangements by Issue category to Areal Extent of LME

The majority of fisheries arrangements (92%) had areas of competence that were either larger than the LME, or offset to include areas outside of the LME. While this can be explained as reflecting the biology and migratory range of the species being addressed in arrangements for highly migratory species, it does not appear to reflect transboundary fisheries issues for species found within a single LME. For the 6% of fisheries arrangements that had areas of competence focusing only on part of the relevant LME, a feasible explanation may be due to the target species being distributed subregionally. No fisheries arrangement was an exact match with an LME, which has been noted to cause governance-related problems within the Caribbean LME and the Bay of Bengal LME where regional-specific pelagic species occur. Most biodiversity arrangements (77%) had areas of competence larger than the LME, likely reflecting the highly migratory nature of the species covered under many of the biodiversity agreements such as marine mammals, turtles and dugongs.

Finally, the arrangements that were more general in nature followed a similar trend to the overall finding by having the areas of competence for the majority of these being either larger

than the LME or offset. As previously noted, this category includes Regional Seas conventions, European Union Common Fisheries Policy and several overarching coordination arrangements such as the Arctic Council and PEMSEA.

4 Discussion

This assessment of governance arrangements addressing issues of fisheries, pollution and biodiversity in LMEs was undertaken to contribute to the work being done by the TWAP FSP (2013-2015) to assist the Global Environment Facility (GEF) and other international organizations in priority setting by providing a baseline and priorities for intervention.

The analysis conducted is a preliminary step towards understanding:

- The extent to which governance issues are covered (thereby allowing identification of gaps);
- The match between governance arrangements and issues;
- The extent to which arrangements extend outside the lme;
- The extent to which issues are covered by multiple arrangements that could result in conflict; and,
- The extent to which there is integration among arrangements either through existing institutions and organizations or through specific integrating mechanisms.

This analysis must be considered preliminary by TWAP for three main reasons: 1) the number of issues identified are based on available published literature, possibly resulting in some newly emerging issues and even existing issues not being captured in the analysis; 2) it focuses exclusively on formal agreements (binding and non-binding) that are currently in place as of March 31, 2014 for addressing these identified transboundary issues in the LMEs; and 3) the data collection process is entirely secondary in nature, based on desk-top research, although efforts were made for expert judgment to inform the findings and conclusions reached.

4.1 Monitoring the extent to which governance issues are addressed

The two main purposes of the TWAP FSP (2013-2015) are: (1) to develop a baseline for assessment of conditions in the five IW water categories, and (2) to put in place a system for monitoring these conditions at regular intervals. The discussion of governance assessment at the time of development of the TWAP FSP recognised, as discussed in Section 1.2 of this report, that governance effectiveness could only be clearly evaluated by assessing the extent to which arrangements have achieved outcomes such as reduced stresses, improved ecosystems, socially just solutions to problems, and improved human well-being (see Figure 2). However, the level of published research currently undertaken to assess governance performance is extremely limited. As such, this analysis focused on contributing to the knowledge base surrounding practices that contribute to 'good' governance, (i.e. those that facilitate the implementation of principles such as transparency, accountability, inclusivity, participation, ecosystem-based and adaptive management espoused in most multilateral agreements), using the assumption that good governance may be necessary but insufficient to achieve effective governance.¹³ It does this by focusing of indicators of completeness, integration and engagement pertaining to arrangements that address transboundary issues

¹³ The current state of knowledge regarding effective governance, mainly due to limited research in this area, is insufficient to conclude a causal link between good governance characteristics and effective governance as measured by performance outcomes

identified within a given LME. As well, the analysis explored the ‘fit’ of these arrangements to address the transboundary issues from the perspective of areal competence.

Using the TWAP Level 1 Governance Assessment Methodology, it is necessary to reiterate that the policy cycle scoring process mainly assesses whether arrangements in place are structured according to ‘good governance’. For example, having clearly specified processes and mechanisms across the seven policy cycle stages could be seen as likely to improve transparency, accountability, and ease with which stakeholders could engage with the process. Ultimately, these characteristics might be expected to produce better governance results, and as noted earlier, are often cited as being desirable characteristics of governance processes (Lemos and Agrawal 2006, Lockwood et al. 2010). However, the state of governance research is such that it is not possible to say definitively that these characteristics are necessary for governance to be effective. The degree to which good governance characteristics are correlated with effective governance remains an emerging area of research in the field of international governance.

This assessment of the 50 multi-country LMEs provides supporting evidence that arrangements for governing transboundary issue relating to fisheries, pollution and biodiversity are sufficiently context specific that it would be unwise to propose a definite link between ‘good’ governance and effectiveness. Therefore, monitoring the policy cycle stage scores and overall completeness for the arrangements pertaining to LMEs should be perceived only as monitoring the extent to which practices considered to reflect ‘good’ governance are in place. Over time, as variables relating to outcomes of governance are monitored, the extent to which ‘good’ governance and effectiveness are related will become better understood.

In addition to monitoring the extent to which ‘good’ governance practices appear to be reflected in arrangements using the TWAP Level 1 Governance Assessment Methodology, this assessment of LMEs focused on collecting and analysing data for three other potentially valuable indicators of governance architecture/structure that could be monitored:

- The extent to which there is a mechanism specified for integrating policy and management across issues within each LME with linkages extending beyond the regional level to global level arrangements;
- The extent to which there is engagement or “buy in” among the countries taking part in an arrangement in place for addressing an issue(s) of concern, whether binding or non-binding, as indicated by formal commitment at the country-level; and
- The extent to which there is spatial and jurisdictional coherence between the arrangements and the issue to be addressed.

4.2 The current status for ‘good governance’ across GEF-eligible, multi-country LMEs

The results indicate that with few exceptions, the 359 transboundary issues identified as areas of concern for the 50 multi-country LMEs were addressed by some 347 different arrangements¹⁴, comprising 17 non-binding collaborative agreements and 86 binding agreements. While there is no doubt as to the large number of arrangements currently in place, this preliminary analysis suggests that their suitability from a governance architectural perspective focusing on assessing ‘good’ governance was wanting in many of the LMEs. As such, it has the potential for assisting GEF and other international organizations two ways: (1)

¹⁴ The missing agreements related to pollution issues (both marine-based and land-based) in the California Current, Newfoundland and Labrador Shelf, Northeast United States, Scotian Shelf or South Brazil Shelf LMEs. As well, the Canary Current and the East China Sea LME lacked identifiable transboundary agreements addressing general biodiversity issues.

by identifying priority areas for intervention; and (2) by providing a baseline across all LMEs against which to monitor subsequent changes over time.

Specifically, the Level 1 Governance Assessment Methodology was used to develop a preliminary, baseline assessment of governance architecture for transboundary LMEs by identifying:

- level of completeness of arrangements to address transboundary issues
- level of integration of organizations responsible for addressing transboundary issues
- level of engagement of countries involved in relevant agreements
- assessment of 'fit' of the current agreements and the arrangements in place to address transboundary areas of concern

4.3 Level of completeness

Overall, completeness scores relating to the arrangements in place to address the suite of 10 subcategories of issues relating to fisheries, biodiversity and pollution in each of the LMEs allowed for an average score to be determined. This score was converted to a ranking of potential risk, using a 5-point score corresponding to very low, low, medium, high and very high risk as shown in Table 8, highlighting areas for possible intervention aimed at strengthening governance architecture. In particular, as illustrated in Figure 7, biodiversity arrangements appear to have the lowest level of completeness in their policy cycles while fisheries arrangements tend to have the highest level, especially those in which agreements are binding, particularly those for highly migratory species and other specifically-targeted species.

This assessment also served to identify the complete absence of arrangements addressing key transboundary issues in five of the 13 geographic regions (North Atlantic, South-East Atlantic, South-West Atlantic, North-East Pacific and South-East Asia), pointing to potential areas for intervention in LME-level governance (Figure 9).

The analysis of completeness score and ranking provides a tool by which LMEs can be monitored over time and as agreements are added or arrangements strengthened. The current literature on governance architecture suggests that effort should be made to increase the level of completeness of the policy cycle for any arrangement. This is seen as critical as it strengthens and facilitates the flow of valuable data and information into the analysis and advice stage of the cycle which in turn provides the structures that contributes to informed decision-making, implementation and review. Finally, it can also be assumed that complete policy cycles demonstrate implementation of key principles associated with good governance and which have become the norm in many multinational and national governance instruments. These include principles of transparency and integration in decision making, inclusivity and participation in the provision of policy-relevant and management level advice from a cross section of stakeholders to inform decision making, collaboration and efficiency to assist with implementation, and accountability and adaptive management in terms of monitoring and evaluation.

4.3.1 Level of integration as a proxy for implementing an EBM approach

As noted in the methodology section describing the calculation of an overall score for level of integration among arrangements in the LME, there is no *a priori* criterion for the extent of clustering that would be considered optimal. Nonetheless, the assumption underpinning the scoring was based on an expectation that without considerable attention to linkages and interaction among arrangements, it would be difficult to have the integrated approach within a system that is needed to achieve EBM. At the other end of the scale, in a system with highly diverse issues, one would not normally expect to find them all covered by the same

responsible bodies. In fact, depending on complexity and capability, it may be more effective and flexible for arrangements to have common responsible organizations at policy setting stages, but different responsible organisations at technical and operational policy cycle stages. The results for integration across the LMEs provide some evidence that both scenarios are in play.

In general, the arrangements in place for addressing transboundary areas of concern shared few organizations across similar stages of the different policy cycles and some 22 LMEs are ranked as having the highest level of risk with respect to this indicator of governance (Table 9). This suggests that the different origins and timing of development of the arrangements may be a factor, arising from the individual and often-times 'silo' approach for developing and implementing issue-specific agreements. This may help target interventions to seize opportunities on how best to achieve EBM goals within the LME, especially if agreements allow for such amendments to be made.

Similarly, LMEs showing a high degree of integration, while a preliminary indication of good architectural design, also require further analysis to understand exactly what this scoring means. It may be due to the fact that only a small number of issues are dealt with by a small number of individual arrangements, as is the case for the Sea of Okhotsk, or it may be that genuine effort is being made to practice EBM within the LME by recognizing the context-specificity with the LME, as might be the case in the LMEs bordering European countries. This appeared to be the case for fourteen of the LMEs assessed where increased attention to the principles of integration and EBM in recent times have led to the establishment of an integrating policy-setting mechanism that serves as an umbrella for the different issue-specific arrangements in the LME. The benefits to be gained and the challenges arising from such an approach will need to be determined for each LME. This will require additional input from regional experts to determine whether this should be pursued as a goal across all LMEs or whether once again, context will serve to limit its application in some LMEs.

4.3.2 The role of country engagement in the assessment of 'good' governance

Engagement by countries in agreements addressing transboundary areas of concern within a given LME revealed none of the 50 LMEs had average engagement levels of less than 40%. Using the five-point scale to assess the level of potential risk, the assessed levels of engagement corresponded to potential risk levels ranging from very low to medium for all 50 LMEs (Table 10).

However, the analysis suggests that in general, binding agreements have a lower level of engagement than non-binding agreements regardless of the type of issue the agreement is meant to address (Figure 14). The level of effort or accountability needed by countries engaged in binding agreements to comply with the conditions of the agreement may explain this finding but this still needs to be verified. Despite this, the research has identified that the overwhelming majority of agreements formulated to address transboundary issues are binding. This trend is consistent, regardless of the issue being addressed by the agreement, as evidenced by all of the pollution arrangements being binding, along with 88% of all fisheries arrangements and 70% of those addressing biodiversity concerns.

Once again, the evidence obtained from an assessment of engagement speaks to the need to understand why there is the sense amongst the drafters of policy instruments that binding agreements are preferred over non-binding ones even in the face of a lower level of engagement by countries. The literature on governance complexity would suggest that rather than generalising that one form of agreement is better over another, a far more effective, albeit demanding, approach is to examine the context specificity of each LME or groupings of LMEs, prior to establishing the nature of agreements set up to address transboundary issues (Mahon et al. 2010). Such an approach should also be informed by thinking on governance going back some 20 years which highlights the fact that 'governance is more than just government'

(Rosenau 1995). It should also include an examination of the cultural, geopolitical and socio-economic factors, among others, that may influence the architecture of governance responses in some LMEs, (e.g. those in South-East Asia and the Caribbean) where the preferred choice seems to follow a collaborative, polycentric networked approach (Ostrom 2010). Following the thinking of governance theorists, such an analysis would suggest that context-specific conditions affecting the level of vulnerability of both the human and natural subsystems being governed should influence the responses put in place by those who govern (Jentoft 2007).

To summarize, a detailed understanding of what the findings on engagement suggest requires a closer examination of the rationale used by countries for determining their level of engagement for binding versus non-binding issue-specific types of agreements. This would be further informed by analysis of the arrangements in place to implement the agreement in terms of the completeness of their policy cycles as it relates to engagement. One could speculate that an arrangement with a low level of completeness across its policy cycle stages, suggestive of possible fractures in the policy process, may prove less effective in achieving its governance objectives even with a 100% engagement by the countries involved than one in which completeness is higher. This applies regardless of the binding or non-binding nature of the agreement.

Finally, a word must be said about situations in which some countries are excluded from participating in agreements that can potentially affect the success of efforts aimed at addressing issues of regional concern. The analysis found several cases where this situation arose, ranging from just a single country in a given LME to as much as 20 countries, depending on the specific agreement. In many of these instances, the explanation was mostly due to the sub-LME nature of the agreement. However, it would seem appropriate for efforts to be made to examine the consequences of all such omissions identified in this analysis. If deemed negative, effort should be made to avoid such situations from occurring, by rectifying existing agreements and ensuring new agreements prevent such situations from arising. Where relevant, input from LME-level experts should be sought on this issue.

4.3.3 'Fit' of arrangements for governance of transboundary issues

Governance scholars have written extensively on the notion of the 'fit' of area of competence of institutions to the area of the issue (Young 2002, Young et al. 2007); an idea which also applies to LMEs. When this idea is coupled with the notion of LMEs as rational management units for addressing ecosystem-level, transboundary concerns, the obvious question to be asked is whether LMEs are in fact being used as a spatial unit for managing these issues and if not, why not? Furthermore, what exactly are the implications, if any, if the answer is found to be negative, given the focus by GEF on supporting LMEs as management units? Obviously timing will play a role in answering this question as agreements concluded prior to the LME boundary delimitation could not be included in an assessment aimed at answering the posed question, although the data collection for this analysis did include noting whether agreements had included articles for amendment.

The results indicate that, to an overwhelming degree (96%), LME boundaries played little role in influencing the areas of competence for agreements, suggesting that what is lacking may be more than the *"political will... to apply the LME concept for the sustainable development... in many parts of the World Ocean."* (Sherman and Hempel 2009, p.9). The majority of the agreements were deemed to be supra-LME in scope, either inclusive of but extending beyond the boundaries of the LME or covering only a part of the LME while extending to other areas outside of the LME (Figure 18). Furthermore, there were examples at the other end of the spectrum in which agreements were restricted to subregions within LMEs.

These findings are significant from an LME governance architectural perspective if LMEs are to be used as rational units of EBM. For supra-LME arrangements, the potential exists for countries outside of an LME to be able to exercise influence, either directly or indirectly, that

is contrary to the needs of those within the LME. For example, in the Caribbean and Bay of Bengal LME, the needs of the countries in terms of management of 'regional' pelagic species by the International Commission for the Conservation of Atlantic Tunas (ICCAT) are superseded, if not undermined, by those outside of the region, resulting in low priority to addressing these species. This suggests that lower level governance mechanisms are needed, nested within these supra-LME arrangements, to serve LME level concerns. Again, this provides a cautionary reminder of the limitations of the 'one size fits all' approach when it comes to dealing with the complexity and scale issues inherent in ocean systems.

The potential for challenges associated with 'fit' is also demonstrated when arrangements are offset from the LME scale. This is exemplified by the Guinea Current LME (GCLME) with the Subregional Fisheries Commission (SRFC) where some countries are inside the GCLME and some in the neighbouring Canary Current LME. Whether this would result in challenges to 'good' governance cannot be answered at this stage of analysis and experts from the regions should provide the guidance necessary to better understand this situation.

However, it is worth noting that preventing a country from participating is notably different from countries choosing not to be engaged at a subregional level. An example of this in practice are the mechanisms for addressing shrimp and groundfish and flyingfish in the North Brazil Shelf and Caribbean LMEs where subregional working groups of interested countries are involved in the management of these species under umbrella arrangements.

4.4 LMEs in the global governance system

The observation that the majority of arrangements assessed are larger than and/or offset from LMEs calls for reflection on the role of LMEs in the overall arrangements for governance of the oceans. Current thinking of governance arrangements address issues of fit and scale through the conceptual lens of multi-scale, multi-level clusters or networks of arrangements (Young 2002, Ostrom 2010, de Búrca, Keohane and Sabel 2013, Wyborn and Bixler 2013, Gruby and Basurto 2014, Newig and Koontz 2014). From this perspective, LMEs appear as a level between national and the large-scale regional clusters described by Mahon et al. (2014 in press). It appears that there may often be a sub-LME level as well, when issues requiring governance involve only a subarea of the LME or a subset of the countries within an LME. Thus for oceans, the scale gradation would be: global>regional cluster> LME>sub-LME> national> local. The relative emphasis on these will vary among regions. However, in all regions there will be the need to consider the relative roles of institutions at all levels, their relationship to the issues to be governed and their interactions among each other (Fanning et al 2007). This will lead to a nested polycentric perspective on governance such as was developed for the Caribbean and North Brazil LMEs which are nested within the Wider Caribbean Region (Mahon et al. 2014). It will also lead to an emphasis on rationalising roles and responsibilities as well as linkages within the nested system.

4.5 Comparison across key indicators of governance architecture

In terms of monitoring progress towards 'good' governance, this analysis identified three indicators of comparison that may be useful in assessing governance from a structural design perspective at the LME level, in addition to assessing the level of 'fit' of a given arrangement to the areal extent of an LME discussed in section 4.2.4. These three are indicators of completeness, integration and engagement, a comparison of which is depicted in Table 12, based on the placement of scores obtained and ranking of potential risk for individual LMEs in Tables 8, 9 and 10, using the legend below.

Risk level	Completeness Indicator Range	Integration Indicator Range	Engagement Range
1 –Very low	80-100%	0.80-1.0	80-100%
2 - Low	60-80%	0.6 -0.8	60-80%
3 - Medium	40-60%	0.4-0.6	40-60%
4 - High	20-40%	0.2-0.4	20-40%
5 – Very High	0-20%	0.0-0.2	0-20%

While plausible explanations may be offered for the current ranking obtained for each indicator for each LME, the plethora of combinations across the three indicators for individual LMEs suggests the need for further exploration to determine whether there are correlations between these indicators and to what extent context specificity influenced the rankings. However, based on the overall analysis, it would appear that the Mediterranean Sea LME shows the least level of risk across the three indicators, with high completeness scores and very high integration and engagement scores due in large measure to the nature and presence of an overarching integrating mechanism in place to address transboundary areas of concern.

Of greater concern is the very low level of integration scores obtained for well over half of all LMEs assessed, posing a potential very high risk to the adoption of EBM in these LMEs and the principle of integration as a key characteristic of good governance. This is primarily due to the significant disconnect between organizations involved with fisheries issues in these LMEs and those involved in pollution and biodiversity issues, thereby providing opportunities to focus effort on greater collaboration among these and/or the creation of overarching integrating mechanisms. Furthermore, the LME governance assessment results for the three indicators provide the opportunity to compare the findings for the additional categories of indicators in Figure 2 to see whether achievement of downstream objectives related to outputs, outcomes and impacts are dependent on these rankings.

Table 12. Comparison of completeness, integration and engagement scores and potential risk level for LMEs

LME #	LME Name	# of Arrangements	Completeness %	Integration (0.0-1.0)	Engagement (%)
1	East Bering Sea	7	70	0.1	93
3	California Current	6	50	0	89
5	Gulf of Mexico	7	58	0.2	81
6	Southeast U.S. Continental Shelf	4	65	0.2	81
7	Northeast US Continental Shelf	6	49	0	75
8	Scotian Shelf	6	50	0	63
9	Newfoundland-Labrador Shelf	6	50	0	63
11	Pacific Central American Coastal	9	65	0.1	85
12	Caribbean Sea	9	60	0.2	68
13	Humboldt Current	8	68	1	88
14	Patagonian Shelf	7	82	0.2	58
15	South Brazil Shelf	4	36	0	100
17	North Brazil Shelf	8	58	0.2	74
18	Canadian Eastern Arctic - West Greenland	7	72	1	80
19	Greenland Sea	13	74	0.1	75
20	Barents Sea	11	74	0.1	75
21	Norwegian Sea	8	76	0.1	83
22	North Sea	11	73	0.1	62

23	Baltic Sea	5	61	0.1	61
24	Celtic-Biscay Shelf	9	74	1	59
25	Iberian Coastal	9	74	1	44
26	Mediterranean	9	78	1	85
27	Canary Current	7	46	0.2	80
28	Guinea Current	6	54	0.2	78
29	Benguela Current	6	80	1	71
30	Agulhas -Somali Current	7	47	0.1	69
32	Arabian Sea	9	45	0.1	86
33	Red Sea	5	52	0.2	65
34	Bay of Bengal	10	50	0.1	87
35	Gulf of Thailand	6	50	0.1	75
36	South China Sea	6	50	0.1	68
37	Sulu-Celebes Sea	6	50	0.1	71
38	Indonesian Sea	7	52	0.1	56
39	North Australian Shelf	6	51	0.1	80
47	East China Sea	5	43	0.1	83
48	Yellow Sea	5	33	0.5	83
49	Kuroshio Current	3	56	0.3	100
50	Sea of Japan	5	30	0.5	88
51	Oyashio Current	3	30	0.3	100
52	Sea of Okhotsk	2	38	0.9	100
53	West Bering Sea	4	60	0.3	100
54	North Bering - Chukchi Sea	5	69	1	100
55	Beaufort Sea	3	67	1	100
59	Iceland Shelf	10	78	0.1	90
60	Faroe Plateau	8	77	1	71
61	Antarctica	8	70	1	59
62	Black Sea	6	77	0.1	74
64	Central Arctic Ocean	11	73	1	78
66	Canadian High Arctic North Greenland Shelf	10	77	1	75
99	Pacific Warm Pool	5	51	1	64

5 Conclusion

There is clearly much complexity in terms of placed-based context that makes it difficult to generalise governance structure or architecture across the LMEs. Mahon et al. (2010) questioned whether LMEs might be so complex that a diversity of approaches to governance might be required. Their analysis demonstrated that there is considerable heterogeneity among LMEs with regard to characteristics that would be expected to affect governability and that several governance approaches will be required to cope with this heterogeneity. However, they also concluded that LMEs can be grouped according to these characteristics, suggesting that different approaches could be considered for clusters rather than for individual LMEs and that there can be sharing of experience and learning within clusters (Mahon et al. 2010).

From a substantive perspective, this assessment of governance arrangements for the 50 multi-country LMEs appears to be supportive of the conclusion of heterogeneity among LMEs. At the same time, it is suggestive of some aspects of commonality across LMEs, particularly those relating to the level of completeness of policy cycles to facilitate 'good' governance. The level of engagement by countries which affect or are affected by transboundary issues within the LME also appears to be a cross-cutting factor for 'good' governance. However, this indicator may be driven by the binding or non-binding nature of an agreement, the type of issue that the agreement and its arrangement is established to address and the area of competence or 'fit' for 'good' governance to be realised.

In addition to its substantive contribution in preliminarily identifying the status of baseline governance indicators across LMEs, the potential of this LME level governance arrangements

assessment to inform process may prove to be equally valuable. First, it would be of benefit to determine whether actors involved in addressing these issues at the transboundary level see the potential of the TWAP Level 1 Methodology as providing the context or framework within which a structured discussion about governance arrangements within their LME can take place. Second, by using a common framework and methodology, key actors within each LME can have a more informed perspective of their LME's position relative to other LMEs and to the broader suite of both regional and global governance mechanisms in place for addressing similar issues. This could potentially serve to facilitate learning across relevant LMEs from exposure to both failure and successes in governance processes being used.

In summary, while rankings of indicators of governance architecture are possible and progress can be made towards enhancing these by direct intervention by GEF, other donor agencies and regional organisations, it is essential to reiterate that governance success requires a detailed understanding of the complexity of the system to be governed. Any preliminary conclusion of ranking of any indicator for any LME must be seen as simply a flag to determine whether the assessment points to the need for intervention or whether the identified ranking is in fact appropriate for the system.

6 References

- Biermann, F. 2007. 'Earth system governance' as a crosscutting theme of global change research. *Global Environmental Change*. 17: 326–337.
- Biermann, F. and P. Pattberg [eds]. 2012. *Global environmental governance reconsidered*. MIT Press, Cambridge.
- de Búrca, G., R.O. Keohane and C. F. Sabel. 2013. *New Modes of Pluralist Global Governance*. New York University School of Law, Public Law & Legal Theory Research Paper Series, Working Paper No. 13-08. Available at: <http://ssrn.com/abstract=2225603>
- Duda, A.M and K. Sherman. 2002. A new imperative for improving management of large marine ecosystems. *Ocean and Coastal Management* 45: 797-833.
- Duda, A. 2002. Monitoring and Evaluation Indicators for GEF International Waters Projects. *Global Environment Facility Monitoring and Evaluation Working Paper* 10: 11 p.
- Duda, A. and A. C. Hume. 2013. A new imperative to harness sound science in the GEF International Waters focal area. *Environmental Development* 7: 102-108.
- Fanning L, R. Mahon, P. McConney, J. Angulo, F. Burrows, et al. A large marine ecosystem governance framework. *Marine Policy* 2007; 31:434–43.
- Fanning L, R. Mahon and P. McConney. 2013. Applying the large marine ecosystem (LME) governance framework in the Wider Caribbean Region. *Marine Policy* 2013; 42:99-110.
- Gruby, R. and X. Basurto. 2014. Multi-level governance for large marine commons: Politics and polycentricity in Palau's protected area network. *Environmental Science & Policy* 36: 48-60.
- Hennessey, T. and J. Sutinen J. 2005. *Sustaining large marine ecosystems: the human dimension*. Large Marine Ecosystems Series. Amsterdam: Elsevier, 286 pp.
- Hoagland, P. and D. Jin. 2008. Accounting for marine economic activities in large marine ecosystems. *Ocean and Coastal Management* 51:246–58.

- Honey, K. T. and K. Sherman. 2013. The Western Pacific Warm Pool Assessment Approach for the Transboundary Waters Assessment. Background Brief. NOAA Large Marine Ecosystem Program, Narragansett, RI, USA.
- Jeftic, L., P. Glennie, L. Talaue-McManus and J. A. Thornton (Eds.). 2011. Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, Nairobi, 61 pp.
- Jentoft, S. 2007. Limits of governability: Institutional implications for fisheries and coastal governance. *Marine Policy* 31: 360-370.
- Kooiman, J., M. Bavinck, S. Jentoft and R. Pullin. 2005. Fish for Life. Interactive Governance for Fisheries. MARE Publication Series No. 3. Amsterdam University Press, Amsterdam, 427 pp.
- Lemos, M. C., and A. Agrawal. 2006. Environmental governance. *Annual Review of Environment and Resources* 31:297–325.
- Lockwood, M., J. Davidson, A. Curtis, E. Stratford and R. Griffith. 2010. Governance principles for natural resource management. *Society and Natural Resources*, 23:1–16.
- Longhurst, A. 1998. Ecological geography of the sea, Academic Press, San Diego, California. 560 pp.
- Mahon, R., L. Fanning, P. McConney and R. Pollnac. 2010. Governance Characteristics of Large Marine Ecosystems. *Marine Policy* 34:919–927.
- Mahon, R, L. Fanning and P. McConney. 2011a. Observations on governance in the Global Environment Facility (GEF) International Waters (IW) Programme. CERMES Technical Report No. 45, 36 pp. (www.cavehill.uwi.edu/cermes)
- Mahon, R., L. Fanning, and P. McConney. 2011b. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, Nairobi, 61 pp.
- Mahon, R., A. Cooke, L. Fanning and P. McConney. 2013. Governance arrangements for marine ecosystems of the Wider Caribbean Region. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados. CERMES Technical Report No 60. 99p.
- Mahon, R., L. Fanning, K. M. Gjerde, O. Young, M. Reid, S. Douglas. in press. Transboundary Waters Assessment Programme (TWAP) Assessment of Governance Arrangements for the Ocean: Vol 2 – areas beyond national jurisdiction (ABNJ). IOC Technical Series 115.
- Mahon, R., L. Fanning, P. McConney. 2014. Assessing and facilitating emerging regional ocean governance arrangements in the Wider Caribbean region. *Ocean Yearbook* 28: 631-671.
- Newig, J. and T.M. Koontz. 2014. Multi-level governance, policy implementation and participation: the EU's mandated participatory planning approach to implementing environmental policy. *Journal of European Public Policy*, 21(2): 248–267.
- Olsen, S.B., J.G. Sutinen, L. Juda, T.M. Hennessey and T.A. Grigalunas. A handbook on governance and socioeconomics of large marine ecosystems. Coastal Resources Center: University of Rhode Island; 2006 95 pp.

- Ostrom, E. 2010. Polycentric systems for coping with collective action and global environmental change. *Global Environmental Change* 20: 550-557.
- Rosenau, J.N. (1995). Governance in the Twenty-First Century. *Global Governance*, 1:13-43.
- Rothwell, D. and T. Stephens. 2010. *The International Law of the Sea*. Hart Publishing, Oxford, UK.
- Sherman, K. 1994. Sustainability, biomass yields, and health of coastal ecosystems: an ecological perspective. *Marine Ecology Progress Series* 112: 277-301
- Sherman, K. 1999. Modular approach to the monitoring and assessment of large marine ecosystems. In Kumpf H, Steidinger K, Sherman K. Editors. *The Gulf of Mexico large marine ecosystem: assessment, sustainability and management*. Vol. 3, Maiden, MA: Blackwell Science, p 34-63.
- Sherman, K. and A.M. Duda. 1999. An ecosystem approach to global assessment and management of coastal waters. *Marine Ecology Progress Series* 190: 271-287.
- Sherman, K, M. Sissenwine, V. Christensen, A. Duda, G. Hempel, et al. 2005. A global movement toward an ecosystem approach to management of marine resources. *Marine Ecology progress Series* 300: 275-279.
- Sherman K and G. Hempel. 2009. The UNEP large marine ecosystem report: a perspective on changing conditions in LMEs of the world's Regional Seas. *UNEP Regional Seas Report and Studies No. 182*. Nairobi: UNEP, pp.872
- United Nations Environment Programme (UNEP). 2010. Modalities for advancing cross-sectoral cooperation in managing marine areas beyond national jurisdiction. Discussion paper, 12th Global Meeting of the Regional Seas Conventions and Action Plans, Bergen, Norway, 20th – 22nd September 2010. UNEP (DEPI)/RS.12 /8, 27 p.
- Wyborn, C. And R. P. Bixler. 2013. Collaboration and nested environmental governance: Scale dependency, scale framing, and cross-scale interactions in collaborative conservation. *Journal of Environmental Management*, 123:58-67
- Young O. R. 1999. *The effectiveness of international environmental regimes: causal connections and behavioural mechanisms*. MIT Press, Cambridge, MA.
- Young, O. R. 2002. *The institutional dimensions of environmental change: fit interplay and scale*. London: MIT Press, 221 pp.
- Young, O. R., G. Osherenko, J. Ekstrom, L.B. Crowder, J. Ogden, et. al. 2007. Solving the crisis in ocean governance: place-based management of marine ecosystems. *Environment*, 49 (4): 20–32.
- Young, O. R. 2013. Effectiveness of international environmental regimes: Existing knowledge, cutting-edge themes, and research strategies. *Proceedings of the National Academy of Sciences*. 108(50):19853-19860.

Appendix 1 – List of all agreements relevant to identified transboundary issues in Multi-Country LMEs

Non-Binding Agreements	Short Name of Agreement
ACPB-Alaska/Chukotka	MOU under Agreement on Conservation of Polar Bears
Arctic Council	Arctic Council
BIMSTEC	Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) Working Committee on Fisheries
CECAF	Fishery Committee for the Eastern Central Atlantic
COBSEA	Coordinating Body on the Seas of East Asia
CRFM	Agreement establishing the Caribbean Regional Fisheries Mechanism
Dugong CMS/MOU	Convention on Migratory Species of Wild Animals – Dugong MOU South East Asia
IOSEA	The Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia
NOWPAP	Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific Region
PEMSEA	Partnerships in Environmental Management for the Seas of East Asia
PIF	Pacific Island Forum
SACEP	South Asian Cooperative Environment Programme
SEAFDEC	South East Asian Fisheries Development Center
SEA-RPOA	Regional Plan of Action (RPOA) to Promote Responsible Fishing Practices (including Combating IUU Fishing) in the Region (South East Asia)
SPC	Secretariat of the Pacific Community
SWIOFC	Southwest Indian Ocean Fisheries Commission
WECAFC	Western Central Atlantic Fisheries Commission
Binding Agreements	Short Name of Agreement
Abidjan Convention	Abidjan Convention and 3 protocols, LBS and MBS Emergency
Antigua Convention	Antigua Convention
ACCOBAMS	Agreement on the Conservation of Cetaceans in the Black Sea Mediterranean Sea and Contiguous Atlantic Area
ACPB	Agreement on Conservation of Polar Bears
APFIC	Asia Pacific Fisheries Commission
ASCOBANS	Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas
ATS	Antarctic Treaty System and Environment Protocol

Barcelona Convention	Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean and 7 protocols: Dumping Protocol (from ships and aircraft); Prevention and Emergency Protocol (pollution from ships and emergency situations); Land-based Sources and Activities Protocol; Specially Protected Areas and Biological Diversity Protocol; Offshore Protocol (pollution from exploration and exploitation); Hazardous Wastes Protocol; Protocol on Integrated Coastal Zone Management (ICZM)
BCC	Benguela Current Convention
BOB-IGO	Agreement on the Institutionalisation of the Bay of Bengal Programme as an Inter-Governmental Organisation
Bonn	Agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances
Bucharest Convention	Convention on the Protection of the Black Sea against Pollution - Bucharest Convention and 4 protocols for LBS, MBS, Dumping and Emergencies
Cartagena Convention	Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region and 3 protocols, LBS, MBS and SPAW (Habitat)
CCAMLR	Convention for the Conservation of Antarctic Marine Living Resources
CCAS	Convention for the Conservation of Antarctic Seals
CCBSP	Convention on the Conservation & Management of Pollock Resources in the Central Bering Sea
CCSBT	Convention for the Conservation of the Southern Bluefin Tuna
COMHAFAT	Ministerial Conference on Fisheries Cooperation among African States Bordering the Atlantic (ATLAFCO/COMHAFAT)
COREP+	Convention Concerning the Regional Development of Fisheries in the Gulf of Guinea and the Regional Fisheries Committee for the Gulf of Guinea (COREP)
CPPS	Permanent Commission of the South Pacific
EU-CFP	European Union - Common Fisheries Policy
FCWC	Convention for the establishment of Fishery Committee of the West Central Gulf of Guinea
FFA	Pacific Islands Forum Fisheries Agency/South Pacific Forum Fisheries Agency Convention
GFCM	Agreement for the establishment of the General Fisheries Commission for the Mediterranean
Helsinki	Convention on the Protection of the Marine Environment of the Baltic Sea Area - Helsinki Convention and its annexes (HELCON)
IAC	Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)

IATTC	Convention for the Strengthening of the Inter-American Tropical Tuna Commission
ICCAT	International Convention for the Conservation of Atlantic Tunas
ICES	Convention for the International Council for the Exploration of the Sea
IOTC	Agreement for the establishment of the Indian Ocean Tuna Commission (IOTC)
IPHC	International Pacific Halibut Commission (IPHC)/Convention for the Preservation of the Halibut Fishery
Jeddah Convention	Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment - The Jeddah Convention and its 2 protocols on LBS and MBS
Kuwait Convention	Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution – Kuwait Convention and its 3 protocols, LBS, MBS and Emergencies
Lima Convention	Convention for the Protection of the Marine Environment and Coastal Areas of the South-East Pacific - The Lima Convention and its 4 protocols, LBS, MBS, Emergencies and Radioactive Substance
MEX-US	Agreement of Cooperation between the US and Mexico regarding Pollution of the Marine Environment by Discharges of Hydrocarbons and other Hazardous Substances
NAFO	Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries
Nairobi Convention	Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment of the West Indian Ocean and its 3 protocols on LBS, MBS and Emergencies
NAMMCO	Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North Atlantic
NASCO	Convention for the Conservation of Salmon in the North Atlantic Ocean
NEAFC	North-East Atlantic Fisheries Commission
Noumea Convention	Convention for the Protection of the Natural Resources and Environment of the South Pacific and its 2 protocols on LBS, Emergencies and Dumping
NPAFC	Convention for the Conservation of Anadromous Stocks in The North Pacific Ocean
OLDEPESCA	Agreement instituting the Latin American Organization for Fisheries Development
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention) and its annexes

OSPESCA	Central America Fisheries and Aquaculture Organization
PICES	Convention establishing a Marine Science Organization for the North Pacific
PSC	Pacific Salmon Commission
RECOFI	Partnerships in Environmental Management for the Seas of East Asia
Rio de la plata	Treaty of the Rio de la Plata and its Maritime Front
SEAFO	The Convention on the Conservation and Management of Fishery Resources in the South East Atlantic Ocean
SIOFA	South Indian Ocean Fisheries Agreement
SPRFMO	Convention on the Conservation and Management of High Seas Fishery Resources in the South Pacific Ocean
SRFC	Sub-Regional Fisheries Commission
WCPFC	Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean

Appendix 2 - Summary data for engagement by countries in each LME for each relevant agreement

LME	Agreement	Binding	Issue Category	# of Countries	# Ineligible	# engaged	% engaged
Agulhas-Somali Current	Dugong MOU	-	Biodiversity	10	-	8	80
	IOSEA	-	Biodiversity	10	-	9	90
	SWIOFC	-	Fisheries	10	-	10	100
	Nairobi PA/biodiversity protocol	1	Biodiversity	10	-	4	40
	IOTC	1	Fisheries	10	-	8	80
	SIOFA	1	Fisheries	10	3	2	29
	Nairobi	1	General	10	-	8	80
	Nairobi Emergency protocol	1	Pollution	10	-	4	40
	Nairobi LBS Protocol	1	Pollution	10	-	8	80
Antarctica	ICCAT	1	Fisheries	50	-	16	32
	ATS	1	General	50	-	50	100
	ATS Environmental Protocol	1	General	50	-	35	70
	CCAMLR	1	General	50	-	27	54
	CCAS	1	General	50	-	20	40
Arabian Sea	Dugong MOU	-	Biodiversity	14	-	6	43
	IOSEA	-	Biodiversity	14	3	9	82
	SACEP	-	General	14	11	3	100
	IOTC	1	Fisheries	14	-	6	43
	RECOFI	1	Fisheries	14	6	8	100

	Jeddah	1	Pollution	14	10	4	100
	Jeddah MBS Protocol	1	Pollution	14	10	4	100
	Kuwait	1	Pollution	14	6	8	100
	Kuwait LBS Protocol	1	Pollution	14	6	6	75
	Kuwait MBS Protocol	1	Pollution	14	6	8	100
	Kuwait Oil Spill Protocol	1	Pollution	14	6	8	100
	ATSEA-North Australia Shelf						
	Dugong MOU	-	Biodiversity	4	-	2	50
	IOSEA	-	Biodiversity	4	-	3	75
	SE Asia RPOA	-	Fisheries	4	-	4	100
	COBSEA	-	General	4	2	2	100
	PEMSEA	-	General	4	2	2	100
	APFIC	1	Fisheries	4	-	3	75
	FFA	1	Fisheries	4	-	2	50
	IOTC	1	Fisheries	4	2	2	100
	WCPFC	1	Fisheries	4	1	2	67
	Baltic Sea						
	ASCOBANS	1	Biodiversity	9	-	6	67
	NAMMCO	1	Biodiversity	9	-	-	-
	EU-CFP	1	Fisheries	9	-	8	89
	NASCO	1	Fisheries	9	-	2	22
	HELCON	1	General	9	-	9	100
	ICES	1	General	9	-	9	100

Barents Sea	OSPAR	1	General	9	4	4	80
	Bonn Agreement	1	Pollution	9	-	3	33
	Arctic Council	-	General	3	-	3	100
	ACPB	1	Biodiversity	3	-	3	100
	NAMMCO	1	Biodiversity	3	-	1	33
	ICCAT	1	Fisheries	3	-	2	67
	NASCO	1	Fisheries	3	-	2	67
	NEAFC	1	Fisheries	3	-	2	67
	ICES	1	General	3	-	3	100
	OSPAR	1	General	3	-	2	67
Bay of Bengal	Dugong MOU	-	Biodiversity	8	-	5	63
	IOSEA	-	Biodiversity	8	-	8	100
	SEAFDEC	-	Fisheries	8	4	4	100
	BIMSTEC	-	General	8	3	5	100
	COBSEA	-	General	8	5	3	100
	SACEP	-	General	8	4	4	100
	APFIC	1	Fisheries	8	-	7	88
	BOBP-IGO	1	Fisheries	8	-	4	50
	IOTC	1	Fisheries	8	1	6	86
	Arctic Council	-	General	2	-	2	100
Beaufort Sea	COMHAFAT	1	Fisheries	3	1	2	100

Black Sea	ICCAT	1	Fisheries	3	-	3	100
	SEAFO	1	Fisheries	3	-	3	100
	Abidjan Convention	1	General	3	-	1	33
	Benguela Current Convention	1	General	3	-	3	100
	Abidjan Convention Emergency Protocol	1	Pollution	3	-	1	33
	Abidjan Convention LBSA Protocol	1	Pollution	3	-	1	33
	ACCOBAMS	1	Biodiversity	6	-	4	67
	Bucharest Biodiversity & Landscape Protocol	1	Biodiversity	6	1	4	80
	EU-CFP	1	Fisheries	6	-	3	50
	GFCM	1	Fisheries	6	-	3	50
	ICCAT	1	Fisheries	6	4	2	100
	Bucharest Convention	1	General	6	-	6	100
	Bucharest Dumping Protocol	1	Pollution	6	-	6	100
	Bucharest Emergency Protocol	1	Pollution	6	-	6	100
	Bucharest LBS Protocol	1	Pollution	6	-	1	17
California Current	IAC	1	Biodiversity	2	-	2	100
	IATTC	1	Fisheries	2	-	2	100
	IPHC	1	Fisheries	2	1	1	100
	MEX-US	1	Fisheries	2		2	100
	NPAFC	1	Fisheries	2	1	1	100
	OLDEPESCA	1	Fisheries	2	1	1	100

Canadian Eastern Arctic - West Greenland	PSC	1	Fisheries	2	1	1	100
	Antigua	1	General	2	1	-	-
	PICES	1	General	2	1	1	100
	Arctic Council	-	General	2	-	2	100
	NAMMCO	1	Biodiversity	2	-	1	50
	ICCAT	1	Fisheries	2	-	1	50
	NAFO	1	Fisheries	2	-	2	100
Canadian High Arctic North Greenland Shelf	NASCO	1	Fisheries	2	-	2	100
	Arctic Council	-	General	2	-	2	100
	NAMMCO	1	Biodiversity	2	-	1	50
	ICCAT	1	Fisheries	2	-	1	50
	NAFO	1	Fisheries	2	-	2	100
	NASCO	1	Fisheries	2	-	2	100
	NEAFC	1	Fisheries	2	1	1	100
Canary Current	ICES	1	General	2	-	1	50
	OSPAR	1	General	2	-	1	50
	CECAF	-	Fisheries	7	-	7	100
	COMHAFAT	1	Fisheries	7	1	6	100
	ICCAT	1	Fisheries	7	-	4	57
	SRFC	1	Fisheries	7	2	5	100
	Abidjan Convention	1	General	7	2	4	80

Caribbean	Abidjan Emergency Protocol	1	Pollution	7	2	4	80
	Abidjan LBSA Protocol	1	Pollution	7	2	2	40
	CRFM	-	Fisheries	27	13	14	100
	WECAFC	-	Fisheries	27	2	23	92
	Cartagena SPAW Protocol	1	Biodiversity	27	-	14	52
	IAC	1	Biodiversity	27	-	8	30
	ICCAT	1	Fisheries	27	-	14	52
	OLDEPESCA	1	Fisheries	27	11	7	44
	OSPESCA	1	Fisheries	27	20	7	100
	Cartagena Convention	1	General	27	-	25	93
	Cartegena LBS Protocol	1	Pollution	27	-	10	37
	Catagena Oil Spill Protocol	1	Pollution	27	-	23	85
Celtic-Biscay Shelf	ASCOBANS	1	Biodiversity	3	-	2	67
	NAMMCO	1	Biodiversity	3	-	-	-
	EU-CFP	1	Fisheries	3	-	3	100
	ICCAT	1	Fisheries	3	-	2	67
	NASCO	1	Fisheries	3	-	-	-
	NEAFC	1	Fisheries	3	-	-	-
	ICES	1	General	3	-	3	100
	OSPAR	1	General	3	-	3	100
	Bonn Agreement	1	Pollution	3	-	3	100

Central Arctic	Arctic Council	-	General	4	-	4	100
	ACPB	1	Biodiversity	4	1	3	100
	NAMMCO	1	Biodiversity	4	-	2	50
	ICCAT	1	Fisheries	4	-	3	75
	NASCO	1	Fisheries	4	-	4	100
	NEAFC	1	Fisheries	4	1	3	100
	ICES	1	General	4	-	3	75
	OSPAR	1	General	4	-	1	25
East Bering Sea	Arctic Council	-	General	2	-	2	100
	ACPB	1	Biodiversity	2	-	2	100
	CCBSP	1	Fisheries	2	-	2	100
	IPHC	1	Fisheries	2	1	1	100
	NPAFC	1	Fisheries	2	-	2	100
	WCPFC	1	Fisheries	2	-	1	50
	PICES	1	General	2	-	2	100
East China Sea	Dugong MOU	-	Biodiversity	4	1	-	-
	NOWPAP	-	General	4	1	3	100
	PEMSEA	-	General	4	1	3	100
	APFIC	1	Fisheries	4	1	3	100
	WCPFC	1	Fisheries	4	1	3	100
	PICES	1	General	4	1	3	100

Faroe Plateau	Arctic Council	-	General	2	1	1	100
	NAMMCO	1	Biodiversity	2	1	1	100
	ICCAT	1	Fisheries	2	-	1	50
	NASCO	1	Fisheries	2	-	1	50
	NEAFC	1	Fisheries	2	-	1	50
	ICES	1	General	2	-	1	50
	OSPAR	1	General	2	-	2	100
Greenland Sea	Arctic Council	-	General	3	-	3	100
	ASCOBANS	1	Biodiversity	3	-	1	33
	NAMMCO	1	Biodiversity	3	-	2	67
	EU-CFP	1	Fisheries	3	-	2	67
	ICCAT	1	Fisheries	3	-	2	67
	NASCO	1	Fisheries	3	1	1	50
	NEAFC	1	Fisheries	3	-	3	100
	ICES	1	General	3	-	3	100
	OSPAR	1	General	3	-	3	100
	Bonn Agreement	1	Pollution	3	-	2	67
Guinea Current	CECAF	-	Fisheries	17	-	17	100
	COMHAFAT	1	Fisheries	17	1	15	94
	COREP	1	Fisheries	17	12	5	100
	FCWC	1	Fisheries	17	11	6	100

Gulf of Mexico	ICCAT	1	Fisheries	17	-	10	59
	SRFC	1	Fisheries	17	13	4	100
	Abidjan Convention	1	General	17	-	13	76
	Abidjan Emergency Protocol	1	Pollution	17	-	13	76
	Abidjan LBS Protocol	1	Pollution	17	-	-	-
	WECAFC	-	Fisheries	3	-	3	100
	Cartagena SPAW	1	Biodiversity	3	-	2	67
	IAC	1	Biodiversity	3	-	2	67
	ICCAT	1	Fisheries	3	-	2	67
	MEX-US	1	Fisheries	3	1	2	100
Gulf of Thailand	OLDEPESCA	1	Fisheries	3	1	2	100
	Cartagena Convention	1	General	3	-	3	100
	Cartagena LBS Protocol	1	Pollution	3	-	1	33
	Cartagena Oil Spills Protocol	1	Pollution	3	-	3	100
	Dugong MOU	-	Biodiversity	4	-	1	25
	IOSEA	-	Biodiversity	4	-	4	100
	SEAFDEC	-	Fisheries	4	-	4	100
	COBSEA	-	General	4	-	4	100
	PEMSEA	-	General	4	-	4	100
	APFIC	1	Fisheries	4	-	4	100
	FFA	1	Fisheries	4	-	-	-

Humboldt Current	IAC	1	Biodiversity	3	-	3	100
	Lima Management of CMPAs Protocol	1	Biodiversity	3	1	2	100
	IATTC	1	Fisheries	3	2	1	100
	OLDEPESCA	1	Fisheries	3	-	1	33
	SPRFMO	1	Fisheries	3	1	1	50
	CPPS	1	General	3	1	2	100
	Lima Convention	1	General	3	1	2	100
	Lima Hydrocarbons Protocol	1	Pollution	3	1	2	100
	Lima LBS Protocol	1	Pollution	3	1	2	100
	Lima Radioactive Protocol	1	Pollution	3	1	2	100
Iberian Coastal	ASCOBANS	1	Biodiversity	3	-	1	33
	NAMMCO	1	Biodiversity	3	-	-	-
	EU-CFP	1	Fisheries	3	-	3	100
	ICCAT	1	Fisheries	3	-	1	33
	NASCO	1	Fisheries	3	-	-	-
	NEAFC	1	Fisheries	3	-	-	-
	ICES	1	General	3	-	3	100
	OSPAR	1	General	3	-	3	100
	Bonn Agreement	1	Pollution	3	-	1	33
Iceland Shelf	Arctic Council	-	General	3	-	3	100
	NAMMCO	1	Biodiversity	3	-	3	100

Indonesian Sea	ICCAT	1	Fisheries	3	-	2	67
	NASCO	1	Fisheries	3	-	3	100
	NEAFC	1	Fisheries	3	-	3	100
	ICES	1	General	3	-	2	67
	OSPAR	1	General	3	-	3	100
	Dugong MOU	-	Biodiversity	2	-	-	-
	IOSEA	-	Biodiversity	2	-	1	50
	SEAFDEC	-	Fisheries	2	1	1	100
	COBSEA	-	General	2	1	1	100
	PEMSEA	-	General	2	-	2	100
	APFIC	1	Fisheries	2	-	2	100
	FFA	1	Fisheries	2	1	-	-
	IOTC	1	Fisheries	2	-	1	50
	WCPFC	1	Fisheries	2	1	-	-
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	NASCO	1	Fisheries	5	-	3	60

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	PEMSEA	-	General	7	1	6	100
	APFIC	1	Fisheries	7	1	5	83
	FFA	1	Fisheries	7	-	-	-
	WCPFC	1	Fisheries	7	2	2	40
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	WECAFC	-	Fisheries	2	-	2	100
	Cartagena SPAW	1	Biodiversity	2	-	1	50
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	ICCAT	1	Fisheries	2	-	1	50
	Cartagena Convention	1	General	2	-	2	100
	Cartagena LBS Protocol	1	Pollution	2	-	2	100
	Cartagena Oil Spill Protocol	1	Pollution	2	-	2	100
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	IOSEA	-	Biodiversity	3	-	3	100
	SEAFDEC	-	Fisheries	3	-	3	100
	COBSEA	-	General	3	-	3	100
	PEMSEA	-	General	3	-	3	100

West Bering Sea	APFIC	1	Fisheries	3	-	3	100
	FFA	1	Fisheries	3	-	-	-
	WCPFC	1	Fisheries	3	-	1	33
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Volume 1 • Large Marine Ecosystems

Supplement

Individual Governance Architecture Assessment
for Fifty Transboundary Large Marine Ecosystems



Intergovernmental Oceanographic Commission
Technical Series 119

Transboundary Waters Assessment Programme (TWAP) Assessment of Governance Arrangements for the Ocean

Volume 1 Transboundary Large Marine Ecosystems

<p>Supplement: Individual Governance Architecture Assessment for Fifty Transboundary Large Marine Ecosystems</p>

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Introduction

This Supplement is an accompaniment to the document published by the Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO) entitled *Transboundary Waters Assessment Programme (TWAP) Assessment of Governance Arrangements for the Ocean, Volume 1: Transboundary Large Marine Ecosystems*, Technical Series 119 (2015). This volume is one of the outputs of the Large Marine Ecosystem component of the Global Environment Facility (GEF) Transboundary Waters Assessment Programme (TWAP)(2013-2015). TWAP conducted indicator-based assessments for transboundary water systems in five categories: aquifers, rivers, lakes, Large Marine Ecosystems (LMEs) and Open Oceans. These included assessment of governance arrangements and overall architecture for transboundary systems.
















In the course of preparing this work, a separate assessment was carried out for each transboundary LME that is shared by two or more coastal States. The results of these individual LME assessments are provided in this Supplement in alphabetical order. For each LME, the assessment describes:

- The LME as a system to be governed
- The transboundary issues as identified in published documentation
- The governance arrangements addressing each transboundary issue, including the spatial overlap among the different arrangements and the level of country participation in each arrangement
- The assessment of the arrangements in terms of level of completeness of the policy cycle in place for each arrangement
- The assessment of transboundary integration of arrangements within systems
- A concluding paragraph identifying both the assessed scores for the three governance architecture indicators of completeness, integration and engagement and a level of risk associated with each of the scores obtained for each indicator.

This publication is intended to be a resource for LME practitioners and others interested in governance architecture of LMEs. Each LME chapter can be cut out and updated for use in furthering governance assessment of LMEs.

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-  California Current
-  Canadian Eastern Arctic - West Greenland
-  Canadian High Arctic North Greenland Shelf
-  Canary Current
-  Caribbean Sea
-  Celtic-Biscay Shelf
-  Central Arctic Ocean
-  East Bering Sea
-  East China Sea
-  Faroe Plateau
-  Greenland Sea
-  Guinea Current
-  Gulf of Mexico
-  Gulf of Thailand
-  Humboldt Current
-  Iberian Coastal
-  Iceland Shelf
-  Indonesian Sea
-  Kuroshio Current
-  Mediterranean
-  Newfoundland-Labrador Shelf
-  North Australian Shelf and Arafura-Timor Seas
-  North Brazil Shelf
-  North Sea

-  Northeast U.S Continental Shelf
-  Northern Bering-Chucki Seas
-  Norwegian Sea
-  Oyashio Current
-  Pacific Central American Coastal
-  Pacific Warm Pool
-  Patagonian Shelf
-  Red Sea
-  Scotian Shelf
-  Sea of Japan
-  Sea of Okhotsk
-  South Brazil Shelf
-  South China Sea
-  Southeast U.S. Continental Shelf
-  Sulu-Celebes Sea
-  West Bering Sea
-  Yellow Sea

Assessment of transboundary governance architecture for the Agulhas-Somali Current LME

1 The system to be governed

The system is the Agulhas-Somali Current LME. It was decided that these two LMEs should be treated together. During project development the review of oceanographic information led to the conclusion that the ecosystem extended beyond the boundaries of the two LMEs as previously defined. Therefore, the Agulhas-Somali Current LME Project area was expanded to include offshore areas as described in the TDA (ASCLME 2012a). The initial area and the expanded area include the marine waters of the countries shown in Table 1, as well as a significant area of High Seas.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapters II-4 and II-5), so a review is not provided here. This assessment is also informed by the governance assessment, TDA, PRODOC and draft SAP (ASCLME 2011, 2012a, 2012b).

Table 1. Percentage of Agulhas-Somali Current LME area taken up by the EEZ of each country and the High Seas for the combined Agulhas-Somali Current LMEs (area = 3,457,500 km²) and the expanded Agulhas-Somali Current LME (area = 14,875,940 km²)

Country	Percent of area	
	Combined LMEs	Expanded LME
Comoro Islands	4.7	1.1
France (Bassas da India)	3.5	0.4
France (Glorioso Islands)	1.2	0.3
France (Ile Europe)	3.6	0.8
France (Juan de Nova I.)	1.8	0.4
France (Mayotte)	1.8	0.4
France (Reunion)		2.1
Kenya	3.1	0.8
Madagascar	23.9	8.1
Mauritius		8.6
Mozambique	16.4	3.8
Seychelles	1.3	9.0
Somalia	13.3	4.7
South Africa	14.3	4.7
Tanzania	6.9	1.6
High Seas	4.1	51.0

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Issues to be governed

The issues to be addressed by governance were identified in the TDA (ASCLME 2012 b). Fifty transboundary issues were identified and grouped under four Main Areas of Concern (MACs) as outlined below:

- Water quality degradation
 - Alteration of natural river flow and changes in freshwater input and sediment load

- Habitat and community modification
 - Shoreline change, due to modification, land reclamation and coastal erosion
 - Disturbance, damage and loss of coastal, watershed and upland habitats²
 - Disturbance, damage and loss of subtidal benthic habitats³
 - Disturbance, damage and degradation of pelagic habitats⁴
 - Increase in the occurrence of harmful or toxic algal blooms (HABs)
 - Introduction of exotic non-native species, invasives and nuisance species
- Declines in living marine resources
 - Declines in populations of focal species⁵
 - Declines in populations of commercial fish stocks⁶
 - Declines in populations of commercial invertebrates⁷

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

¹ Microbiological contamination from land-based (domestic, industrial, agriculture and livestock) and marine (mariculture, shipping) sources, nutrient enrichment from land-based (domestic, industrial, agriculture, livestock) and marine (mariculture) sources, chemical contamination (excluding oil spills) from land-based (domestic, industrial and agricultural) and marine (shipping, dumping at sea) sources, suspended solids in coastal waters due to human activities on land and in the coastal zone, solid wastes / marine debris (plastics etc.) from shipping and land-based-sources, oil spills (drilling, exploitation, transport, processing, storage, shipping).

² Upland/watershed habitats (>10 m elevation), coastal forest habitats, coastal habitats (beaches, dunes, coastal vegetation and flood plain habitats to 10 m elevation), wetland habitats, estuarine habitats, mangrove habitats,

³ Coral reef habitats, seagrass habitats, macroalgal habitats, soft sediment habitats, deep water habitats (including sea mounts).

⁴ Nearshore <30 m, neritic 30-200m and oceanic >200m depth.

⁵ Marine mammals, cetaceans, seabirds, turtles

⁶ Sharks and rays, arge pelagic, small pelagics, deep water demersals, reef and demersal fish

⁷ Molluscs (bivalves, gastropods), abalone, cephalopods, sea cucumbers, sea urchins, prawns and shrimp, lobsters, crayfish, crabs.

2.2 Identify transboundary arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

- Convention for the Conservation of the Southern Bluefin Tuna (CCSBT)
- Indian Ocean Tuna Commission (IOTC)
- South Indian Ocean Fisheries Agreement (SIOFA)
- Southwest Indian Ocean Fisheries Commission (SWIOFC)
- Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment of the West Indian Ocean (Nairobi Convention)
 - Protocol Concerning Protected Areas and Wild Fauna and Flora in the Eastern African Region (PA/Biodiversity Protocol)
 - Protocol Concerning Co-operation in Combating Marine Pollution in Cases of Emergency in the Eastern African Region (Emergency Protocol)
 - Protocol for the Protection of the Marine and Coastal Environment of the Western Indian Ocean from Land-Based Sources and Activities (LBS Protocol).
- African Centre for Capacity Building in Ocean Governance (AfriCOG)
- Southern Indian Ocean Deepsea Fisheries Association (SIODFA)
- Indian Ocean MOU on Port State Control (IMO IO PSC MOU)
- Western Indian Ocean Marine Science Association (WIOMSA)
- Coastal Ocean Research and Development in the Indian Ocean (CORDIO)
- Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)
- A Strategic Action Programme for Sustainable Management of the Western Indian Ocean Large Marine Ecosystems (not yet endorsed)
- East African Action Plan, 1981

The extent to which the geographical area of coverage of the major regional intergovernmental agreements overlaps the Agulhas-Somali Current LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Agulhas-Somali Current LME

Agreement	Combined LMEs			Expanded LME		
	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME ⁸	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME
CCSBT	2	46	D	9	45	D
IOTC	6	99	C	24	100	C
SIOFA	<0.1	4	D	27	48	D
SWIOFC	36	88	D	81	46	D
Nairobi Convention and protocols	53	96	C	100	42	B
IMO IO PSC MOU		100	B	100		B
IOSEA	100		C	100		C
Dugong MOU						

The extent of country membership in these bodies and instruments for the Agulhas-Somali Current LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Agulhas-Somali Current LME

Coastal countries in the LME	Agreements										
	Nairobi Convention				CCSBT	IOTC	SIOFA	SWIOFC	IMO IO PSC MOU	IOSEA	Dugong MOU
	2010	PA/biodiversity Protocol	Emergency Protocol	LBS Protocol							
Comoro I.	B			B	N	B		C	C	C	C
France (all)	B	B	B	B	N	B	B	C	C	C	C
Kenya	B			B	N	B		C	C	C	C
Madagascar		B	B		N	B		C		C	C
Mauritius	B			B	N	B	B	C	C	C	
Mozambique	B			B	N	B		C	C	C	C
Seychelles	B	B	B	B	N	B	B	C		C	C
Somalia	B	B	B	B	N		N	C			C
South Africa					N		N	C	C	C	
Tanzania	B			B	N	B	N	C	C	C	C
% engagement	80	40	40	80		80	29	100	70	90	80
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed											

⁸ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

2.2.1 Assessment of issues

The arrangements for the issues identified above are summarized in Table 4a-h. An overall summary is presented in Table 5.

Table 4a: Agulhas-Somali Current LME ¹ – Summary for fisheries – Small pelagics and demersal finfish and invertebrates in national waters					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	SWIOFC Scientific Committee	Supra-LME	3		<ul style="list-style-type: none">• ABNJ fisheries are only significant for the expanded area• Role of ASCLME Project?
Policy decision-making	SWIOFC Commission	Supra-LME	1		
Planning analysis and advice	SWIOFC Scientific Committee	Supra-LME	3		
Planning decision-making	SWIOFC Commission	Supra-LME	1		
Implementation	CPs Secretariat	National Supra-LME	1		
Review and evaluation	Scientific Committee	Supra-LME	2		
Data and information	CPs Secretariat	National Supra-LME	2		
Overall total and % completeness >>			13/21 = 62		

Table 4b: Agulhas-Somali Current LME – Summary for fisheries – Small pelagics and demersal finfish and invertebrates in ABNJ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	None yet established	NA	0		• Role of ASCLME Project?
Policy decision-making	Meeting of the Parties	Supra-LME	3		
Planning analysis and advice	None yet established	NA	0		
Planning decision-making	Meeting of the Parties	Supra-LME	3		
Implementation	CPs	National Supra-LME	0		
Review and evaluation	CPs Meeting of Parties	National	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			9/21 = 43		

Table 4c: Agulhas-Somali Current LME – Transboundary arrangement for fisheries – HMS (tuna and tuna-like)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IOTC Scientific Committee, sub-commissions, and working parties	Supra-LME	3		<ul style="list-style-type: none">• Somalia and South Africa are not members of IOTC• Does SWIOFC have any role in tuna?• Is there any regionally coordinated ASCLME approach to IOTC?• Are there stocks of small tunas that are mainly within the LME that come under IOTC? If so, does IOTC do anything with them?• Are there trophic interactions between the oceanic tunas (large scale distribution) and small pelagics in the LME that require linkages in management?
Policy decision-making	IOTC Commission	Supra-LME	1		
Planning analysis and advice	IOTC Scientific Committee, sub-commissions, and working parties	Supra-LME	3		
Planning decision-making	IOTC Commission	Supra-LME	2		
Implementation	Countries	National	1		
Review and evaluation	IOTC Scientific Committee	Supra-LME	2		
Data and information	IOTC Secretariat	Supra-LME	2		
Overall total and % completeness >>			14/21 = 67%		

Table 4d: Agulhas-Somali Current LME – Summary for Pollution - LBS					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	LBS Protocol tech committee	LME	1		<ul style="list-style-type: none">• The policy process for this protocol operates under the umbrella of the Nairobi convention process• Role of ASCLME Project?
Policy decision-making	LBS Protocol COP	LME	1		
Planning analysis and advice	LBS Protocol tech committee	LME	1		
Planning decision-making	LBS Protocol COP	LME	1		
Implementation	CPs Secretariat	National LME	1		
Review and evaluation	LBS Protocol tech committee LBS Protocol COP	LME	2		
Data and information	CPs Secretariat	National LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 4e: Agulhas-Somali Current LME – Summary for Pollution – MBS					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CPs	National	0	IMO	<ul style="list-style-type: none"> • The policy process for this protocol operates under the umbrella of the Nairobi convention process • Role of ASCLME Project?
Policy decision-making	Emergency Protocol COP	Supra-LME	1		
Planning analysis and advice	CPs	National	0		
Planning decision-making	Emergency Protocol COP	Supra-LME	1		
Implementation	CPs Secretariat	National Supra-LME	1		
Review and evaluation	CPs Secretariat/IMO	National Supra-LME	1		
Data and information	CPs Secretariat/IMO	National Supra-LME	1		
Overall total and % completeness >>			5/21 = 24%		

Table 4f: Agulhas-Somali Current LME – Summary for Biodiversity – PAs					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	PA/biodiversity Protocol tech committee	Supra-LME	1		<ul style="list-style-type: none">• The policy process for this protocol operates under the umbrella of the Nairobi convention process• Role of ASCLME Project?
Policy decision-making	PA/biodiversity Protocol COP Nairobi Convention COP	Supra-LME	1		
Planning analysis and advice	PA/biodiversity Protocol tech committee	Supra-LME	1		
Planning decision-making	PA/biodiversity Protocol COP	Supra-LME	1		
Implementation	CPs Secretariat	National Supra-LME	1		
Review and evaluation	PA/biodiversity Protocol tech committee PA/biodiversity Protocol COP	Supra-LME	2		
Data and information	CPs Secretariat	National Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 4g: Aghulas-Somali Currents LME – Transboundary arrangement for biodiversity - specific (sea turtles)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		<ul style="list-style-type: none">• This is an MOU under CMS• Role of ASCLME Project?
Policy decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Planning analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		
Planning decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Implementation	IOSEA – sea turtle MOU CPs	National	0		
Review and evaluation	IOSEA – sea turtle MOU Secretariat	Supra-LME	2		
Data and information	IOSEA – sea turtle MOU CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 4h: Agulhas-Somali Current LME – Transboundary arrangement for biodiversity - specific (dugong)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CPs	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	CPs	Supra-LME	2		
Planning analysis and advice	CPs	Supra-LME	2		
Planning decision-making	CPs	Supra-LME	2		
Implementation	CPs	Supra-LME National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

2.2.2 Issues mentioned in the TDA but not addressed above:

Table 5: Agulhas-Somali Current LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries:	System name: Agulhas-Somali Current		Region:??
Complete these columns then assess issues using the arrangements tables			After completing the arrangements tables, complete these columns		
Trans-boundary issue ²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – EEZs	10		62		SWIOFC
Fisheries – ABNJ	10		43		SIOFA
Fisheries – HMS	10		67		IOTC
Pollution - LBS	10		38		Nairobi
Pollution - MBS	10		24		
Biodiversity – PAs and	10		38		
Biodiversity - specific (sea turtles)	10		52		IOSEA MOU
Biodiversity – specific (dugong)	10		52		CMS MOU
	System architecture completeness index >>		47%		<< System priority for intervention

2.3 Assess transboundary integration of arrangements within systems

The assessment of transboundary integration is based on the extent to which issue specific arrangements in an LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-g) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 5)								
Policy cycle stage	Fisheries - EEZs	Fisheries - ABNJ	Fisheries - HMS	Pollution - LBS	Pollution - MBS	Pollution - PAs and general	Biodiversity - Specific (Sea turtles)	Biodiversity - specific (dugongs)
Policy analysis and advice	SIOFC Scientific Committee	None yet established	IOTC Scientific Committee, sub-commissions, and working parties	LBS Protocol tech committee	CPs	PA/biodiversity Protocol tech committee	IOSEA MOU CPs Secretariat Advisory Committee	MOU CPs
Policy decision-making	SIOFC Commission	Meeting of the Parties	IOTC Commission	LBS Protocol COP	Emergency Protocol COP	PA/biodiversity Protocol COP Nairobi Convention COP	IOSEA MOU Meeting of Parties	MOU CPs
Planning analysis and advice	SIOFC Scientific Committee	None yet established	IOTC Scientific Committee, sub-commissions, and working parties	LBS Protocol tech committee	CPs	PA/biodiversity Protocol tech committee	IOSEA MOU CPs Secretariat Advisory Committee	MOU CPs
Planning decision-making	SIOFC Commission	Meeting of the Parties	IOTC Commission	LBS Protocol COP	Emergency Protocol COP	PA/biodiversity Protocol COP	IOSEA MOU Meeting of Parties	MOU CPs
Implementation	CPs Secretariat	CPs	Countries	CPs Secretariat	CPs Secretariat	CPs Secretariat	IOSEA MOU CPs	MOU CPs
Review and evaluation	Scientific Committee	CPs Meeting of Parties	IOTC Scientific Committee	LBS Protocol tech committee LBS Protocol COP	CPs Secretariat/IMO	PA/biodiversity Protocol tech committee PA/biodiversity Protocol COP	IOSEA MOU Secretariat	Secretariat
Data and information	CPs Secretariat	CPs	IOTC Secretariat	CPs Secretariat	CPs Secretariat/IMO	CPs Secretariat	IOSEA MOU CPs	MOU CPs

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	1	0	1	0	0	0	0	0.3
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
4 and 5	1	1	1	1	1	1	1	1
4 and 6	1	1	1	1	1	1	1	1
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
5 and 6	1	1	1	1	1	1	1	1
5 and 7	0	0	0	0	0	0	0	0
5 and 8	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
6 and 8	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
Average	0.14	0.11	0.14	0.11	0.11	0.11	0.11	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the eight issues is 0.1 out of a possible 1.

3 Conclusions

In this LME, the two arrangements for fisheries in the areas within national jurisdiction (SWIOFC) and demersal resources in ABNJ (SIOFA) are supposed to be closely connected but given the fact that the latter is not fully operational, it is difficult to tell if this is happening. The arrangements for pollution and biodiversity that fall under the Nairobi Convention are also linked. However neither of these sets appears to be integrated with each other or with the tuna arrangement. Further, no integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. However, the ASCLME Project appears to be performing that role. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Agulhas-Somali Current LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Agulhas-Somali Current LME	Completeness	Integration	Engagement
	47%	0.1	69%

4 References

Anon. 2011. Report of the Performance Review of the South West Indian Ocean Fisheries Commission. FAO, Rome, 64 p.

ASCLME/SWIOFP 2012. Transboundary Diagnostic Analysis for the western Indian Ocean. Volume 2: Diagnostic Analysis. ASCLME Project, Grahamestown, South Africa

ASCLME. 2013. A Strategic Action Programme for Sustainable Management of the Western Indian Ocean Large Marine Ecosystems.

ASCLME. 2011. Regional policy and governance assessment for the Agulhas and Somali Current Large Marine Ecosystems (ASCLME) Region. ASCLME Project, 81 p.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱTable notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱTable notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 4 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share

the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Antarctica LME

1 The system to be governed

The system is the Antarctica LME. This unique LME is very fragile and is considered a low productivity ecosystem based on its extreme weather conditions. It covers a surface area of about 3 million km² within the marine waters of Antarctica (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter 57), so a review is not provided here.

Table 1. Percentage of Antarctica LME area taken up by the EEZ of each country and the High Seas	
Country (N to S)	Percent of LME area
Antarctica	99.6
High Seas	0.4

2 Governance arrangements

2.1 Transboundary Issues to be governed

The issues to be addressed by governance were identified in the:

- Fisheries
 - prevalence of demersal catches; possible depletion of the Antarctic cod, ice fish, and Patagonian toothfish; potential for overfishing
- Biodiversity
 - mass removal of baleen whales; negative impact from UV radiation on surface phytoplankton productivity, causing damage in the eggs and larvae of ice fish and lack of hemoglobin in Antarctic fish; disruption to the food web (caused by increased acidity)
- Pollution
 - chemical contaminants (copper, lead, zinc and cadmium) leaching from rubbish dumped in old tip sites, machinery parts and fuel drums during the summer melt; possible negative effects from tourists and scientists at laboratory stations
- Climate Change
 - negative impacts from anthropogenic environmental change; increased UV radiation; increased acidity; ice shelves disintegration

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

In general, Antarctica and the surrounding waters have a special status that requires international cooperation. However, the key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements governing this LME are:

1. Antarctic Treaty System (ATS)
 - a. Protocol on Environmental Protection
2. Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR)
3. Convention for the Conservation of Antarctic Seals (CCAS)
4. The International Commission for the Conservation of Atlantic Tunas (ICCAT)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Antarctica LME is shown in Table 2.

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
Antarctic Treaty System (ATS) and its Protocol	13	100	C
Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR)	8	100	C
Convention for the Conservation of Antarctic Seals (CCAS)	13	100	C
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	34	D

The extent of country membership in these bodies and instruments for the Antarctica LME is shown in Table 3.

Countries participating in Agreements in the LME ²	Agreements				
	ATS	Env Protocol	CCAMLR	CCAS	ICCAT
Argentina	B	B	B	B	
Austria	B	C			
Australia	B	B	B	B	
Belarus	B	B			

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

² Note: The Antarctic LME is a special case with regard to countries in the LME. As such, only those countries who have ratified the Antarctic Treaty are listed in this Table. Similarly, only those countries within the list that have ratified ICCAT are indicated with a B.

Countries participating in Agreements in the LME ²	Agreements				
	ATS	Env Protocol	CCAMLR	CCAS	ICCAT
Belgium	B	B	B	B	
Brazil	B	B		B	B
Bulgaria	B	B	B	B	
Canada	B	B	B	B	B
Chile	B	B	B	B	
China	B	B	B	B	B
Colombia	B	C			
Cuba	B	C			
Czech Republic	B	B			
Denmark	B	C			
Ecuador	B	B			
Estonia	B				
European Union					B
Finland	B	B	B		
France	B	B	B	B	B
Germany	B	B	B	B	
Greece	B	B			
Guatemala	B	C			
Hungary	B	C			
India	B	B	B		
Italy	B	B	B	B	B
Japan	B	B	B	B	B
Korea (North)	B	C			
Korea (South)	B	B	B		B
Malaysia	B				
Monaco	B	B			
Netherlands	B	B	B		
New Zealand	B	B	B	B	
Norway	B	B	B	B	B
Pakistan	B	B	B		
Papua New Guinea	B	C			
Peru	B	B	B	B	
Poland	B	B	B	B	
Portugal	B				
Romania	B	B			
Russian Federation	B	B	B	B	B
Slovak Republic	B	C			
South Africa	B	B	B	B	B
Spain	B	B	B		
Sweden	B	B	B		
Switzerland	B	C			

Table 3. Country membership in regional marine agreements relevant to the Antarctica LME					
Countries participating in Agreements in the LME ²	Agreements				
	ATS	Env Protocol	CCAMLR	CCAS	ICCAT
Turkey	B	C			B
Ukraine	B	B			
United Kingdom	B	B	B	B	B
United States	B	B	B	B	B
Uruguay	B	B	B		B
Venezuela	B				B
% engagement	100	70	54	40	32
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed					

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-e. They are summarised in Table 5

Table 4a. Antarctica LME ¹ – Transboundary arrangement for Pollution(LBS and MBS), Fisheries (EEZ-ABNJ) and Biodiversity - General					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Antarctic Treaty Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Supra-LME	3		
Policy decision-making	Antarctic Treaty Consultative Meeting (ATCM)	Supra-LME	3		
Planning analysis and advice	Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Supra-LME	3		
Planning decision-making	Antarctic Treaty Consultative Meeting (ATCM)	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	ATCM, supported by the CEP reviews implementation of measures	Supra-LME	2		
Data and information	Joint Committee on Antarctica Data Management	Supra-LME	3		
Overall total and % completeness >>			17/21 = 81%		

Table 4b. Antarctica LME – Transboundary arrangement for Pollution(LBS and MBS)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Protocol on Environmental Protection - Antarctic Treaty Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Supra-LME	3		
Policy decision-making	None specific to protocol (uses AT decision-making body)		0		
Planning analysis and advice	Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Supra-LME	3		
Planning decision-making	None specific to protocol (uses AT decision-making body)		0		
Implementation	Countries	National	0		
Review and evaluation	CEP reviews implementation of measures	Supra-LME	2		
Data and information	Joint Committee on Antarctica Data Management	Supra-LME	3		
Overall total and % completeness >>			11/21 = 53%		

Table 4c. Antarctica LME – Transboundary arrangement for Biodiversity – Specific (Seals)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CCAS Scientific Committee on Antarctic Research (SCAR).	Supra-LME	3		
Policy decision-making	None (uses Antarctic Treaty Consultative Meeting)		0		
Planning analysis and advice	CCAS Scientific Committee on Antarctic Research (SCAR).	Supra-LME	3		
Planning decision-making	None (uses Antarctic Treaty Consultative Meeting)		0		
Implementation	Countries	National	0		
Review and evaluation	CCAS Scientific Committee on Antarctic Research (SCAR).	Supra-LME	0		
Data and information	Countries CCAS Scientific Committee on Antarctic Research (SCAR)	National Supra-LME	3		
Overall total and % completeness >>			9/21 = 43%		

Table 4d. Antarctica LME – Transboundary arrangement for Fisheries – EEZ-ABNJ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CCAMLR - Scientific Committee, Standing Committee on Implementation and Compliance, Standing Committee on Administration and Finance.	Supra-LME	3		
Policy decision-making	CCAMLR Commission	Supra-LME	3		
Planning analysis and advice	CCAMLR - Scientific Committee, Standing Committee on Implementation and Compliance, Standing Committee on Administration and Finance.	Supra-LME	3		
Planning decision-making	CCAMLR Commission	Supra-LME	3		
Implementation	Countries	National	1		
Review and evaluation	Scientific Committee Standing Committee on Implementation and Compliance (SCIC)	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4e. Antarctica LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			17/21 = 81%		

Table 5: Antarctica LME governance architecture - System summary ⁱⁱ				
IW category: Marine region	Countries:	System name: Antarctica		Region: Antarctic
<i>Complete these columns then assess issues using the arrangements tables</i>		<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries –EEZ/ABNJ		86%		CCAMLR
Fisheries – large pelagics (tunas and tuna-like)		81%		ICCAT
Biodiversity – Specific (Seals)		43%		CCAS
Pollution – MBS		81%		Antarctic Treaty
Pollution –LBS		81%		Antarctic Treaty
Biodiversity – General		81%		Antarctic Treaty
Pollution – MBS		53%		AT Env. Protocol
Pollution – LBS		53%		AT Env Protocol
	System architecture completeness index >>	70%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-4e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a - e)								
Policy cycle stage	Fisheries - HMS	Fisheries – EEZ/ABNJ	Pollution - LBS	Pollution - MBS	Biodiversity - General	Pollution - LBS	Pollution - MBS	Biodiversity - Specific (Seals)
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	CCAMLR - Scientific Committee, Standing Committee on Implementation and Compliance, Standing Committee on Administration and Finance.	Antarctic Treaty Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Antarctic Treaty Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Antarctic Treaty Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Protocol on Environmental Protection - Antarctic Treaty Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Protocol on Environmental Protection - Antarctic Treaty Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	CCAS Scientific Committee on Antarctic Research (SCAR).
Policy decision-making	ICCAT Commission	CCAMLR Commission	Antarctic Treaty Consultative Meeting (ATCM)	Antarctic Treaty Consultative Meeting (ATCM)	Antarctic Treaty Consultative Meeting (ATCM)	None specific to protocol (uses AT decision-making body)	None specific to protocol (uses AT decision-making body)	None (uses Antarctic Treaty Consultative Meeting)
Planning analysis and advice	ICCAT SCRS and Species Panels	CCAMLR - Scientific Committee, Standing Committee on Implementation and Compliance,	Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific	Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the	Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific	Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific	Committee on Environmental Protection (CEP) supported by Scientific Committee on Antarctic Research, the Scientific	CCAS Scientific Committee on Antarctic Research (SCAR).

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a - e)								
Policy cycle stage	Fisheries - HMS	Fisheries – EEZ/ABNJ	Pollution - LBS	Pollution - MBS	Biodiversity - General	Pollution - LBS	Pollution - MBS	Biodiversity - Specific (Seals)
		Standing Committee on Administration and Finance.	Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Scientific Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	Committee for the Conservation of Antarctic Marine Living Resources, the Council of Managers of National Antarctic Programmes. CEP may establish Intersessional Contact Groups (ICG) for substantive tasks	
Planning decision-making	ICCAT Commission	CCAMLR Commission	Antarctic Treaty Consultative Meeting (ATCM)	Antarctic Treaty Consultative Meeting (ATCM)	Antarctic Treaty Consultative Meeting (ATCM)	None specific to protocol (uses AT decision-making body)	None specific to protocol (uses AT decision-making body)	None (uses Antarctic Treaty Consultative Meeting)
Implementation	Countries	Countries	Countries	Countries	Countries	Countries	Countries	Countries
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Scientific Committee Standing Committee on Implementation and Compliance (SCIC)	ATCM, supported by the CEP reviews implementation of measures	ATCM, supported by the CEP reviews implementation of measures	ATCM, supported by the CEP reviews implementation of measures	CEP reviews implementation of measures	CEP reviews implementation of measures	CCAS Scientific Committee on Antarctic Research (SCAR).
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries Secretariat	Joint Committee on Antarctica Data Management	Joint Committee on Antarctica Data Management	Joint Committee on Antarctica Data Management	Joint Committee on Antarctica Data Management	Joint Committee on Antarctica Data Management	Countries CCAS Scientific Committee on Antarctic Research (SCAR)

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
2 and 3	1	0	1	0	0	0	0	0.29
2 and 4	1	0	1	0	0	0	0	0.29
2 and 5	1	0	1	0	0	0	0	0.29
2 and 6	1	0	1	0	0	0	0	0.29
2 and 7	1	0	1	0	0	0	0	0.29
2 and 8	0	0	0	0	0	0	0	0
3 and 4	1	1	1	1	0	1	1	0.86
3 and 5	1	1	1	1	0	1	1	0.86
3 and 6	1	0	1	0	0	0	1	0.43
3 and 7	1	0	1	0	0	0	1	0.43
3 and 8	1	0	1	0	0	0	0	0.29
4 and 5	1	1	1	1	0	1	1	0.86
4 and 6	1	0	1	0	0	0	1	0.43
4 and 7	1	0	1	0	0	0	1	0.43
4 and 8	1	0	1	0	0	0	0	0.29
5 and 6	1	0	1	0	0	0	1	0.43
5 and 7	1	0	1	0	0	0	0	0.29
5 and 8	1	0	1	0	0	0	0	0.29
6 and 7	1	0	1	0	0	1	1	0.57
6 and 8	1	0	1	0	0	1	1	0.57
7 and 8	1	0	1	0	0	0	0	0.29
Average	0.71	0.02	0.71	0.02	0	0.18	0.36	0.3

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the eight issues is 0.3 out of a possible 1.

3 Conclusions

Given that decision making for the entire Antarctic Treaty System (ATS) rests primarily with the Antarctic Treaty Consultative Meeting, comprised of contracting parties that meet the requirements of the Treaty in terms of activities within the area of competence, transboundary issues within this LME appear to be highly integrated, despite the scoring for individual agreements within the Treaty system. As such, this LME has been assigned an overall integration score of 1.0 due to the presence

of the Antarctic Treaty System (ATS) with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Antarctica LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Antarctica LME	Completeness	Integration	Engagement
	70%	1.0	59%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jetic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp. <http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Arabian Sea LME

1 The system to be governed

The system is the Arabian Sea LME. The Arabian Sea LME lies in the northwestern Indian Ocean between the Arabian Peninsula and India, and is bordered by Bahrain, Djibouti, India, Iran, Iraq, Kuwait, Maldives, Oman, Pakistan, Qatar, Saudi Arabia, Somalia, United Arab Emirates (UAE) and Yemen. It covers an area of over 3.9 million km². A substantial component of the LME is considered high seas with the remainder the marine waters of the LME under the jurisdiction of the countries as indicated in Table 1.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter VI-9), so a review is not provided here. The assessment is also informed by the UNEP (2006) GIWA Thematic Report 52 for the Arabian Sea.

Table 1. Percentage of Arabian Sea LME area taken up by the EEZ of each country and the High Seas (area = 3,920,027 km²)

Country	Percent of LME area
Bahrain	0.2
Djibouti	0.2
India	25.8
Iran	4.1
Iraq	0
Kuwait	0.3
Maldives	1.3
Oman	13.6
Pakistan	5.6
Qatar	0.8
Saudi Arabia	0.9
Somalia	3.5
UAE	1.4
Yemen	10.8
High Seas	31.6

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance Arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 9 (Sherman and Hempel, 2009) and the UNEP (2006) report:

- Fisheries
 - inshore coastal pelagics and demersal over-exploitation
 - maintain large oceanic tuna landings
 - bycatch in demersal fisheries exceed landings
- Pollution
 - LBS (eutrophication from sewage and industrial wastes, heavy metals, chlorinated pesticides and persistent toxic substances)
 - MBS (hydrocarbon production and transportation)
- Biodiversity/Habitat modification
 - coastal development, draining of marshland and reduction in river discharges due to diversion of major river systems

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Indian Ocean Tuna Commission (IOTC)
2. Regional Commission for Fisheries(RECOFI)
3. South Indian Ocean Fisheries Agreement (SIOFA) – area of competence occupies less than 1% of the LME
4. Regional Organization for the Protection of the Marine Environment (ROPME)
5. Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment - The Jeddah Convention (Jeddah)
6. Kuwait Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution.
 - a. Oil Spill Protocol and Protocol concerning Marine Pollution from Exploration of the Continental Shelf
 - b. Protocol concerning the Protection of the Marine Environment from Land-Based Sources
7. The Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA)
8. South Asian Cooperative Environment Programme (SACEP)
 - a. South Asian Seas Action Plan (SESAP)
9. Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)
10. Action Plan for the Protection of the Marine Environment and the Coastal Areas of Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates, 2001
11. East African Action Plan, 1981

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Arabian Sea LME is shown in Table 2.

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of Agreement to LME ¹
Agreement for the establishment of the Indian Ocean Tuna Commission (IOTC)	6	100	C
Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment – Jeddah	55	15	D
Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution – Kuwait Convention	99	18	B
Agreement for the establishment of Regional Commission for Fisheries (RECOFI)	99	12	B
South Indian Ocean Fisheries Agreement (SIOFA)	<1	<1	D
MOU on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA)		100	C
South Asian Cooperative Environment Programme (SACEP)			
Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)		100	C

The extent of country membership in these bodies and instruments for the Arabian Sea LME is shown in Table 3.

Coastal countries in the LME	Agreements										
	IOTC	Jeddah	Jeddah MBS protocol	Kuwait	Kuwait MBS protocol	Kuwait Oil Spill protocol	Kuwait LBS Protocol	RECOFI	IOSEA	SACEP	Dugong MOU
Bahrain		N	N	B	B	B	B	B	C	N	C
Djibouti		B	B	N	N	N	N	N		N	
India	B	N	N	N	N	N	N	N	C	C	C
Iran	B	N	N	B	B	B	B	B	C	N	
Iraq		N	N	B	B	B	N	B	N	N	
Kuwait		N	N	B	B	B	B	B	N	N	
Maldives	B	N	N	N	N	N	N	N	C	C	
Oman	B	N	N	B	B	B	B	B	C	N	
Pakistan	B	N	N	N	N	N	N	N	C	C	
Qatar		N	N	B	B	B	B	B	N	N	
Saudi Arabia		B	B	B	B	B	B	B	C	N	C
Somalia		B	B	N	N	N	N	N		N	C

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

UAE		N	N	B	B	B	C	B	C	N	C
Yemen	B	B	B	N	N	N	N	N	C	N	C
% engagement	43	100	100	100	100	100	75	100	82	100	43
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed											

2.2.1 Assessment of transboundary issues

The arrangements for the issues identified above are summarized in Tables 4a - 4i. An overall summary is presented in Table 5.

Table 4a: Arabian Sea LME ¹ – Transboundary Arrangements for Fisheries – HMS (tuna and tuna like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IOTC - Scientific Committee Sub-commission	Supra-LME	3		6 of the 14 states are members of IOTC. 3 countries with the largest share of the LME are members of IOTC. Given that one-third of the LME is high-seas, should potential for countries to have a shared interest in large pelagics be higher? Why are countries not members of IOTC?
Policy decision-making	IOTC - Commission	Supra-LME	1		
Planning analysis and advice	IOTC - Scientific Committee Sub-commission	Supra-LME	3		
Planning decision-making	IOTC - Commission	Supra-LME	2		
Implementation	Countries	National	1		
Review and evaluation	Countries	National	2		
	IOTC - Scientific committee, sub-commissions, and working parties	Supra-LME			
Data and information	Countries IOTC - Secretariat	National Supra-LME	2		
Overall total and % completeness >>			14/21 = 67%		

Table 4b: Arabian Sea LME – Transboundary Arrangements for all Fisheries – EEZ (coastal pelagics and demersals, including bycatch issues)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	RECOFI - Committees, Working groups, specialists	Supra-LME	2		Neither India (largest EEZ in LME) nor Pakistan are members of RECOFI, as well as a number of other coastal countries. Why has no country ratified the Convention? Has this hampered country buy-in to address and deal with transboundary issues?
Policy decision-making	RECOFI - Commission	Supra-LME	1		
Planning analysis and advice	RECOFI - Committees, Working groups, specialists	Supra-LME	2		
Planning decision-making	RECOFI - Commission	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	RECOFI - Commission	Supra-LME	1		
Data and information	Countries	National	1		
Overall total and % completeness >>			9/21 = 43%		

Table 4c: Arabian Sea LME – Transboundary Arrangements for Pollution - Marine-Based Sources					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Kuwait Convention MBS protocols - Oil Spill Protocol and Protocol concerning marine pollution from exploration and exploitation of the continental shelf - Marine Emergency Mutual Aid Centre (MEMAC), ROPME Secretariat, IMO, Council	LME	1	PERSGA	Average of completeness scores for Kuwait Oil Spill (8/21) and Continental Shelf Exploitation (6/21) is used. What connection, if any to Jeddah Convention and MBS Protocol? What role does SACEP and the SASAP play in LME governance of pollution and biodiversity, if any?
Policy decision-making	ROPME Council	LME	1		
Planning analysis and advice	Kuwait Oil Spill Protocol and Protocol concerning marine pollution from exploration and exploitation of the continental shelf - Marine Emergency Mutual Aid Centre (MEMAC), Secretariat, IMO, Council Jeddah Convention Oil Pollution Protocol – Marine Emergency Mutual Aid Centre	LME	1		
Planning decision-making	Kuwait Council	LME	1		
Implementation	Countries Marine Emergency Mutual Aid Centre	National LME	0.5		
Review and evaluation	Kuwait Council	LME	1		
Data and information	Countries Marine Emergency Mutual Aid Centre Secretariat	National LME	1.5		
Overall total and % completeness >>			7/21 = 33%		

Table 4d: Arabian Sea LME – Transboundary Arrangements for Pollution - Marine-Based Sources					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Marine Emergency Mutual Aid Centre	Supra-LME	3	ROPME	What connection, if any to Kuwait Convention and MBS Protocols? How do countries who are parties to both conventions deal with the two instruments? What role does SACEP and the SASAP play in regional governance of pollution and biodiversity, if any?
Policy decision-making	PERGSA Council	Supra-LME	1		
Planning analysis and advice	Marine Emergency Mutual Aid Centre	Supra-LME	3		
Planning decision-making	PERGSA Council	Supra-LME	1		
Implementation	Countries Marine Emergency Mutual Aid Centre	National Supra-LME	1		
Review and evaluation	PERSGA Council	Supra-LME	2		
Data and information	Countries Marine Emergency Mutual Aid Centre	National Supra-LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4e: Arabian Sea LME – Transboundary Arrangement for Pollution - Land-Based Sources					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ROPME Secretariat	LME	1	PERSGA	What role does SACEP and the SASAP play in regional governance of pollution and biodiversity?
Policy decision-making	Kuwait Council	LME	1		
Planning analysis and advice	ROPME Secretariat	LME	1		
Planning decision-making	Kuwait Council	LME	1		
Implementation	Countries	National	0		
Review and evaluation	Kuwait Council	LME	1		
Data and information	Countries ROPME Secretariat	National LME	1		
Overall total and % completeness >>			6/21 = 29%		

Table 4f: Arabian Sea LME – Transboundary Arrangement for Pollution - Land-Based Sources and Biodiversity (General)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Jeddah Convention - PERSGA Secretariat, Partner IGOs	Supra-LME	1	ROPME	Jeddah LBS Protocol formulated but not in force so the Convention scores are used for LBS and Biodiversity in the absence of protocols being in force. What role does SACEP and the SASAP play in regional governance of pollution and biodiversity in this LME, if any?
Policy decision-making	Jeddah Council	Supra-LME	1		
Planning analysis and advice	Jeddah Convention - PERSGA Secretariat Partner IGOs	Supra-LME	1		
Planning decision-making	Jeddah Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Jeddah Council Jeddah Committee for the Settlement of Disputes	LME	2		
Data and information	Countries PERSGA Secretariat	National Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 4g: Arabian Sea LME – Transboundary Arrangement for Biodiversity - General					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Countries Kuwait Judicial Commission	National LME	1	PERSGA	Used scores from Kuwait Convention for addressing Biodiversity concerns What role does SACEP and the SASAP play in regional governance of pollution and biodiversity?
Policy decision-making	Kuwait Council	LME	1		
Planning analysis and advice	ROPME Secretariat	LME	1		
Planning decision-making	Kuwait Council	LME	1		
Implementation	Countries	National	1		
Review and evaluation	Kuwait Council	LME	1		
Data and information	Countries ROPME Secretariat	National LME	1		
Overall total and % completeness >>			7/21 = 33%		

Table 4h: Arabian Sea LME – Transboundary Arrangement for Biodiversity – Specific (Marine Turtles)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Countries Secretariat Advisory Committee	National Supra-LME	2		
Policy decision-making	Meeting of Parties	Supra-LME	2		
Planning analysis and advice	Countries Secretariat Advisory Committee	National Supra-LME	2		
Planning decision-making	Meeting of Parties	Supra-LME	2		
Implementation	Countries	National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	Countries	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 4i: Arabian Sea LME – Transboundary arrangement for biodiversity - specific (dugong)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CPs	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	CPs	Supra-LME	2		
Planning analysis and advice	CPs	Supra-LME	2		
Planning decision-making	CPs	Supra-LME	2		
Implementation	CPs	Supra-LME National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 5: Arabian Sea LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Bahrain, Djibouti, India, Iran, Iraq, Kuwait, Maldives, Oman, Pakistan, Qatar, Saudi Arabia, Somalia, UAE and Yemen	System name: Arabian Sea		Region: Northern Indian Ocean
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – HMS (tuna and tuna like species)	14		67%		Used Regional Sea Convention for LBS scoring
Fisheries – EEZ (coastal pelagics and demersals) in the EEZ of coastal countries	14		43%		Used Regional Sea Convention for Biodiversity scoring
Pollution - Marine-Based Sources	14		33%		Kuwait MBS protocols
Pollution – Marine-Based Sources	14		62%		Jeddah MBS protocol
Pollution - Land-Based Sources	14		29%		Kuwait LBS protocol
Pollution - Land-Based Sources	14		38%		Jeddah
Biodiversity – General	14		33%		Kuwait
Biodiversity – General	14		38%		Jeddah
Biodiversity – Specific - turtles	14		52%		
Biodiversity – specific (dugong)	14		52%		CMS MOU
	System architecture completeness index >>		45%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

While the documents used to identify issues for this LME highlighted diversion of rivers as affecting the coastal and marine environment and modification of coastal habitat, there does not appear to be any formal regional governance protocols other than the regional seas conventions for addressing these issues.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly

by extracting the information from the arrangement summaries (Tables 4a-i) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-i)										
Policy cycle stage	Fisheries - HMS	Fisheries - General	Pollution - LBS	Pollution - LBS	Pollution - MBS	Pollution - MBS	Biodiversity - General	Biodiversity - General	Biodiversity - Specific	Biodiversity - specific (dugongs)
Policy analysis and advice	IOTC - Scientific Committee Sub-commission	RECOFI - Committees, Working groups, specialists	ROPME Secretariat	Jeddah Convention - PERSGA Secretariat, Partner IGOs	Marine Emergency Mutual Aid Centre	Kuwait Convention MBS protocols - Marine Emergency Mutual Aid Centre (MEMAC), ROPME Secretariat, IMO, Council	Jeddah Convention - Secretariat, Partner IGOs	Countries Kuwait Judicial Commission	Countries Secretariat Advisory Committee	MOU CPs
Policy decision-making	IOTC - Commission	RECOFI - Commission	Kuwait Council	Jeddah Council	Jeddah Council	Kuwait Council	Jeddah Council	Kuwait Council	Meeting of Parties	MOU CPs
Planning analysis and advice	IOTC - Scientific Committee Sub-commission	RECOFI - Committees, Working groups, specialists	ROPME Secretariat	Jeddah Convention - PERSGA Secretariat Partner IGOs	Marine Emergency Mutual Aid Centre	Kuwait MBS Protocols Marine Emergency Mutual Aid Centre (MEMAC), Secretariat, IMO, Council	Jeddah Convention - PERSGA Secretariat Partner IGOs	ROPME Secretariat	Countries Secretariat Advisory Committee	MOU CPs
Planning decision-making	IOTC - Commission	RECOFI - Commission	Kuwait Council	Jeddah Council	Jeddah Council	Kuwait Council	Jeddah Council	Kuwait Council	Meeting of Parties	MOU CPs
Implementation	Countries	Countries	Countries	Countries	Countries Marine Emergency Mutual Aid Centre	Countries Marine Emergency Mutual Aid Centre	Countries	Countries	Countries	MOU CPs

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-i)										
Policy cycle stage	Fisheries - HMS	Fisheries - General	Pollution - LBS	Pollution - LBS	Pollution - MBS	Pollution - MBS	Biodiversity - General	Biodiversity - General	Biodiversity - Specific	Biodiversity - specific (dugongs)
Review and evaluation	Countries IOTC - Scientific committee, sub-commissions, and working parties	RECOFI - Commission	Kuwait Council	Jeddah Council Jeddah Committee for the Settlement of Disputes	Jeddah Council	Kuwait Council	Jeddah Council Jeddah Committee for the Settlement of Disputes	Kuwait Council	Secretariat	Secretariat
Data and information	Countries IOTC - Secretariat	Countries	Countries ROPME Secretariat	Countries PERSGA Secretariat	Countries Marine Emergency Mutual Aid Centre	Countries Marine Emergency Mutual Aid Centre Secretariat	Countries PERSGA Secretariat	Countries ROPME Secretariat	Countries	MOU CPs

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
1 and 10	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
2 and 10	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	1	1	1	1	0	1	1	0.86
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	1	1	1	0	1	1	0.71
3 and 9	0	0	0	0	0	0	0	0
3 and 10	0	0	0	0	0	0	0	0
4 and 5	0	1	0	1	0	1	0	0.43
4 and 6	0	0	0	0	0	0	0	0
4 and 7	1	1	1	1	0	1	1	0.86
4 and 8	0	0	0	0	0	0	0	0
4 and 9	0	0	0	0	0	0	0	0
4 and 10	0	0	0	0	0	0	0	0
5 and 6	1	0	1	0	1	0	1	0.57
5 and 7	0	1	0	1	0	1	0	0.43
5 and 8	0	0	0	0	0	0	0	0
5 and 9	0	0	0	0	0	0	0	0
5 and 10	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
6 and 8	0	1	0	1	0	1	0	0.43

6 and 9	0	0	0	0	0	0	0	0
6 and 10	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
7 and 9	0	0	0	0	0	0	0	0
7 and 10	0	0	0	0	0	0	0	0
8 and 9	0	0	0	0	0	0	0	0
8 and 10	0	0	0	0	0	0	0	0
9 and 10	0	0	0	0	0	0	0	0
Average	0.07	0.13	0.11	0.13	0.02	0.13	0.11	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the seven issues is 0.1 out of a possible 1.

3 Conclusions

While this LME has two separate regional seas agreements in place covering pollution (LBS and MBS) and biodiversity (Kuwait and Jeddah Conventions and protocols), no overarching integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal. In terms of the fisheries arrangements, these are also not formally integrated although it is conceivable that informal linkages may be present at some level.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6-0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Arabian Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Arabian Sea LME	Completeness	Integration	Engagement
	45%	0.1	86%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

UNEP (2006). Mistafa, T.N. Arabian Sea. GIWA Thematic Report – Region 52. University of Kalmar, Kalmar, Sweden.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Baltic Sea LME

1 The system to be governed

The system is the Baltic Sea LME. It is the world's largest brackish water body, covering an area of over 385,000 km² of the nine riparian countries: Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter 35), so a review is not provided here.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified as follows:

- Fisheries
 - severe overexploitation and unsustainable fisheries (cod, herring, salmon & eel)
 - increasing fish mortality; excessive bycatch and discards and destructive fishing practices
- Pollution
 - severe eutrophication (agricultural discharges via rivers); increased occurrence of HABs; localized microbiological pollution; heavy metal concentration;
 - ballast water from oil tankers
- Biodiversity
 - decreased viability of stocks in the ecosystem caused by pollution and diseases; invasive/alien species (ballast water from oil tankers)
 - habitat modification mainly from human settlements, pollution and coastal construction
 - biotope complexes are exposed all kinds of anthropogenic threat (e.g. threatened sandy foreshores and lagoons).

Table 1. Percentage of Baltic Sea LME area taken up by the EEZ of each country and the High Seas (area = 385,735 km²)

Country	Percent of LME area
Denmark	5.4
Estonia	9.1
Finland	21.1
Germany	3.9
Latvia	7.3
Lithuania	1.5
Poland	8.1
Russia	5.9
Sweden	37.0
High Seas	0.7

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
2. International Council for the Exploration of the Sea (ICES)
3. Convention on the Protection of the Marine Environment of the Baltic Sea Area - Helsinki Convention (HELCON)
4. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
5. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)
6. The Council of Baltic Sea States (CBSS)
7. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR) and its Annexes (which are contained within the Convention.
 - a) Annex I: Prevention and elimination of pollution from land-based sources;
 - b) Annex II: Prevention and elimination of pollution by dumping or incineration;
 - c) Annex III: Prevention and elimination of pollution from offshore sources; and
 - d) Annex IV: Assessment of the quality of the marine environment.
8. OSPAR Action Plan 1998-2003
9. Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)
10. European Union Common Fisheries Policy (CFP)
11. European Union Maritime Policy
12. The Baltic Sea Joint Comprehensive Environmental Action Programme, 1992

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Baltic Sea LME is shown in Table 2.

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	<1	100	C
International Council for the Exploration of the Sea (ICES)	3	100	C
Convention on the Protection of the Marine Environment of the Baltic Sea Area - Helsinki Convention (HELCON)	98	93	D
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	2	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	2	100	C
OSPAR Convention	<1	7	D
Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)	18	100	C
European Union Common Fisheries Policy (CFP)	10	93	D
European Union Maritime Policy	10	93	D

The extent of country membership in these bodies and instruments for the Baltic Sea LME is shown in Table 3.

LME coastal countries	Agreement							
	ICES	HELCON	NAMMCO	NASCO	OSPAR	Bonn Agreement	ASCOBANS	EU-CFP
Denmark	B	B			B	B	B	B
Estonia	B	B			N		C	B
Finland	B	B			B		B	B
Germany	B	B			B	B	B	B
Latvia	B	B			N		C	B
Lithuania	B	B			N		B	B
Poland	B	B			N		B	B
Russia	B	B		B			C	
Sweden	B	B		B	B	B	B	B
% engagement	100	100	0	22	80	33	67	89
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed								

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

2.2.1 Assessment of transboundary issues

The arrangements for the issues identified above are summarized in Table 4a-g. An overall summary is presented in Table 5.

Table 4a: Baltic Sea LME ⁱ – Transboundary Arrangement for Fisheries – Specific (salmon)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	Supra-LME	3	ICES	Only 2 of the 9 coastal states are members Dependent on ICES for scientific advice
Policy decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	Supra-LME	3		
Planning decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat and International Atlantic Salmon Research Board	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4b: Baltic Sea LME – Transboundary Arrangement for Fisheries – Specific (Marine Mammals)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3		Only Denmark (through Greenland and Faroe Islands) is a member of NAMMCO among the Baltic States. What role does ICES play?
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4c: Baltic Sea LME – Transboundary Arrangement for Pollution – LBS and Habitat Modification					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	HELCOM - Heads of Delegation (Agriculture/Env. Forum; Fisheries/Env Forum; MSP Working Group) Secretariat HELCOM Monitoring and Assessment Group HELCOM Habitat group HELCOM Land Group HELCOM Response Group	LME	3		All Baltic States are members What role does ICES play?
Policy decision-making	HELCOM Commission	LME	1		
Planning analysis and advice	Secretariat HELCOM Monitoring and Assessment Group HELCOM Habitat group HELCOM Land Group HELCOM Response Group	LME	2		
Planning decision-making	HELCOM Commission	LME	1		
Implementation	Countries	National	1		
Review and evaluation	HELCOM Commission Ministerial meeting of Environment Ministers and EU Commissioner	LME	2		
Data and information	Countries Secretariat	National LME	2		
Overall total and % completeness >>			12/21 = 57%		
Table 4d: Baltic Sea LME – Transboundary Arrangement for Pollution – MBS leading to decreased viability of stocks in the ecosystem caused by pollution and					

diseases; invasive/alien species (ballast water from oil tankers)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	HELCOM - Heads of Delegation (Fisheries/Env Forum; MSP Working Group) Secretariat HELCOM Monitoring and Assessment Group HELCOM Response Group	LME	3		All Baltic States are members What role does ICES play?
Policy decision-making	HELCON Commission	LME	1		
Planning analysis and advice	Secretariat HELCOM Monitoring and Assessment Group HELCOM Response Group	LME	2		
Planning decision-making	HELCON Commission	LME	1		
Implementation	Countries	National	1		
Review and evaluation	HELCON Commission Ministerial meeting of Environment Ministers and EU Commissioner	LME	2		
Data and information	Countries Secretariat	National LME	2		
Overall total and % completeness >>			12/21 = 57%%		

Table 4e: Baltic Sea LME – Transboundary Arrangement for Biodiversity – Specific (Small cetaceans)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ASCOBANS Advisory Committee	Supra-LME	3	Arctic Council CMS	
Policy decision-making	Meeting of the Parties	Supra-LME	2		
Planning analysis and advice	ASCOBANS Advisory Committee	Supra-LME	3		
Planning decision-making	Meeting of the Parties	Supra-LME	1		
Implementation	Contracting Parties	National	0		
Review and evaluation	Meeting of the Parties	Supra-LME	2		
Data and information	Contracting Parties, Secretariat, Advisory Committee, Coordinating Authorities	National Supra-LME	2		
Overall total and % completeness >>			13 /21 = 62%		

Table 4f: Baltic Sea LME – Transboundary Arrangement for Fisheries – EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3	Arctic Council	
Policy decision-making	European Commission	Supra-LME	2		
Planning analysis and advice	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3		
Planning decision-making	European Commission	Supra-LME	3		
Implementation	Contracting Parties Scientific, Technical and Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	National Supra-LME	2		
Review and evaluation	Commission STECF	Supra-LME	3		
Data and information	Contracting Parties Commission STECF Advisory Councils	National Supra-LME	3		
Overall total and % completeness >>			19/21 = 90%		

Table 4g: Baltic Sea LME – Transboundary Arrangement for Pollution – MBS					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Bonn Agreement – Contracting Parties	National	2	Arctic Council	
Policy decision-making	Meeting of the Parties	Supra-LME	1		
Planning analysis and advice	Contracting Parties	National	2		
Planning decision-making	Meeting of the Parties	Supra-LME	1		
Implementation	Contracting Parties	National	0		
Review and evaluation	Meeting of the Parties	Supra-LME	1		
Data and information	Contracting Parties	National	1		
Overall total and % completeness >>			8 /21 = 38%		

Table 5: Baltic Sea LME governance architecture - System summaryⁱⁱ

IW category: Marine region		Countries: Denmark, Estonia, Finland, Germany, Latvia Lithuania, Poland Russia, Sweden	System name: Baltic Sea		Region: Arctic	
Complete these columns then assess issues using the arrangements tables			After completing the arrangements tables, complete these columns			
Trans-boundary issue ²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations	
Fisheries – specific (salmon)	9		57%		NASCO	
Fisheries – Specific (marine Mammals)	9		71%		NAMMCO	
Fisheries – EEZ	9		90%		EU-CFP	
Pollution – LBS	9		57%		HELCON	
Pollution – MBS	9		57%		HELCON	
Pollution – MBS	9		38%		Bonn	
Biodiversity – General	9		57%		HELCON	
Biodiversity – Specific (Small Cetaceans)	9		62%			
	System architecture completeness index >>		61%		<< System priority for intervention	

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-g) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-d)								
Policy cycle stage	Fisheries - Salmon	Fisheries - Mammals	Fisheries - EEZ	Pollution - MBS	Pollution - MBS	Pollution – LBS	Biodiversity - General	Biodiversity - Specific
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Bonn Agreement – Contracting Parties	HELCOM - Heads of Delegation (Fisheries/Env Forum; MSP Working Group) Secretariat HELCOM Monitoring and Assessment Group HELCOM Response Group	HELCOM - Heads of Delegation (Agriculture/Env v. Forum; Fisheries/Env Forum; MSP Working Group) Secretariat HELCOM Monitoring and Assessment Group HELCOM Response Group	HELCOM - Heads of Delegation (Agriculture/Env v. Forum; Fisheries/Env Forum; MSP Working Group) Secretariat HELCOM Monitoring and Assessment Group HELCOM Response Group	ASCOBANS Advisory Committee
Policy decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	European Commission	Meeting of the Parties	HELCON Commission	HELCON Commission	HELCON Commission	Meeting of the Parties
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	NAMMCO Management Committee and Scientific Committee	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Contracting Parties	Secretariat HELCOM Monitoring and Assessment Group HELCOM Response Group	Secretariat HELCOM Monitoring and Assessment Group HELCOM Response Group	Secretariat HELCOM Monitoring and Assessment Group HELCOM Response Group	ASCOBANS Advisory Committee
Planning decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	European Commission	Meeting of the Parties	HELCON Commission	HELCON Commission	HELCON Commission	Meeting of the Parties
Implementation	Countries	Countries Secretariat – Joint NAMMCO Control Scheme	Contracting Parties Scientific, Technical and	Contracting Parties	Countries	Countries	Countries	Contracting Parties

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-d)								
Policy cycle stage	Fisheries - Salmon	Fisheries - Mammals	Fisheries - EEZ	Pollution - MBS	Pollution - MBS	Pollution – LBS	Biodiversity - General	Biodiversity - Specific
		for Hunting	Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)					
Review and evaluation	NASCO Council	NAMMMCO Council Committee on Inspection and Observation	Commission STECF	Meeting of the Parties	HELCON Commission Ministerial meeting of Environment Ministers and EU Commissioner	HELCON Commission Ministerial meeting of Environment Ministers and EU Commissioner	HELCON Commission Ministerial meeting of Environment Ministers and EU Commissioner	Meeting of the Parties
Data and information	Countries NASCO Secretariat and International Atlantic Salmon Research Board	Countries NAMMCO Secretariat	Contracting Parties Commission STECF Advisory Councils	Contracting Parties	Countries Secretariat	Countries Secretariat	Countries Secretariat	Contracting Parties, Secretariat, Advisory Committee, Coordinating Authorities

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.								
Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
5 and 6	1	1	1	1	0	1	1	0.9
5 and 7	1	1	1	1	0	1	1	0.9
5 and 8	0	0	0	0	0	0	0	0
6 and 7	1	1	1	1	0	1	1	0.9
6 and 8	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
Average	0.1	0.1	0.1	0.1	0	0.1	0.1	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the seven issues is 0.1 out of a possible 1.

3 Conclusions

The arrangement for pollution (both marine and land-based) and biodiversity in this LME - the Helsinki Convention - appears to be well integrated. This Convention also has structural components that address fisheries and biodiversity and as such, provides an integrating mechanism for the LME at a level that is lacking in most LMEs. The extent to which HELCON has any formal linkages with NASCO and NAMMCO is not clear. It is also likely that ICES provides a common science advisory role within all of the arrangements.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Baltic Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Baltic Sea LME	Completeness	Integration	Engagement
	61%	0.1	61%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
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- 3 = Implemented through a coordinated regional/global mechanism^{viii}

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- 0 = No DI mechanism
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End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

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Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Barents Sea LME

1 The system to be governed

The system is the Barents Sea LME. It is relatively shallow sea with a surface area of over 1.9 million km² spanning the countries of Denmark, Norway and Russia (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter XIII-36), so a review is not provided here.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified as follows:

- Fisheries
 - severe overexploitation of the major fish stocks (cod and haddock); increasing number of collapsed stocks
 - destruction of the bottom habitat by trawling also has a negative impact on cod and bottom fish, such as catfish, perch, plaice, Greenland halibut and American plaice
- Pollution
 - LBS - water mass and atmospheric advection (external sources); industrial activities; elevated levels of microbiological pollution (localized); solid waste (localized); chemical pollutants (chlorinated hydrocarbons and heavy metals)
 - MBS – hydrocarbon and other hazardous contaminants
- Biodiversity
 - Deterioration due to high levels of persistent organic contaminants
 - Habitat modification and changes in the faunal composition of benthic communities (localized)

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)

Table 1. Percentage of Barents Sea LME area taken up by the EEZ of each country and the High Seas (area = 1,977,922 km²)

Country	Percent of LME area
Denmark	<0.1
Norway	43.0
Russia	54.1
High Seas	2.9

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
3. International Council for the Exploration of the Sea (ICES)
4. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
5. North-East Atlantic Fisheries Commission (NEAFC)
6. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)
7. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR) and its Annexes (which are contained within the Convention.
 - a) Annex I: Prevention and elimination of pollution from land-based sources;
 - b) Annex II: Prevention and elimination of pollution by dumping or incineration;
 - c) Annex III: Prevention and elimination of pollution from offshore sources; and
 - d) Annex IV: Assessment of the quality of the marine environment.
8. Barents-Euro-Arctic Council (BEAC) and its regional arm, the Barents Regional Council (This arrangement seems primarily for trade and other socio-economic issues)
9. Agreement on the Conservation of Polar Bears (ACPB)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Barents Sea LME is shown in Table 2.

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
Arctic Council (AC)	10.4	97.1	C
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	2	100	C
International Council for the Exploration of the Sea (ICES)	14	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	10	100	C
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	10	100	C
North-East Atlantic Fisheries Commission(NEAFC)	12	82	D
Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)	12	81	D
Agreement on the Conservation of Polar Bears (ACPB)		100	C

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

The extent of country membership in these bodies and instruments for the Barents Sea LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Barents Sea LME									
LME coastal countries	Agreement								
	AC	ICCAT	ICES	NASCO	NAMMCO	NEAFC	OSPAR	ACPB	BEAC
Denmark	C		B			B	B	B	C
Norway	C	B	B	B	B	B	B	B	C
Russia	C	B	B	B		B		B	C
% engagement	100	67	100	67	33	67	67	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed									

2.2.1 Assessment of transboundary issues

The arrangements for the issues identified above are summarized in Table 4a-g. An overall summary is presented in Table 5.

Table 4a: Barents Sea LME ¹ – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		All countries are members of NEAFC ICES named in NEAFC to provide scientific advice
Policy decision-making	NEAFC - Commission	Supra-LME	3		
Planning analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		
Planning decision-making	NEAFC - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Supra-LME	3		
Data and information	Countries ICES	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4b. Barents Sea LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4c: Barents Sea LME – Transboundary arrangement for fisheries – specific (salmon)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICES NASCO Secretariat and its Commissions	Supra-LME	3		All countries are members of NASCO ICES named in NASCO to provide scientific advice
Policy decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Planning analysis and advice	NASCO Three Commissions NASCO Secretariat ICES	Supra-LME	3		
Planning decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4d: Barents Sea LME – Transboundary Arrangement for Fisheries – Specific (Marine Mammals)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3	Arctic Council	Norway and Denmark (through Greenland and Faroe islands) are members of NAMMCO but Russia is not.
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	NAMMCO Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	NAMMCO Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4e: Barents Sea LME – Transboundary Arrangement for Biodiversity - Protection of Marine Mammals (specific)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ACPB – IUCN Polar Bear Specialist Group and Country experts	Supra-LME National	1	Arctic Council	All 3 coastal states are members of ACPB
Policy decision-making	ACPB- Countries	National	0		
Planning analysis and advice	ACPB – IUCN Polar Bear Specialist Group and Country experts	Supra-LME National	2		
Planning decision-making	ACPB Countries	National	0		
Implementation	ACPB Countries	National	0		
Review and evaluation	ACPB - IUCN Polar Bear Specialist Group	Supra-LME	2		
Data and information	ACPB – IUCN Polar Bear Specialist Group and Country experts	National Supra-LME	3		
Overall total and % completeness >>			8/21 = 38%		

Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	OSPAR – 5 main Committees and their Working Groups a) Biodiversity and Ecosystem b) Eutrophication Strategy c) Hazardous Substances d) Offshore Industry Strategy e) Radioactive Substances	Supra-LME	3	Arctic Council ICES (as observer)	
Policy decision-making	OSPAR Commission	Supra-LME	3		
Planning analysis and advice	OSPAR – 5 main Committees and their Working Groups	Supra-LME	3		
Planning decision-making	OSPAR Commission	Supra-LME	3		
Implementation	Countries OSPAR Commission Special Studies OSPAR Secretariat	National Supra-LME	1		
Review and evaluation	OSPAR Commission, Main Committees and Working Groups	Supra-LME	3		
Data and information	Countries OSPAR Secretariat	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4g: Barents Sea LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC)	
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 5: Barents Sea LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Denmark, Norway, Russia	System name: Barents Sea		Region: Arctic
Complete these columns then assess issues using the arrangements tables			After completing the arrangements tables, complete these columns		
Trans-boundary issue ²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – EEZ/ABNJ	3		86%		
Fisheries – large pelagics (tunas and tuna-like)	3		86%		
Fisheries – specific (salmon)	3		57%		
Fisheries – Specific (Marine Mammals)	3		71%		
Pollution (LBS)	3		90%		
Pollution (LBS)	3		67%		
Pollution (MBS)	3		67%		
Pollution (MBS)	3		90%		
Biodiversity – General	3		90%		
Biodiversity - General	3		67%		
Biodiversity – Specific (Polar Bears)	3		38%		
	System architecture completeness index >>		74%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

The impacts associated with climate change in the Arctic are not specifically addressed as they are manifested in the transboundary fisheries, pollution and biodiversity concerns of the region.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-g) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-g)											
Policy cycle stage	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries - Specific	Fisheries Specific - Marine Mammals	Pollution – LBS,	Pollution - MBS	Biodiversity - General	Biodiversity – Polar Bears	Pollution - LBS	Pollution - MBS	Biodiversity - General
Policy analysis and advice	NEAFC - Permanent Committee on Management and Science (PEMAS) ICES	ICCAT Standing Committee on Research and Statistics (SCRS)	ICES NASCO Secretariat and its Commissions	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	OSPAR – Eutrophication Strategy Hazardous Substances Radioactive Substances Committees and Working Groups	OSPAR - Offshore Industry Strategy Committee and Working Groups	OSPAR Biodiversity and Ecosystem Committee and Working Groups	ACPB – IUCN Polar Bear Specialist Group and Country experts	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Policy decision-making	NEAFC - Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council	OSPAR Commission	OSPAR Commission	OSPAR Commission	ACPB- Countries	Arctic Council	Arctic Council	Arctic Council
Planning analysis and advice	NEAFC - Permanent	ICCAT SCRS and Species	NASCO Three	NAMMCO Management	OSPAR – Eutrophication	OSPAR - Offshore	OSPAR - Biodiversity	ACPB – IUCN Polar	Arctic Council -	Arctic Council -	Arctic Council

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-g)											
Policy cycle stage	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries - Specific	Fisheries Specific - Marine Mammals	Pollution – LBS,	Pollution - MBS	Biodiversity - General	Biodiversity – Polar Bears	Pollution - LBS	Pollution - MBS	Biodiversity - General
	Committee on Management and Science (PEMAS) ICES	Panels	Commissions NASCO Secretariat ICES	t Committee and Scientific Committee	on Strategy Hazardous Substances Radioactive Substances Committees and Working Groups	Industry Strategy Committee and Working Groups	and Ecosystem Committee and Working Groups	Bear Specialist Group and Country experts	Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Planning decision-making	NEAFC - Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council	OSPAR Commission	OSPAR Commission	OSPAR Commission	ACPB Countries	Arctic Council	Arctic Council	Arctic Council
Implementation	Countries	Countries	Countries	NAMMCO Secretariat –	Countries OSPAR	Countries OSPAR	Countries OSPAR	ACPB Countries	Countries	Countries	Countries

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-g)											
Policy cycle stage	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries - Specific	Fisheries Specific - Marine Mammals	Pollution – LBS,	Pollution - MBS	Biodiversity - General	Biodiversity – Polar Bears	Pollution - LBS	Pollution - MBS	Biodiversity - General
				Joint NAMMCO Control Scheme for Hunting	Commission Special Studies OSPAR Secretariat	Commission Special Studies OSPAR Secretariat	Commission Special Studies OSPAR Secretariat				
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Conservation and Management Measures Compliance Committee (CMMCC)	NASCO Council	NAMMCO Council Committee on Inspection and Observation ACPB - IUCN Polar Bear Specialist Group	OSPAR Commission , Main Committees and Working Groups	OSPAR Commission , Main Committees and Working Groups	OSPAR Commission , Main Committees and Working Groups	ACPB - IUCN Polar Bear Specialist Group	Arctic Council	Arctic Council	Arctic Council
Data and information	Countries ICES	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	NAMMCO and ACPB Countries NAMMCO Secretariat ACPB – IUCN Polar Bear Specialist Group and Country experts	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Countries OSPAR Secretariat	ACPB – IUCN Polar Bear Specialist Group and Country experts	Countries Secretariat	Countries Secretariat	Countries Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.								
Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	1	0	1	0	0	0	0	0.29
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
1 and 10	0	0	0	0	0	0	0	0
1 and 11	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
2 and 10	0	0	0	0	0	0	0	0
2 and 11	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
3 and 9	0	0	0	0	0	0	0	0
3 and 10	0	0	0	0	0	0	0	0
3 and 11	0	0	0	0	0	0	0	0
4 and 5	0	1	0	1	1	1	1	0.71
4 and 6	0	1	0	1	1	1	1	0.71
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
4 and 9	0	0	0	0	0	0	0	0
4 and 10	0	0	0	0	0	0	0	0
4 and 11	0	0	0	0	0	0	0	0
5 and 6	0	1	0	1	1	1	1	0.71
5 and 7	0	0	0	0	0	0	0	0
5 and 8	0	0	0	0	0	0	0	0

5 and 9	0	0	0	0	0	0	0	0
5 and 10	0	0	0	0	0	0	0	0
5 and 11	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
6 and 8	0	0	0	0	0	0	0	0
6 and 9	0	0	0	0	0	0	0	0
6 and 10	0	0	0	0	0	0	0	0
6 and 11	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
7 and 9	0	0	0	0	0	0	0	0
7 and 10	0	0	0	0	0	0	0	0
7 and 11	0	0	0	0	0	0	0	0
8 and 9	0	0	0	0	0	0	0	0
8 and 10	0	0	0	0	0	0	0	0
8 and 11	0	0	0	0	0	0	0	0
9 and 10	0	1	0	1	0	1	1	0.57
9 and 11	0	1	0	1	0	1	1	0.57
10 and 11	0	1	0	1	0	1	1	0.57
Average	0.02	0.11	0.02	0.11	0.05	0.11	0.11	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the eleven issues is 0.1 out of a possible 1.

3 Conclusions

In this LME, none of the fisheries arrangements appear to be integrated while the three arrangements for pollution and biodiversity appear to have the Arctic Council as an integrating arrangement for one set of issues and the OSPAR Convention for a second set of similar issues relating to pollution and biodiversity. Additionally, the specific biodiversity arrangements for marine mammals and polar bears do not appear to have any formal linkages. It needs to be said that, the Arctic Council is not a binding arrangement so its implementation is voluntary and country dependent.

It does appear that the Arctic Council has the potential to develop into an informal overall policy coordinating organization, although as mentioned, its policy coordination role with respect to fisheries is weak. Nonetheless, this LME has been assigned an overall integration score of 1.0 due to the presence of the Arctic Council with its ability to potentially function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Barents Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Barents Sea LME	Completeness	Integration	Engagement
	74%	1.0	75%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1.

Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Bay of Bengal LME

1 The system to be governed

The system is defined as the Bay of Bengal LME. This includes the marine waters under the jurisdiction of Bangladesh, India, Indonesia, Malaysia, Myanmar, Sri Lanka and Thailand. While the Maldives is considered to be a part of this LME from the perspective of the GEF Bay of Bengal LME Project, its waters do not overlap the LME as originally defined (Table 1)¹. Therefore if the LME is an ecological unit and the aim is to manage it as such, the Maldives does not actually have a stake in the ecosystem. There may nonetheless good reasons to include it from a functional cooperation perspective.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009 Chapter VII-10) so no review is provided here. This assessment is also informed by the BOBLME TDA (2012a, 2012b) and the GEF institutional review (GEF 2011)

2 Governance arrangements

2.1 Issues to be governed

The following areas of concern were identified in the TDA (2012):

- Overexploitation of marine living resources
- Degradation of mangroves, coral reefs and seagrass
- Pollution and water quality

In terms of issues requiring separate governance arrangements the above areas of concern have been broken out into the following issues:

- Fisheries
 - small pelagic resources

Table 1. Percentage of LME area taken up by the EEZ of each country and the High Seas for the original LME (3 647 858 km²) and for the extended BOBLME Project area (6 253 373 km²)

Country	Percent of area	
	original LME	BOBLME Project
Bangladesh	2.1	1.3
India	34.1	21.1
Indonesia	7.9	11.6
Malaysia	1.9	1.1
Maldives	0.0	14.6
Myanmar	14.1	8.2
Sri Lanka	10.8	8.5
Thailand	3.2	1.9
High Seas	25.9	31.6

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

¹ A similar issue arises in the East: why is only part of the Sumatra East coast included, while the Indonesian Fisheries Management Area 571 includes the entire coast line. Also where actually is the southeastern boundary? Port Klang? One fathom bank?

- demersal finfish fisheries (including reefs?)
- tuna resources
- Habitat degradation and modification
 - mangroves, coral reefs and seagrass
 - degradation and modification of seabed habitat and seamounts
- Pollution
 - LBS.

From a transboundary governance perspective it is desirable to combine the above issues under as few governance arrangements as possible. However, the extent to which this can be done (from a governance process perspective) will depend on the degree to which the issues share a responsible agency. For example, while the decline and vulnerability of sharks or sea turtles may be primarily a biodiversity issue, they may be caused largely by fishing and can therefore be addressed within the fisheries arrangement. Similarly, the issue of lost and discarded fishing gear was noted under pollution, but is probably best dealt with as a fishery issue.

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are listed below. Their overlap with the BOB LME is shown in table 2.

- Agreement on the Institutionalization of the Bay of Bengal Programme as an Inter-Governmental Organisation (BOBP-IGO)²
- Agreement for the establishment of the Indian Ocean Tuna Commission (IOTC)
- Asia Pacific Fisheries Commission – FAO (APFIC)
- South East Asian Fisheries Development Center (SEAFDEC)
- Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
- Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC), Working Committee on Fisheries³
- Network of Aquaculture Centers in Asia-Pacific (NACA)

² The Agreement on the Institutionalization of the Bay of Bengal Programme as an Inter-Governmental Organisation was signed in April 2003 in Chennai, India (with the Maldives signing in May 2003). The Agreement evolved from the FAO Bay of Bengal Programme (1979 to 2000). <http://www.bobpigo.org>. Its objective is to support the development and management of sustainable coastal fisheries

³ Nag, B. and D. De. 2007. Asian Integration Process and BIMSTEC. Centre for Studies in International Relations and Development Discussion Paper #35.

- South Asia Cooperative Environment Programme (SACEP)⁴, South Asian Seas Action Plan (SASAP)
- South Asian Association for Regional Cooperation (SAARC), Convention on Co-operation on Environment (2010)⁵
- ASEAN, ASWG Fisheries and Coastal and Marine Environment
- Coordinating Body on the Seas of East Asia (COBSEA)⁶
- Indian Ocean- South East Asian (IOSEA) Marine Turtle Memorandum of Understanding
- Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)
- East African Action Plan, 1981

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Bay of Bengal LME is shown in Table 2.

Agreement	Original LME			Expanded LME		
	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME ⁷	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME
IOTC	6	99	C	10	100	C
APFIC	23	84	D	23	49	D
BOBP-IGO	100	61	B	100	36	B
FFA	<1	1	D	<1	<1	D
SEAFDEC	13	71	D	20	65	D
WCPFC	<1	1	D	<1	<1	D
SIOFA	0	0		2	<1	D
SWIOFC	0	0		4	3	D
Dugong MOU	?	100	C	?	100	C
IOSEA	?	100	C	?	100	C
COBSEA	5	18	D	8	16	D
SACEP			D	70	55	D

⁴ SACEP is a cooperation agreement. There is no Regional Seas convention yet.

⁵ Convention not yet in force

⁶ UNEP Regional Seas Programme

⁷ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

The extent of country membership in these bodies and instruments for the Bay of Bengal LME is shown in Table 3.

Table 3. Country membership in arrangements relevant to the Bay of Bengal LME												
Countries	Arrangement											
	BOB-IGO	IOTC	APFIC	SACEP ⁸	COBSEA	SAARC	SEAFDEC	ASEAN	PEMSEA	IOSEA	Dugong MOU	BIMSTEC
Bangladesh	B	N	B	C	N	C	N	N	N	C	C	C
India	B	B	B	C	N	C	N	N	N	C	C	C
Indonesia		B	B	N	C	N	C	C	C	C		N
Malaysia	N	B	B	N	C	N	C	C	N	C		N
Maldives	B	B	N	C	N	C	N	C	N	C		N
Myanmar	N	N	B	N	N	N	N	C	N	C	C	C
Sri Lanka	B	B	B	C	N	C	N	N	N	C	C	C
Thailand		B	B	N	C	N	C	C	C	C	C	C
% engagement	50	86	88	100	100	100	100	100	100	100	63	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed												

2.2.1 Assessment of issues

The arrangements for the issues identified above are summarized in Table 4a-g. An overall summary is presented in Table 5.

⁸Includes Afghanistan, Iran, Bhutan, Nepal

Table 4a: Bay of Bengal LME ⁱ – Transboundary arrangement for fisheries - small pelagic resources, demersal finfish and invertebrates (BOBP-IGO)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	BOBP IGO Technical Advisory Committee	Sub-LME	3	<ul style="list-style-type: none">• BOBLME Project• BIMSTEC, APFIC, SEAFDEC	<ul style="list-style-type: none">• Only four of the eight countries are members.• Holds sessions annually (plus special sessions and approves the work program and budget of the organization• It appears that most decisions are programmatic rather than management.• BOB IGO calls for National Plans of Action developed with assistance from the BOB IGO. Regional Plan of Action for transboundary species?• Habitat modification - degradation and modification of seabed habitat and seamounts is primarily a fisheries issue that can be dealt with under this arrangement• Lobster is covered by this arrangement
Policy decision-making	BOBP IGO Governing Council	Sub-LME	1		
Planning analysis and advice	Technical Advisory Committee	Sub-LME	3		
Planning decision-making	BOBP IGO Governing Council	Sub-LME	1		
Implementation	Countries Assistance from APFIC	National	0		
Review and evaluation	BOBP IGO Technical Advisory Committee	Sub-LME	1		
Data and information	National/BOBP IGO APFIC	Sub-LME	2		
Overall total and % completeness >>			11/21 = 52%		

Table 4b: Bay of Bengal LME – Transboundary arrangement for fisheries - small pelagic resources, demersal finfish and invertebrates (APFIC)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	APFIC Secretariat	Supra-LME	2	• BOBLME supports country engagement in APFIC	• Seven of the eight countries are members. • Is the RPOA relevant in this area?
Policy decision-making	APFIC Commission	Supra-LME	1		
Planning analysis and advice	APFIC Secretariat, SEAFDEC, World Fish Centre via RPOA	Supra-LME	1		
Planning decision-making	Commission	Supra-LME	1		
Implementation	CPs	National	0		
Review and evaluation	Secretariat; CPs	Supra-LME	2		
Data and information	CPs; Secretariat	Supra-LME	2		
Overall total and % completeness >>			9/21 = 43%		

Table 4c: Bay of Bengal LME – Transboundary arrangement for fisheries - tuna					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IOTC Scientific Committee, sub-commissions, and working parties	Supra-LME	3	<ul style="list-style-type: none">• BOBP-IGO is a partner in the World bank FAO ABNJ Project• BOBLME collaborates with IOTC primarily on capacity development / awareness / communication	<ul style="list-style-type: none">• Bangladesh and Myanmar are not members of IOTC• IOTC also considers neritic tunas in the region• There are probably trophic interactions between the oceanic tunas (large scale distribution) and small pelagics in the LME that require linkages in management
Policy decision-making	IOTC Commission	Supra-LME	1		
Planning analysis and advice	IOTC Scientific Committee, sub-commissions, and working parties	Supra-LME	3		
Planning decision-making	IOTC Commission	Supra-LME	2		
Implementation	Countries	National	1		
Review and evaluation	IOTC Scientific Committee	Supra-LME	2		
Data and information	IOTC Secretariat	Supra-LME	2		
Overall total and % completeness >>			14/21 = 67%		

Table 4d: Bay of Bengal LME – Transboundary arrangement for (a) pollution – LBS and MBS and (b) biodiversity - habitat degradation (reefs, mangroves and seagrasses)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	SACEP Consultative Committee supported by 6 Subject Area Centres of Excellence	Sub- LME	3	PEMSEA BOBLME	<ul style="list-style-type: none">• SACEP is a formally constituted regional body. While, a Regional Seas Convention for the area has not yet been adopted, the South Asian Seas Action Plan (SASAP) was adopted in March 1995. SACEP is the SASAP secretariat. SASAP only covers countries on the western side of the BOB.• Three countries on the eastern side of the BOB are covered by the COBSEA Regional Seas initiative, but COBSEA is more focussed in the South China Sea LME area
Policy decision-making	SACEP Governing Council	Sub- LME	1		
Planning analysis and advice	Consultative Committee supported by 6 Subject Area Centres of Excellence	Sub- LME	3		
Planning decision-making	CPs	Sub- LME National	1		
Implementation	CPs, Secretariat	Sub- LME	2		
Review and evaluation	Governing Council	Sub- LME	0		
Data and information	CPs, Secretariat	Sub- LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4e: Bay of Bengal LME – Transboundary arrangement for (a) pollution – LBS and MBS and (b) biodiversity - habitat degradation (reefs, mangroves and seagrasses)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	COBSEA Secretariat	Supra-LME	1	PEMSEA	<ul style="list-style-type: none">• SACEP is a formally constituted regional body. While, a Regional Seas Convention for the area has not yet been adopted, the South Asian Seas Action Plan (SASAP) was adopted in March 1995. SACEP is the SASAP secretariat. SASAP only covers countries on the western side of the BOB.• Three countries on the eastern side of the BOB are covered by the COBSEA Regional Seas initiative, but COBSEA is more focussed in the South China Sea LME area• SAARC’s focus is mainly on ICZM (Maldives Unit)• The scores are the average of SACEP and COBSEA
Policy decision-making	COBSEA	Supra-LME	1		
Planning analysis and advice	COBSEA Secretariat, CPs	Supra-LME	1		
Planning decision-making	CPs	Supra-LME	1		
Implementation	CPs	Supra-LME National	2		
Review and evaluation	COBSEA	Supra-LME	0		
Data and information	CPs	Supra-LME	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4f: Bay of Bengal LME – Transboundary arrangement for biodiversity - specific (sea turtles)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Planning analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		
Planning decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Implementation	IOSEA – sea turtle MOU CPs	National	0		
Review and evaluation	IOSEA – sea turtle MOU Secretariat	Supra-LME	2		
Data and information	IOSEA – sea turtle MOU CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 4g: Bay of Bengal LME – Transboundary arrangement for biodiversity - specific (dugong)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CPs	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	CPs	Supra-LME	2		
Planning analysis and advice	CPs	Supra-LME	2		
Planning decision-making	CPs	Supra-LME	2		
Implementation	CPs	Supra-LME National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 5: Bay of Bengal LME governance architecture - System summary ⁱⁱ					
IW category: LME	Countries: Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka, Thailand		System name: Bay of Bengal LME		Region: South Asia, Indian Ocean
Complete these columns then assess issues using the arrangements tables (Table 4)			After completing the arrangements tables, complete these columns		
Trans-boundary issue ²	Number of countries involved ³	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries - small pelagic resources, demersal finfish and invertebrates	7		52		BOBP-IGO. The fisheries arrangements are clearly defined but are largely oriented to cooperation not management. Relationships between BOB-IGO, APFIC and SEAFDEC, the major bodies, are not clear. Only APFIC has strong membership.
Fisheries - small pelagic resources, demersal finfish and invertebrates	7		43		APFIC
Fisheries - tuna	7		67		Well defined arrangement but not binding. Few BOBLME countries are members.
Pollution – LBS	7		57		These arrangements for environmental governance are weak and largely oriented towards cooperation. Membership in the strongest arrangement is only half the countries (western BOBOLME)
Pollution – MBS	7		57		
Pollution – LBS	7		38		
Pollution – MBS	7		38		
Biodiversity – habitat degradation	7		57		These applicable arrangements are as follows: <ul style="list-style-type: none">• Pollution LBS & MBS – SACEP, COBSEA• Biodiversity (habitat degradation) – SACEP, COBSEA
Biodiversity – habitat degradation	7		38		
Biodiversity – specific (sea turtles)	7		52		CMS IOSEA turtle MOU
Biodiversity – specific (dugong)	7		52		CMS MOU
	System architecture completeness index >>		50%		<< System priority for intervention ⁸

The coastal fisheries arrangement (Table 4a) is clearly defined but is largely oriented to cooperation not management. BOBP-IGO which appears to be the lead organisation for

fisheries only has membership of four countries. Only APFIC has strong membership. It appears that all BOBLME countries could be members in these organisations and SEAFDEC. Therefore it appears that the potential is there to develop transboundary arrangements for fisheries that cover the issues and the BOBLME area well. Relationships between BOB-IGO, APFIC and SEAFDEC, the major bodies in this arrangement, are not clear from their documentation.

The IOTC represents a well-defined policy process for highly migratory fish species (Table 4b). It overlaps the Bay of Bengal LME entirely and all but two countries are members. The low scores in decision-making are because decisions are not binding, and in implementation because it is purely at the national level.

The arrangements for environmental governance (habitats, LBS) are weak from a governance perspective as they are largely oriented towards cooperation (Tables 4c, d). Coverage of the Bay of Bengal by the relevant organisations appears to be split into eastern and western groupings. Membership in the strongest arrangement, the western grouping is only half the countries. The Eastern grouping (COBSEA) is more focused in the South East Asia area. Myanmar is not a member of either grouping, but is in the COBSEA area. Roles and relationships among various organisations involved in these issues are not clear. This is likely to make it difficult for the many non-governmental organisations with an interest in these issues to engage in governance processes.

2.3 Assess transboundary integration of arrangements within systems

The assessment of transboundary integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-g) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7, from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table5)							
Policy cycle stage	Fisheries - small pelagic resources, demersal finfish and invertebrates	Fisheries - small pelagic resources, demersal finfish and invertebrates	Fisheries - tuna	Pollution – LBS and MBS Biodiversity - habitat degradation	Pollution – LBS and MBS Biodiversity - habitat degradation	Biodiversity - specific (sea turtles)	Biodiversity - specific (dugongs)
Policy analysis and advice	BOB IGO Technical Advisory Committee	APFIC Secretariat	IOTC Scientific Committee, sub-commissions, and working parties	SACEP Consultative Committee + 6 Subject Area Centres of Excellence	COBSEA Secretariat	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Policy decision-making	BOB IGO Governing Council	APFIC Commission	IOTC Commission	SACEP Governing Council	COBSEA	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Planning analysis and advice	Technical Advisory Committee	APFIC Secretariat, SEAFDEC, World Fish Centre via RPOA	IOTC Scientific Committee, sub-commissions, and working parties	Consultative Committee supported by 6 Subject Area Centres of Excellence	COBSEA Secretariat, CPs	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Planning decision-making	BOB IGO Governing Council	Commission	IOTC Commission	CPs	CPs	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Implementation	Countries Assistance from APFIC	CPs	CPs	CPs, Secretariat	CPs	IOSEA – sea turtle MOU CPs	MOU CPs
Review and evaluation	Technical Advisory Committee	Secretariat; CPs	IOTC Scientific Committee	Governing Council	COBSEA	IOSEA – sea turtle MOU Secretariat	Secretariat
Data and information	National/BOB IGO APFIC	CPs; Secretariat	IOTC Secretariat	CPs, Secretariat	CPs	IOSEA – sea turtle MOU CPs	MOU CPs

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	1	0.1
1 and 3	0	0	0	0	0	0	0	0.0
1 and 4	0	0	0	0	0	0	0	0.0
1 and 5	0	0	0	0	0	0	0	0.0
1 and 6	0	0	0	0	0	0	0	0.0
1 and 7	0	0	0	0	0	0	0	0.0
1 and 8	0	0	0	0	0	0	0	0.0
1 and 9	0	0	0	0	0	0	0	0.0
1 and 10	0	0	0	0	0	0	0	0.0
1 and 11	0	0	0	0	0	0	0	0.0
1 and 12	0	0	0	0	0	0	0	0.0
2 and 3	0	0	0	0	0	0	0	0.0
2 and 4	0	0	0	0	0	0	0	0.0
2 and 5	0	0	0	0	0	0	0	0.0
2 and 6	0	0	0	0	0	0	0	0.0
2 and 7	0	0	0	0	0	0	0	0.0
2 and 8	0	0	0	0	0	0	0	0.0
2 and 9	0	0	0	0	0	0	0	0.0
2 and 10	0	0	0	0	0	0	0	0.0
2 and 11	0	0	0	0	0	0	0	0.0
2 and 12	0	0	0	0	0	0	0	0.0
3 and 4	0	0	0	0	0	0	0	0.0
3 and 5	0	0	0	0	0	0	0	0.0
3 and 6	0	0	0	0	0	0	0	0.0
3 and 7	0	0	0	0	0	0	0	0.0
3 and 8	0	0	0	0	0	0	0	0.0
3 and 9	0	0	0	0	0	0	0	0.0
3 and 10	0	0	0	0	0	0	0	0.0
3 and 11	0	0	0	0	0	0	0	0.0
3 and 12	0	0	0	0	0	0	0	0.0
4 and 5	1	1	1	1	0	1	1	0.9
4 and 6	0	0	0	0	0	0	0	0.0
4 and 7	0	0	0	0	0	0	0	0.0
4 and 8	1	1	1	1	0	1	1	0.9
4 and 9	0	0	0	0	0	0	0	0.0
4 and 10	0	0	0	0	0	0	0	0.0
4 and 11	0	0	0	0	0	0	0	0.0
4 and 12	0	0	0	0	0	0	0	0.0
5 and 6	0	0	0	0	0	0	0	0.0
5 and 7	0	0	0	0	0	0	0	0.0

5 and 8	1	1	1	1	0	1	1	0.9
5 and 9	1	1	1	1	1	1	1	1.0
5 and 10	0	0	0	0	0	0	0	0.0
5 and 11	0	0	0	0	0	0	0	0.0
5 and 12	0	0	0	0	0	0	0	0.0
6 and 7	1	1	1	1	0	1	1	0.9
6 and 8	0	0	0	0	0	0	0	0.0
6 and 9	1	1	1	1	0	1	1	0.9
6 and 10	0	0	0	0	0	0	0	0.0
6 and 11	0	0	0	0	0	0	0	0.0
6 and 12	0	0	0	0	0	0	0	0.0
7 and 8	0	0	0	0	0	0	0	0.0
7 and 9	1	1	1	1	0	1	1	0.9
7 and 10	0	0	0	0	0	0	0	0.0
7 and 11	0	0	0	0	0	0	0	0.0
7 and 12	0	0	0	0	0	0	0	0.0
8 and 9	0	0	0	0	0	0	0	0.0
8 and 10	0	0	0	0	0	0	0	0.0
8 and 11	0	0	0	0	0	0	0	0.0
8 and 12	0	0	0	0	0	0	0	0.0
9 and 10	0	0	0	0	0	0	0	0.0
9 and 11	0	0	0	0	0	0	0	0.0
9 and 12	0	0	0	0	0	0	0	0.0
10 and 11	1	1	1	1	1	1	1	1.0
10 and 12	0	0	0	0	0	0	0	0.0
11 and 12	0	0	0	0	0	0	0	0.0
Average	0.12	0.12	0.12	0.12	0.03	0.12	0.14	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the seven issues is 0.1 out of a possible 1.

3 Conclusions

In this LME, there does not appear to be any agency that is formally mandated to provide transboundary integration for the issues dealt with above. The BOBLME Project may be filling this role in an unofficial capacity. It also supports integration by facilitating and catalyzing cooperative activities and capacity development.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Bay of Bengal LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Bay of Bengal LME	Completeness	Integration	Engagement
	50%	0.1	87%

4 Acknowledgements

Thanks to Dr Rudi Hermes for reviewing the assessment and providing many useful suggestions.

5 References

- BOBLME.2012a. Transboundary Diagnostic Analysis (TDA) for the Bay of Bengal Large MarineEcosystem (BOBLME) - Volume 1.
- BOBLME.2012b. Transboundary Diagnostic Analysis (TDA) for the Bay of Bengal Large MarineEcosystem (BOBLME) - Volume 2.
- Edeson, W. 2004.Review of Legal and Enforcement Mechanisms in the BOBLME Region. Bay ofBengal Large Marine Ecosystem (BOBLME) Theme report. GCP/RAS/179/WBG.FAO-BOBLME Programme.
- GEF. 2011. International Waters: Review of legal and institutional frameworks. UNDP, NY, 309 p.
- Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1.Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.
- <http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
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- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱTable notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱTable notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Beaufort Sea LME

1 The system to be governed

The system is the Beaufort Sea LME. It is a high-latitude LME bordered by northern Alaska and Canada, with a surface area of about 1,079,204 km². It consists of three main area components: the southern part of the deep Canada Basin, the shelf along northern Alaska and northwestern Canada including Amundsen Gulf, and the southwestern part of the Canadian archipelago including the gulfs and channels around Victoria Island. About 87% of this LME falls within the jurisdiction of Canada and the US, with the High Seas making up the remaining 13% (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter XI - 30), so a review is not provided here.

Table 1. Percentage of Beaufort Sea LME area taken up by the EEZ of each country and the High Seas (area = 1,079,204 km²)

Country (N to S)	Percent of LME area
Canada	64.4
United States	22.2
High Seas	13.4

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter XI - 30 (Sherman and Hempel, 2009) as follows:

- Biodiversity
 - whales and other marine mammals are vulnerable to contaminants from the oil industry
- Pollution
 - low contamination (low amounts of organo-chlorine compounds and concentrations of total polycyclic aromatic hydrocarbons (PAHs))
- Climate Change
 - changes in water flow, transport of nutrients, the loss of ice habitat

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Beaufort Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Beaufort Sea LME (area = 1,079,204 km ²)			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
Arctic Council (AC)	5.9	100	C

The extent of country membership in these bodies and instruments for the Beaufort Sea LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Beaufort Sea LME	
Coastal countries in the LME	Agreements
	AC
Canada	C
United States	C
% engagement	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed	

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Table 4a. They are summarised in Table 5

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 4a: Iceland Shelf LME ¹ – Transboundary Arrangement for Pollution – Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC)	
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 5: Beaufort Sea LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Canada, United States	System name: Beaufort Sea		Region: Arctic
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Pollution (MBS)	2		67%		AC
Pollution (LBS)	2		67%		AC
Biodiversity – General	2		67%		AC
	System architecture completeness index >>		67%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

The impacts associated with climate change in the Arctic are not specifically addressed as they are manifested in the transboundary fisheries, pollution and biodiversity concerns of the region.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Table 4a) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a)			
Policy cycle stage	Pollution - LBS	Pollution - MBS	Biodiversity -
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Policy decision-making	Arctic Council	Arctic Council	Arctic Council
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces;	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a)			
Policy cycle stage	Pollution - LBS	Pollution - MBS	Biodiversity -
	Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Senior Arctic Officials (SAO)	
Planning decision-making	Arctic Council	Arctic Council	Arctic Council
Implementation	Countries	Countries	Countries
Review and evaluation	Arctic Council	Arctic Council	Arctic Council
Data and information	Countries Secretariat	Countries Secretariat	Countries Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.								
Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	1	0	1	0	1	1	0.57
1 and 3	0	1	0	1	0	1	1	0.57
2 and 3	0	1	0	1	0	1	1	0.57
Average	0	1	0	1	0	1	1	0.57

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the three issues is 0.57 out of a possible 1.

3 Conclusions

The only transboundary agreement addressing the issues is the Arctic Council (AC). It appears that the AC has the potential to develop into an informal overall policy coordinating organization, its policy coordination role with respect to fisheries is weak. This LME has been assigned an overall integration score of 1.0 due to the presence of the Arctic Council with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Beaufort Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Beaufort Sea LME	Completeness	Integration	Engagement
	67%	1.0	100%

4 References

- Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.
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- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
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End notes

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This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

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System architecture completeness: Average for issues.

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^v This can be internal or external

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^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Benguela Current LME

1 The system to be governed

The system is the Benguela Current LME. The percentage of the LME taken up by the marine waters of the coastal countries is shown in Table 1. There is a significant area of High Seas. A small area of the waters of the Democratic Republic of the Congo, which is not considered a Benguela Current LME coastal country does overlap the LME.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter I-1), so a review is not provided here. This assessment is also informed by the TDA, SAP, PRODOC and Benguela Current Convention (UNDP 1999, UNDP 2002, BCC 2008).

Table 1. Percentage of Benguela Current LME area taken up by the EEZ of each country and the High Seas (area = 1,455,995 km²)

Country	Percent of LME area
Angola	32.8
Namibia	38.1
South Africa	18.9
Democratic Republic Congo	<0.1
High Seas	10.2

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Issues to be governed

The issues to be addressed by governance were identified in the TDA, SAP, and documents of related organisations:

- Unsustainable fisheries
 - Shared demersals including invertebrates
 - Shared small pelagics
 - Large pelagic species – tunas and tuna-like fishes
 - Straddling and ABNJ demersals
- Deterioration in coastal water quality at local and regional levels(land and marine-based sources of pollution)
- Habitat destruction, degradation and modification of the sea bed and coastal zone
- Increased loss of biotic integrity
 - Changes in community composition, species and diversity
 - Introduction of alien species

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

- 1) Abidjan Convention for Co-operation in the protection and Development of the Marine and Coastal Environment of the West and Central African Region - Abidjan Convention
 - a) Action Plan for the protection and Development of the Marine Environment and Coastal Areas of the West and Central African Region
 - b) Protocol Concerning Co-operation in Combating Pollution in Cases of Emergency
 - c) Protocol concerning the Cooperation in the Protection and Development of the Marine and Coastal Environment from Land-Based Sources and the Activities (LBSA) in the Western, Central and Southern Africa Region - LBS Protocol – not yet in force
- 2) The Benguela Current Convention and Commission
- 3) Ministerial Conference on Fisheries Cooperation among African States Bordering the Atlantic Ocean (COMHAFAT)
- 4) The International Commission for the Conservation of Atlantic Tunas (ICCAT)
- 5) Convention for the Conservation of the Southern Bluefin Tuna (CCSBT)
- 6) The Convention on the Conservation and Management of Fishery Resources in the South East Atlantic Ocean (SEAFO)
- 7) Action Plan for the protection and Development of the Marine Environment and Coastal Areas of the West and Central African Region, 1981

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Benguela Current LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with the Benguela Current LME			
Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME ¹
Abidjan Convention	31	98	D
Benguela Current Convention	100	90	B
COMHAFAT	5	84	D
ICCAT	1	100	C
CCSBT	1	52	D
SEAFO	1	10	D

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

The extent of country membership in these bodies and instruments for the Benguela Current LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Benguela Current LME								
Coastal countries in the LME	Agreements							
	Abidjan Convent-ion	Abidjan-Emergency Protocol	Abidjan-LBSA Protocol ²	CCSBT	COM-HAFAT	ICCAT	SEAFO	Benguela Current Convention
Angola				N	B	B	B	B
Namibia				N	B	B	B	B
South Africa	B	B	B	N	N	B	B	B
% engagement	33	33	33		100	100	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed								

2.2.1 Assessment of issues

The governance arrangements for the issues identified above are presented in Tables 4 a-e. They are summarised in table 5.

² Not yet in force

Table 4a: Benguela Current LME ⁱ – Summary for fisheries – Shared small pelagics and demersals, including invertebrates					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	BCC Ecosystem Advisory Committee	National LME	3	WWF CECAF SADC Fisheries Protocol	<ul style="list-style-type: none">• The Benguela Current Commission provides a full policy process for fisheries within the EEZs of the three member countries.• It is noted that there are other fisheries arrangements overlapping with the area; including CECAF, and COMHAFAT.
Policy decision-making	Ministerial Conference	National LME	3		
Planning analysis and advice	Ecosystem Advisory Committee Compliance Committee Marine Living Resources Committee	National LME	3		
Planning decision-making	Commission	National LME	3		
Implementation	CPs Secretariat	National LME	1		
Review and evaluation	Ecosystem Advisory Committee Compliance Committee Marine Living Resources Committee	National LME	2		
Data and information	BCC Ecosystem Advisory Committee	National LME	2		
Overall total and % completeness >>			=17/21 = 81%		

Table 4b: Benguela Current LME – Transboundary arrangement for fisheries – tunas and tuna-like species					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	LME	3		<ul style="list-style-type: none">• All countries are members of ICCAT• Is there a regionally coordinated approach to ICCAT?• Are there stocks of small tunas occurring mainly within the LME for which ICCAT has a mandate but does little regarding management, other than catch monitoring (recreational fishing)• Are there trophic interactions between the oceanic tunas (large scale distribution) and small pelagics in the LME that require linkages in management• How should southern bluefin tuna be dealt with? Is there enough fishing for in this LME to have it as a separate arrangement?
Policy decision-making	ICCAT Commission	LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	LME	3		
Planning decision-making	ICCAT Commission	LME	3		
Implementation	Countries	LME	0		
Review and evaluation	SCRS and Conservation and Management Measures Compliance Committee (CMMCC)	LME	3		
Data and information	SCRS and Permanent WG for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	LME	3		
Overall total and % completeness >>			17/21 = 81%		

Table 4c: Benguela Current LME – Transboundary arrangement for fisheries – straddling and ABNJ demersals					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	SEAFO Scientific Committee	Supra-LME	3	The extent to which BCC and SEAFO are linked is not clear from websites; even though they are in the same building. Is it an MOU?	<ul style="list-style-type: none">• SEAFO is responsible for all fishery resources beyond national jurisdiction within the LME, except tunas and tuna-like species. This includes a wide range of demersal finfishes and invertebrates• The extent to which these deep sea resources for which SEAFO is responsible occur within the LME is not clear.• SEAFO is also responsible for biodiversity and has closed seamounts to fishing
Policy decision-making	SEAFO Commission	Supra-LME	3		
Planning analysis and advice	SEAFO Scientific Committee	Supra-LME	3		
Planning decision-making	SEAFO Commission	Supra-LME	3		
Implementation	SEAFO CPs	National	0		
Review and evaluation	Compliance Committee CPs	Supra-LME	2		
Data and information	CPs Scientific Committee	Supra-LME	2		
Overall total and % completeness >>			16/21 = 76%		

Table 4d: Benguela Current LME – Transboundary arrangement for pollution – land and marine-based sources of pollution					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Commission Ecosystem Advisory Committee	LME	3	WWF?	<ul style="list-style-type: none">• While all matters pertaining to the marine pollution are encompassed in the mandate of the BCC, coastal countries are also signatories to the Abidjan Convention.• However, there is only one protocol in effect, relating to emergency response to oil spills
Policy decision-making	Ministerial Conference	LME	3		
Planning analysis and advice	Ecosystem Advisory Committee Compliance Committee Minerals and Petroleum Committee Ecosystem Health Committee	LME	3		
Planning decision-making	Commission	LME	3		
Implementation	CPs Secretariat	National LME	1		
Review and evaluation	Ecosystem Advisory Committee Compliance Committee Minerals and Petroleum Committee Ecosystem Health Committee	LME	2		
Data and information	Ecosystem Advisory Committee	LME	2		
Overall total and % completeness >>			17/21 = 81%		

Table 4e: Benguela Current LME – Transboundary arrangement for biodiversity – Habitat destruction, degradation and modification of the sea bed and coastal zone, increased loss of biotic integrity (ecosystem changes, alien invasives) with EEZs					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Commission Ecosystem Advisory Committee	LME	3	WWF	<ul style="list-style-type: none">• While all matters pertaining to coastal and marine biodiversity are encompassed in the mandate of the BCC, coastal countries are also signatories to the Abidjan Convention which addresses these issues.• However, there is no protocol in effect, relating to biodiversity• Note that SEAFO has a stated mandate to protect biodiversity in ABNJ in this LME.
Policy decision-making	Ministerial Conference	LME	3		
Planning analysis and advice	Ecosystem Advisory Committee Compliance Committee Marine Living Resources Committee	LME	3		
Planning decision-making	Commission	LME	3		
Implementation	CPs Secretariat	National LME	1		
Review and evaluation	Ecosystem Advisory Committee Compliance Committee Marine Living Resources Committee	LME	2		
Data and information	Ecosystem Advisory Committee	LME	2		
Overall total and % completeness >>			17/21 = 81%		

2.2.2 Issues mentioned in the TDA but not addressed above:

Table 5: Benguela Current LME governance architecture - System summary ⁱⁱ					
IW category: LME		Countries: Angola, Namibia, South Africa		System name: Benguela Current LME	Region: South Atlantic
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – Shared small pelagics and demersals, including invertebrates	3		81		Benguela Current Commission
Fisheries – tunas and tuna-like species	3		81		ICCAT
Fisheries – straddling and ABNJ demersals	3		76		SEAFO
Pollution – LBS	3		81		Benguela Current Commission
Pollution –MBS	3		81		
Biodiversity – Habitat destruction, degradation and modification of the sea bed and coastal zone	3		81		
	System architecture completeness index >>		80%		<< System priority for intervention

2.3 Assess transboundary integration of arrangements within systems

The assessment of transboundary integration is based on the extent to which issue specific arrangements in an LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 5)					
Policy cycle stage	Fisheries – Shared small pelagics and demersals, including invertebrates	Fisheries – tunas and tuna-like species	Fisheries – straddling and ABNJ demersals	Pollution – LBS and MBS	Biodiversity – Habitat destruction, degradation and modification
Policy analysis and advice	Commission Ecosystem Advisory Committee	ICCAT Standing Committee on Research and Statistics (SCRS)	SEAFO Scientific Committee	Commission Ecosystem Advisory Committee	Commission Ecosystem Advisory Committee
Policy decision-making	Ministerial Conference	ICCAT Commission	SEAFO Commission	Ministerial Conference	Ministerial Conference
Planning analysis and advice	Ecosystem Advisory Committee Compliance Committee Marine Living Resources Committee	ICCAT SCRS and Species Panels	SEAFO Scientific Committee	Ecosystem Advisory Committee Compliance Committee Marine Living Resources Committee	Ecosystem Advisory Committee Compliance Committee Marine Living Resources Committee
Planning decision-making	Commission	ICCAT Commission	SEAFO Commission	Commission	Commission
Implementation	CPs Secretariat	Countries	SEAFO CPs	CPs Secretariat	CPs Secretariat
Review and evaluation	Ecosystem Advisory Committee Compliance Committee Marine Living Resources Committee	SCRS and Conservation and Management Measures Compliance Committee (CMMCC)	Compliance Committee CPs	Ecosystem Advisory Committee Compliance Committee Marine Living Resources Committee	Ecosystem Advisory Committee Compliance Committee Marine Living Resources Committee
Data and information	Ecosystem Advisory Committee	SCRS and Permanent WG for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	CPs Scientific Committee	Ecosystem Advisory Committee	Ecosystem Advisory Committee

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	1	1	1	1	1	1	1	1
1 and 5	1	1	1	1	1	1	1	1
1 and 6	1	1	1	1	1	1	1	1
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
4 and 5	1	1	1	1	1	1	1	1
4 and 6	1	1	1	1	1	1	1	1
5 and 6	1	1	1	1	1	1	1	1
Average	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the six issues is 0.4 out of a possible 1.

3 Conclusions

It is clear in this LME that the Benguela Current Commission provides for full integration across issues in the EEZs that it covers. It is the integration between the HMS and ABNJ arrangements (ICCAT, SEAFO) and between those arrangements and the BCC that lower the score. In the broader assessment the presence of an arrangement that is clearly designed to integrate issues for the LME is overriding and a score of 1.0 is assigned for integration. This assigned score of 1.0 is due to the presence of the Benguela Current Commission with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Benguela Current LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Benguela Current LME	Completeness	Integration	Engagement
	80%	1.0	71%

4 References

BCC. 2008. Support to the Benguela Current Commission (BCC) – PRODOC. Benguela Current Commission, Windhoek, Namibia, 65 p.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

UNDP. 1999. Benguela Current Large Marine Ecosystem Programme (BCLME) Transboundary Diagnostic Analysis (TDA). UNDP, Windhoek, Namibia, 171 p.

UNDP. 2002. Benguela Current Large Marine Ecosystem Strategic Action Programme (SAP). UNDP, UNDP, Windhoek, Namibia, 23 p.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱTable notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱTable notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Black Sea LME

1 The system to be governed

The system is the Black Sea LME. It has a short coastline and is an almost completely enclosed sea located off of the Mediterranean Sea. This LME falls under the shared responsibility and management of six coastal countries: Bulgaria, Georgia, Romania, Russia, Turkey, and Ukraine and includes the marine waters (Table 1).

The Black Sea is linked to the Mediterranean Sea by the narrow Bosphorus and Dardanelles Straits and to the shallow Sea of Azov by the Kerch Strait in the north. The LME covers a surface area of over 470,000 km²

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter V-8), so a review is not provided here. This assessment is also informed by the Black Sea TDA 2007, the PRODOC and the Black Sea Strategic Action Plan (SAP) 1996.

Table 1. Percentage of Black Sea LME area taken up by the EEZ of each country and the High Seas (area = 471,876 km²)

Country	Percent of LME area
Bulgaria	7.6
Georgia	4.9
Romania	4.4
Russia	14.4
Turkey	37.3
Ukraine	31.2
High Seas	0.1

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified in the Black Sea Strategic Plan (1996), the TDA (2007) and Sherman and Hempel (2009) are:

- Fisheries
 - decline commercial species and fish stocks
- Pollution
 - nutrient enrichment/eutrophication
 - chemical pollution
- Biodiversity
 - habitat modification
 - alien species introduction

According to the TDA, nutrient over-enrichment/eutrophication in the Black Sea is closely linked to other transboundary problems such as changes in marine living resources, chemical pollution and biodiversity/habitat changes.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Bucharest Convention on the Protection of the Black Sea against Pollution (1992) and its four Protocols.
 - a. Protocol on Protection of the Black Sea Marine Environment Against Pollution from Land Based Sources (new 2009 Protocol on LBS and Activities not yet in force)
 - b. Protocol on Cooperation in Combating Pollution of the Black Sea Marine Environment by Oil and Other Harmful Substances
 - c. Protocol on the Protection of the Black Sea Marine Environment Against Pollution by Dumping
 - d. The Black Sea Biodiversity and Landscape Conservation Protocol.
2. Agreement for the establishment of the General Fisheries Commission for the Mediterranean (GFCM) 2004
3. International Convention for the Conservation of Atlantic Tunas (ICCAT) 1969
4. Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS)
5. European Union Common Fisheries Policy (CFP)
6. European Union Integrated Maritime Policy
7. Strategic Action Plan for the Rehabilitation and Protection of the Black Sea, 1996
8. The revised Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea, 2009

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Black Sea LME is shown in Table 2.

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
Convention on the Protection of the Black Sea against Pollution (three protocols) – Bucharest Convention	100	100	A
Agreement for the establishment of the General Fisheries Commission for the Mediterranean (GFCM)	16	100	C
Agreement on the Conservation of Cetaceans in the Black Sea,		100	C

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS)			
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	<1	100	C
European Union Common Fisheries Policy (CFP)	2	14	D
European Union Integrated Maritime Policy	2	14	D

The extent of country membership in these bodies and instruments for the Black Sea LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Black Sea LME									
LME coastal countries	Agreement								
	Bucharest					ACCO-BAMS	GFCM	ICCAT	EU-CFP
	Convention	LBS ²	Emergency	Dumping	Biodiversity and Landscape				
Bulgaria	B	C	B	B	B	B	B	N	B
Georgia	B	B	B	B	B	B		N	
Romania	B	C	B	B	C	B	B	N	B
Russia	B	C	B	B	N			B	
Turkey	B	C	B	B	B		B	B	B
Ukraine	B	C	B	B	B	B		N	
% engagement	100	17	100	100	80	67	50	100	50

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-g. They are summarised in table 5.

² Not yet in force

Table 4a: Black Sea LME ⁱ – Transboundary Arrangement for Fisheries – EEZ and HS					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	GFCM – Committee on Aquaculture, Scientific Advisory Committee, Compliance Committee	Supra-LME	3		Only 3 of the 6 coastal states are members of the GFCM
Policy decision-making	GFCM - Commission	Supra-LME	3		
Planning analysis and advice	GFCM – Committee on Aquaculture, Scientific Advisory Committee, Compliance Committee	Supra-LME	3		
Planning decision-making	GFCM - Commission	Supra-LME	3		
Implementation	Countries GFCM - Secretariat	National Supra-LME	2		
Review and evaluation	GFCM – Compliance Committee	Supra-LME	3		
Data and information	Countries GFCM – Secretariat GFCM - Committee on Aquaculture, Scientific Advisory Committee	National Supra-LME	3		
Overall total and % completeness >>			20/21 = 95%		

Table 4b. Black Sea LME – Transboundary arrangement for fisheries – HMS (Tuna and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		<p>None of the countries have ratified ICCAT. Russia and Turkey have signed.</p> <p>How important is tuna fishing to the countries in the LME?</p> <p>How important is ICCAT to the countries, especially given that there is virtually no high seas?</p>
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			17/21 = 80%		

Table 4c: Black Sea LME – Transboundary Arrangement for Pollution – Land-based sources leading to eutrophication and chemical pollution					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Bucharest Convention and LBS Protocol – Advisory Groups	LME	3		All 6 coastal states are members of the Bucharest Convention and have signed the Convention and its 3 protocols. A new protocol on Land-Based Sources and Activities (LBSA) is pending entry into force..
Policy decision-making	Bucharest Convention - Commission	LME	1		
Planning analysis and advice	Bucharest Convention and LBS Protocol – Advisory Groups	LME	3		
Planning decision-making	Bucharest Convention - Commission	LME	1		
Implementation	Countries with support from Activity Centres	LME	1		
Review and evaluation	Bucharest Convention - Commission	LME	2		
Data and information	Countries Secretariat	National LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 4d: Black Sea LME – Transboundary Arrangement for Pollution – Marine-Based Sources					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Bucharest Convention and its Dumping and Emergency Protocols – Advisory Groups	LME	3		All 6 coastal states are members of the Bucharest Convention and its two marine protocol focusing on dumping and emergency
Policy decision-making	Bucharest Convention - Commission	LME	1		
Planning analysis and advice	Bucharest Convention and its Dumping and Emergency Protocols – Advisory Groups	LME	3		
Planning decision-making	Bucharest Convention - Commission	LME	1		
Implementation	Countries with support from Activity Centres	LME	2		
Review and evaluation	Bucharest Convention - Commission	LME	2		
Data and information	Countries Secretariat	National LME	3		
Overall total and % completeness >>			15/21 = 71%		

Table 4e: Black Sea LME – Transboundary Arrangement for Biodiversity – Biodiversity and Landscape					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Bucharest Convention and LBS Protocol – Advisory Groups	LME	3		
Policy decision-making	Bucharest Convention - Commission	LME	1		
Planning analysis and advice	Bucharest Convention and LBS Protocol – Advisory Groups	LME	3		
Planning decision-making	Bucharest Convention - Commission	LME	1		
Implementation	Countries with support from Activity Centres	LME	1		
Review and evaluation	Bucharest Convention - Commission	LME	2		
Data and information	Countries Secretariat	National LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 4f: Black Sea LME – Transboundary Arrangement for Biodiversity – Specific (Cetaceans)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ACCOBAMS Scientific Committee	Supra-LME	3		Only Russia has not signed the Agreement. The remaining 5 coastal states have ratified the agreement.
Policy decision-making	Meeting of the Parties	Supra-LME	2		
Planning analysis and advice	ACCOBAMS Scientific Committee	Supra-LME	3		
Planning decision-making	Countries	National	1		
Implementation	Countries	National	1		
Review and evaluation	CoP	Supra-LME	2		
Data and information	Countries ACCOBAMS Secretariat	National Supra-LME	2		
Overall total and % completeness >>			14/21 = 67%		

Table 4g:Black Sea LME – Transboundary Arrangement for Fisheries – EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3		
Policy decision-making	European Commission	Supra-LME	2		
Planning analysis and advice	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3		
Planning decision-making	European Commission	Supra-LME	3		
Implementation	Contracting Parties Scientific, Technical and Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	National Supra-LME	2		
Review and evaluation	Commission STECF	Supra-LME	3		
Data and information	Contracting Parties Commission STECF Advisory Councils	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 5: Black Sea LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Bulgaria, Georgia, Romania, Russian Federation, Turkey, Ukraine	System name: Black Sea		Region: North East Atlantic
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – EEZ and HS - GFCM	6		95%		
Fisheries – HMS (Tuna and tuna-like species) - ICCAT	6		80%		
Fisheries – EEZ - CFP	6		90%		
Pollution – Land-based sources – Bucharest protocol	6		67%		
Pollution – Marine-Based Sources – Bucharest protocol	6		71%		
Biodiversity – Hab Mod – Bucharest Convention	6		67%		
Biodiversity – Specific Cetaceans - ACCOBAMS	6		67%		
	System architecture completeness index >>		77%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-g) and summarizing it in Table 6 to facilitate comparison. The transboundary integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-f)							
Policy cycle stage	Fisheries – EEZ/HS	Fisheries - EEZ	Fisheries - HMS	Pollution - LBS	Pollution - MBS	Biodiversity – Habitat Modification	Biodiversity - Cetaceans
Policy analysis and advice	GFCM – Committee on Aquaculture, Scientific Advisory Committee, Compliance Committee	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	ICCAT Standing Committee on Research and Statistics (SCRS)	Bucharest Convention and LBS Protocol – Advisory Groups	Bucharest Convention and its Dumping and Emergency Protocols – Advisory Groups	Bucharest Convention Biodiversity and Landscape Protocol Advisory Group	ACCOBAMS Scientific Committee
Policy decision-making	GFCM - Commission	European Commission	ICCAT Commission	Bucharest Convention - Commission	Bucharest Convention - Commission	Bucharest Convention - Commission	Meeting of the Parties
Planning analysis and advice	GFCM – Committee on Aquaculture, Scientific Advisory Committee, Compliance Committee	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	ICCAT SCRS and Species Panels	Bucharest Convention and LBS Protocol – Advisory Groups	Bucharest Convention and its Dumping and Emergency Protocols – Advisory Groups	Bucharest Convention Biodiversity and Landscape Protocol Advisory Group	ACCOBAMS Scientific Committee
Planning decision-making	GFCM - Commission	European Commission	ICCAT Commission	Bucharest Convention - Commission	Bucharest Convention - Commission	Bucharest Convention - Commission	Countries
Implementation	Countries GFCM - Secretariat	Contracting Parties Scientific, Technical and Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	Countries	Countries with support from Activity Centres	Countries with support from Activity Centres	Countries with support from Activity Centres	Countries

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-f)							
Policy cycle stage	Fisheries – EEZ/HS	Fisheries - EEZ	Fisheries - HMS	Pollution - LBS	Pollution - MBS	Biodiversity – Habitat Modification	Biodiversity - Cetaceans
Review and evaluation	GFCM – Compliance Committee	Commission STECF	Conservation and Management Measures Compliance Committee (CMMCC)	Bucharest Convention - Commission	Bucharest Convention - Commission	Bucharest Convention - Commission	CoP
Data and information	Countries GFCM – Secretariat GFCM - Committee on Aquaculture, Scientific Advisory Committee	Contracting Parties Commission STECF Advisory Councils	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries Secretariat	Countries Secretariat	Countries Secretariat	Countries ACCOBAMS Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
4 and 5	0	1	0	1	0	1	1	0.6
4 and 6	0	1	0	1	0	1	1	0.6
4 and 7	0	0	0	0	0	0	0	0
5 and 6	0	1	0	1	0	1	1	0.6
5 and 7	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
Average	0	0.1	0	0.1	0	0.1	0.1	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the seven issues is 0.1 out of a possible 1.

3 Conclusions

In this LME, neither of the two arrangements for fisheries (GFCM and EU-CFP) nor the biodiversity arrangement for cetaceans (ACCOBAMS) appears to be linked formally. However, the two arrangements for land-based and marine based pollution and biodiversity (landscape/habitat modification) under the Bucharest Convention are well connected. No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Black Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Black Sea LME	Completeness	Integration	Engagement
	77%	0.1	74%

4 References

GEF. 2011. International Waters: Review of legal and institutional frameworks. UNDP, NY, 309 p.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the California Current LME

1 The system to be governed

The system is the California Current LME. It has a surface area of approximately 2.2 million km², shared by the US and Mexico (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter XIV-44), so a review is not provided here. This assessment is also informed by NOAA's Integrated Ecosystem Assessment Program for the California Current LME. This is a well-studied LME due to the interest and capacity of the US. However, although efforts have been made to solicit LME funded support from GEF, the LME has not been subject to a GEF-funded TDA/SAP assessment.

Table 1. Percentage of California Current LME area taken up by the EEZ of each country and the High Seas (area = 2,205,843 km²)

Country (N to S)	Percent of LME area
US	34.8
Mexico	34.8
High Seas	30.3

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified in the reviewed documents and focus on impacts arising from commercial and recreational fishing, pollution, habitat degradation, shoreline alteration, logging, agriculture, urbanization, grazing, and energy production:

- Fisheries
 - over-exploitation of salmon species
 - variability of coastal pelagics (sardines, anchovy, mackerel)
 - highly migratory large pelagics (tunas and tuna-like species)
 - decline in demersal stocks
- Pollution
 - degraded sediment quality (toxic contaminants)
 - eutrophication, pesticides and atmospheric pollution
- Biodiversity
 - high demersal bycatch in shrimp and prawn fishery
 - effects of declining fish stocks on birds, marine mammals
 - habitat modification resulting in loss of salmon spawning ground and nursery habitat and loss of coastal wetlands

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean (NPAFC)
2. Convention for the Strengthening of the Inter-American Tropical Tuna Commission (IATTC)
3. International Pacific Halibut Commission - Convention for the Preservation of the Halibut Fishery (IPHC)
4. The North Pacific Marine Science Organization (PICES)
5. Latin American Organization for Fishery Development (OLDEPESCA)
6. Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)
7. MEX-US 1980 Agreement of Cooperation between the US and Mexico regarding Pollution of the Marine Environment by Discharges of Hydrocarbons and other Hazardous Substances
8. Treaty Between the Government of the United States of America and the Government of Canada concerning Pacific Salmon (PSC) (not relevant to this LME)
9. Plan of Action for the Protection and Sustainable Development of the Marine and Coastal Areas of the North-East Pacific, 2002
10. Antigua Convention - Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific (Not yet in force).

The extent to which the geographical area of coverage of these bodies and instruments overlaps the California Current LME is shown in Table 2.

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific (Antigua)	28	35	D
Convention for the Strengthening of the Inter-American Tropical Tuna Commission (IATTC)	3	100	C

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

International Pacific Halibut Commission (IPHC)/Convention for the Preservation of the Halibut Fishery(IPHC)	5	17	D
Convention for the Conservation of Anadromous Stocks in The North Pacific Ocean (NPAFC)	3	16	D
Latin American Organization for Fisheries Development (OLDEPESCA)	8	25	D
The North Pacific Marine Science Organization (PICES)	5	61	D
Treaty Between the Government of the United States of America and the Government of Canada concerning Pacific Salmon (PSC)	4	1	D
Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)		100	C
MEX-US 1980 Agreement of Cooperation between the US and Mexico regarding Pollution of the Marine Environment by Discharges of Hydrocarbons and other Hazardous Substances			

The extent of country membership in these bodies and instruments for the California Current LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the California Current LME									
Coastal countries in the LME		Agreements							
	Antigua ²	IATTC	IPHC	NPAFC	OLDEPESCA	PICES	PSC	IAC	MEX-US
US	N	B	B	B	N	B	B	B	B
Mexico		B	N	N	B	N	N	B	B
% engagement	0	100	100	100	100	100	100	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed									

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-d. They are summarised in table 5.

² Not Yet in Force

Table 4a: California Current LMEⁱ – Transboundary Arrangements for Fisheries – HMS (tuna and tuna-like species)

Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IATTC - Scientific Advisory Committee (Art XI Annex 4)	LME	3	PICES?	Mexico has signed but not ratified the IATTC. What role does PICES play in providing scientific advice, if any?
Policy decision-making	IATTC - Commission	LME	3		
Planning analysis and advice	IATTC - Scientific Advisory Committee (Art XI Annex 4)	LME	3		
Planning decision-making	IATTC - Commission	LME	3		
Implementation	Countries	National	0		
Review and evaluation	Committee for the Review of Implementation of Measures Adopted by the Commission	LME	3		
Data and information	Secretariat Countries	LME/National	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4b: California Current LME – Transboundary Arrangements for Fisheries – Specific (anadromous)

Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NPAFC – Committee on Scientific Research and Statistics and its Science sub-committee and working groups	LME	3	Pacific Salmon Commission PICES	Only a very small US portion in the northern most part of the LME comes under the US/Canada PSC
Policy decision-making	NPAFC - Commission	LME	1		
Planning analysis and advice	NPAFC– Committee on Scientific Research and Statistics and its Science sub-committee and working groups	LME	3		
Planning decision-making	NPAFC - Commission	LME	1		
Implementation	Countries	National	0		
Review and evaluation	NPAFC - Committee on Enforcement	LME	3		
Data and information	NPAFC – Committee on Scientific Research and Statistics and its Science sub-committee and working groups	LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4c: California Current LME – Transboundary Arrangements for Fisheries – Specific (Halibut)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board.	LME	3	PICES	Only the northern part of the LME under the USA's jurisdiction is part of the IPHC area of competence.
Policy decision-making	IPHC - Commission	LME	3		
Planning analysis and advice	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board.	LME	3		
Planning decision-making	IPHC - Commission	LME	3		
Implementation	Countries	National	2		
Review and evaluation	IPHC – Conference Board	LME	3		
Data and information	IPHC – Conference Board	LME	3		
Overall total and % completeness >>			20/21 = 95%		

Table 4d: California Current LME – Transboundary Arrangements for Biodiversity – Specific (Turtles)

Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Policy decision-making	IAC Consultative Committee and CoP	Supra-LME	3		
Planning analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Planning decision-making	IAC CoP	Supra-LME	3		
Implementation	IAC Countries	National	0		
Review and evaluation	IAC Countries	National	1		
Data and information	IAC Countries	National	1		
Overall total and % completeness >>			12/21 = 57%		

Table 5: California Current LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: United States, Mexico	System name: California Current		Region: North-east Pacific
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries - HMS	2		86%		
Fisheries – Specific (anadromous)	2		62%		
Fisheries – Specific (Halibut)	2		95%		
Biodiversity - Turtles	2		57%		
Pollution – MBS	2		0		
Pollution - LBS	2		0		
	System architecture completeness index >>		50%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

While the LME has a number of pollution-related (LBS and MBS) issues as well as biodiversity concerns arising from habitat modification, the Regional Seas Convention (Antigua Convention) is not yet in force. The bilateral agreement between Mexico and the US to prevent pollution from oil spills and other hazardous substances has a joint action plan that is the responsibility of the US Coast Guard and the Secretaria de Marina-Armada de Mexico. However, this action plan is reactive and is implemented once a spill has taken place to protect the shoreline and waters of the two countries in the LME. There does not appear to be any formal transboundary agreements relating to LBS of pollution.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-d) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-d)				
Policy cycle stage	Fisheries - Anadromous	Fisheries - HMS	Fisheries - Halibut	Biodiversity - Turtles
Policy analysis and advice	NPAFC – Committee on Scientific Research and Statistics and its Science sub-committee and working groups PICES	IATTC - Scientific Advisory Committee (Art XI Annex 4)	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board. PICES	IAC Consultative and Scientific Committees
Policy decision-making	NPAFC - Commission	IATTC - Commission	IPHC - Commission	IAC Consultative Committee and CoP
Planning analysis and advice	NPAFC– Committee on Scientific Research and Statistics and its Science sub-committee and working groups PICES	IATTC - Scientific Advisory Committee (Art XI Annex 4)	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board. PICES	IAC Consultative and Scientific Committees
Planning decision-making	NPAFC - Commission	IATTC - Commission	IPHC - Commission	IAC CoP
Implementation	Countries	Countries	Countries	Countries
Review and evaluation	NPAFC - Committee on Enforcement	Committee for the Review of Implementation of Measures Adopted by the Commission	IPHC – Conference Board	Countries
Data and information	NPAFC – Committee on Scientific Research and Statistics and its Science sub-committee and working groups	Secretariat Countries	IPHC – Conference Board	Countries

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	1	0	1	0	0	0	0	0.29
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
Average	0.07	0	0.07	0	0	0	0	0

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the six issues is 0 out of a possible 1.

3 Conclusions

In this LME the two arrangements for fisheries relating to halibut and the anadromous species (IPHC and NPAFC) are assisted by PICES in the provision of policy and planning level advice. However, these arrangements are not linked in any formal way with IATTC and it is unclear to what extent PICES participates in the IATTC. In terms of pollution and biodiversity arrangements, there appears to be no formal arrangement in force although the US and Mexico has an action plan (MEXUS-PAC) to assist each other in the event of a significant spill in each other's waters that could affect the neighbouring country. Since the Antigua Convention is not yet in force, there appears to be no formal arrangements for addressing land-based or marine-based sources of pollution (other than the MEXUS-PAC action plan) in the LME. Likewise, biodiversity arrangements are limited to the Inter-American Convention for the protection of turtles.

Further, no integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the California Current LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

California Current LME	Completeness	Integration	Engagement
	50%	0	89%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

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<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

NOAA's Integrated Ecosystem Assessment (n.d.) Available at
<http://www.st.nmfs.noaa.gov/iea/california.html>

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Canadian Eastern Arctic - West Greenland LME

1 The system to be governed

The system is the Canadian Eastern Arctic - West Greenland Shelf LME. This includes the marine waters of Canada and Greenland (Table 1). The LME has a surface area of 1,385,104 km².

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter XIX - 58), so a review is not provided here. Additionally, this assessment is informed by Large Marine Ecosystems (LMEs) of the Arctic Area: Revision of the Arctic LME Map (PAME, 2013)

Table 1. Percentage of Canadian Eastern Arctic - West Greenland LME area taken up by the EEZ of each country and the High Seas (area = 1,385,104 km²)

Country (N to S)	Percent of LME area
Canada	56.8
Denmark (Greenland)	41.2
High Seas	2.0
The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.	

2 Governance arrangements

2.1 Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter XIX - 58 (Sherman and Hempel, 2009) as follows:

- Fisheries
 - Historical decline in abundance of cod stocks mainly due to environmental factors and unregulated fishing directed for cod in the fjords
 - Bycatch in the Northern Prawn fishery (redfish, greenland halibut, polar cod) that has replaced cod as the major fishery
- Pollution
 - LBS - Historic metal contaminants in sediments(Pd, Hg, Zn) from mining in parts of W. Greenland; POPs and other chemicals transported from Europe, Asia and North America

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)

2. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
3. Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)
4. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
5. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Canadian Eastern Arctic - West Greenland LME is shown in Table 2.

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
Arctic Council (AC)	7.2	98.3	D
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	83	D
Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)	18	83	D
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	5	83	D
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	6	83	D

The extent of country membership in these bodies and instruments for the Canadian Eastern Arctic - West Greenland LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Canadian Eastern Arctic - West Greenland LME

Coastal countries in the LME	Agreements				
	AC	ICCAT	NAFO	NAMMCO	NASCO
Canada	C	B	B		B
Denmark (Greenland)	C		B	B	B

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

% engagement	100	50	100	50	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed					

2.2.1 *Assessment of issues*

The governance arrangements for the issues identified above are presented in Tables 4 a-e. They are summarised in Table 5

Table 4a. Canadian Eastern Arctic West Greenland Shelf LME ¹ – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4b: Canadian Eastern Arctic West Greenland Shelf LME – Transboundary Arrangement for fisheries – EEZ and ABNJ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NAFO Scientific Council	Supra-LME	3		
Policy decision-making	NAFO General Council Fisheries Commission	Supra-LME	3		
Planning analysis and advice	NAFO Scientific Council	Supra-LME	3		
Planning decision-making	NAFO General Council Fisheries Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NAFO Standing Committee on International Control (STACTIC)	Supra-LME	3		
Data and information	Countries NAFO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4c: Canadian Eastern Arctic West Greenland Shelf LME – Transboundary Arrangement for Fisheries – Specific (Marine Mammals)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3		
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	NAMMCO Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	NAMMCO Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4d: Canadian Eastern Arctic West Greenland Shelf LME – Transboundary arrangement for fisheries – specific (salmon)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICES NASCO Secretariat and its Commissions	Supra-LME	3		Both countries are members of NASCO (France through the EU) ICES named in NASCO to provide scientific advice
Policy decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Planning analysis and advice	NASCO Three Commissions NASCO Secretariat ICES	Supra-LME	3		
Planning decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4e: Canadian Eastern Arctic West Greenland Shelf LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC)	
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 5: Canadian Eastern Arctic West Greenland Shelf LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Denmark, Norway, Iceland	System name: Iceland Shelf LME		Region: Arctic
Complete these columns then assess issues using the arrangements tables			After completing the arrangements tables, complete these columns		
Trans-boundary issue ²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – EEZ/ABNJ	2		86%		NAFO
Fisheries – large pelagics (tunas and tuna-like)	2		86%		ICCAT
Fisheries – specific (marine mammals)	2		71%		NAMMCO
Fisheries – specific (salmon)	2		57%		NASCO
Pollution (LBS)	2		67%		AC
Pollution (MBS)	2		67%		AC
Biodiversity – General	2		67%		Ac
	System architecture completeness index >>		72%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a to 4e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-e)							
Policy cycle stage	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries – Specific (salmon)	Fisheries - Specific (Marine Mammals)	Pollution - LBS	Pollution - MBS	Biodiversity - General
Policy analysis and advice	NAFO Scientific Council	ICCAT Standing Committee on Research and Statistics (SCRS)	ICES NASCO Secretariat and its Commissions	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Policy decision-making	NAFO General Council Fisheries Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council	Arctic Council	Arctic Council	Arctic Council
Planning analysis and advice	NAFO Scientific Council	ICCAT SCRS and Species Panels	NASCO Three Commissions NASCO Secretariat ICES	NAMMCO Management Committee and Scientific Committee	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council - Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Planning decision-making	NAFO General Council	ICCAT Commission	NASCO Council NASCO Three	NAMMCO Council	Arctic Council	Arctic Council	Arctic Council

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-e)							
Policy cycle stage	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries – Specific (salmon)	Fisheries - Specific (Marine Mammals)	Pollution - LBS	Pollution - MBS	Biodiversity - General
	Fisheries Commission		Commissions - North American; West Greenland and NE Atlantic				
Implementation	Countries	Countries	Countries	NAMMCO Secretariat – Joint NAMMCO Control Scheme for Hunting	Countries	Countries	Countries
Review and evaluation	NAFO Standing Committee on International Control (STACTIC)	Conservation and Management Measures Compliance Committee (CMMCC)	NASCO Council	NAMMCO Council Committee on Inspection and Observation	Arctic Council	Arctic Council	Arctic Council
Data and information	Countries NAFO Secretariat	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	NAMMCO Countries NAMMCO Secretariat	Countries Secretariat	Countries Secretariat	Countries Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
5 and 6	0	1	0	1	0	1	1	0.6
5 and 7	0	1	0	1	0	1	1	0.6
6 and 7	0	1	0	1	0	1	1	0.6
Average	0	0.14	0	0.14	0	0.14	0.14	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the seven issues is 0.1 out of a possible 1.

3 Conclusions

While none of the four fisheries agreements (NAFO, ICCAT, NAMMCO, NASCO) appear to have formal linkages across the different stages of the policy cycle or with the Arctic Council, there is an integrated mechanism in the form of the Arctic Council for Pollution (LBS and MBS) and general biodiversity issues. This LME has been assigned an overall integration score of 1.0 due to the presence of the Arctic Council with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Canadian Eastern Arctic -West Greenland Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Canadian Eastern Arctic -West Greenland Shelf LME	Completeness	Integration	Engagement
	72%	1.0	80%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

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<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

PAME. 2013. Large Marine Ecosystems (LMEs) of the Arctic Area: Revision of the Arctic LME Map.

http://www.pame.is/images/Documents/PAME_revised_LME_map_with_explanatory_text_15_Aug_2013_-_Vefur.pdf

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- 3 = Agreed compliance mechanism with repercussions

Data and information:

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- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

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Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

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Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Canadian High Arctic North Greenland Shelf LME

1 The system to be governed

The system is the Canadian High Arctic-North Greenland Shelf LME. This new LME consists of the northernmost and High Arctic part of Canada along with the adjacent part of North Greenland covering an area of about 576,000 km² (Table 1)

This assessment is also informed by Large Marine Ecosystems (LMEs) of the Arctic Area: Revision of the Arctic LME Map (PAME, 2013)

Table 1. Percentage of Canadian High Arctic North Greenland Shelf LME area taken up by the EEZ of each country and the High Seas (area = 576,201 km²).

Country	Percent of LME area
Canada	76.0
Denmark (Greenland)	20.6
High Seas	3.5

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified as follows:

- Fisheries
 - high proportion of collapsed stocks; overfishing; decimation of several whale species; slow recovery of the overexploited right whale;
- Pollution
 - high levels of PCB and DDT; presence of persistent organic pollutants (POPs)
- Climate change
 - environmental consequences and biological effects

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)
2. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
3. International Council for the Exploration of the Sea (ICES)
4. Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)
5. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
6. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)
7. North-East Atlantic Fisheries Commission (NEAFC)

8. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Canadian High Arctic North Greenland Shelf LME is shown in Table 2.

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of Agreement to LME ¹
Arctic Council (AC)	3.1	100	C
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	<1	10	D
International Council for the Exploration of the Sea (ICES)	<1	9	D
Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)	<1	<1	D
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	<1	10	D
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	<1	10	D
North-East Atlantic Fisheries Commission (NEAFC)	<1	9	D
Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)	<1	8	D

The extent of country membership in these bodies and instruments for the Canadian High Arctic North Greenland Shelf LME is shown in Table 3.

Coastal countries in the LME	Agreements							
	AC	ICCAT	ICES	NAFO	NAMMCO	NASCO	NEAFC	OSPAR
Canada	C	B	B	B		B	N	
Greenland	C			B	B	B	B	B
% engagement	100	50	50	100	50	100	100	50
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed								

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-f. They are summarised in Table 5

Table 4a: Canadian High Arctic North Greenland Shelf LME ¹ – Transboundary Arrangement for Pollution – Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC)	
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 4b. Canadian High Arctic North Greenland Shelf LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4c: Canadian High Arctic North Greenland Shelf LME – Transboundary Arrangement for Fisheries – Specific (Marine Mammals)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3	Arctic Council	
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	NAMMCO Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	NAMMCO Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4d: Canadian High Arctic North Greenland Shelf LME – Transboundary arrangement for fisheries – specific (salmon)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICES NASCO Secretariat and its Commissions	Supra-LME	3		ICES named in NASCO to provide scientific advice
Policy decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Planning analysis and advice	NASCO Three Commissions NASCO Secretariat ICES	Supra-LME	3		
Planning decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4e: Canadian High Arctic North Greenland Shelf LME – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		All countries are members of NEAFC ICES named in NEAFC to provide scientific advice
Policy decision-making	NEAFC - Commission	Supra-LME	3		
Planning analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		
Planning decision-making	NEAFC - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Supra-LME	3		
Data and information	Countries ICES	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4f: Canadian High Arctic North Greenland Shelf LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS) and Biodiversity (General)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	OSPAR – 5 main Committees and their Working Groups a) Biodiversity and Ecosystem b) Eutrophication Strategy c) Hazardous Substances d) Offshore Industry Strategy e) Radioactive Substances	Supra-LME	3	Arctic Council ICES (as observer)?	
Policy decision-making	OSPAR Commission	Supra-LME	3		
Planning analysis and advice	OSPAR – 5 main Committees and their Working Groups	Supra-LME	3		
Planning decision-making	OSPAR Commission	Supra-LME	3		
Implementation	Countries OSPAR Commission Special Studies OSPAR Secretariat	National Supra-LME	1		
Review and evaluation	OSPAR Commission, Main Committees and Working Groups	Supra-LME	3		
Data and information	Countries OSPAR Secretariat	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 5: Canadian High Arctic North Greenland Shelf LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Canada, Greenland	System name: Canadian High Arctic North Greenland Shelf		Region: Arctic
Complete these columns then assess issues using the arrangements tables			After completing the arrangements tables, complete these columns		
Trans-boundary issue ²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – EEZ/ABNJ	3		86%		NEAFC
Fisheries – large pelagics (tunas and tuna-like)	3		86%		ICCAT
Fisheries – specific (marine mammals)	3		71%		NAMMCO
Fisheries – specific (salmon)	3		57%		NASCO
Pollution (LBS)	3		90%		OSPAR
Pollution (LBS)	3		67%		AC
Pollution (MBS)	3		67%		AC
Pollution (MBS)	3		90%		OSPAR
Biodiversity – General	3		90%		OSPAR
Biodiversity – General	3		67%		AC
	System architecture completeness index >>		77%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-f) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)										
Policy cycle stage	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries – Specific (salmon)	Fisheries - Specific (Marine Mammals)	Pollution – LBS,	Pollution - MBS	Biodiversity - General	Pollution - LBS	Pollution - MBS	Biodiversity - General
Policy analysis and advice	NEAFC - Permanent Committee on Management and Science (PEMAS) ICES	ICCAT Standing Committee on Research and Statistics (SCRS)	ICES NASCO Secretariat and its Commissions	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	OSPAR – Eutrophication Strategy Hazardous Substances Radioactive Substances Committees and Working Groups	OSPAR - Offshore Industry Strategy Committee and Working Groups	OSPAR Biodiversity and Ecosystem Committee and Working Groups	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Policy decision-making	NEAFC - Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council	OSPAR Commission	OSPAR Commission	OSPAR Commission	Arctic Council	Arctic Council	Arctic Council
Planning analysis and advice	NEAFC - Permanent Committee on Management and Science (PEMAS)	ICCAT SCRS and Species Panels	NASCO Three Commissions NASCO Secretariat ICES	NAMMCO Management Committee and Scientific Committee	OSPAR – Eutrophication Strategy Hazardous Substances Radioactive	OSPAR - Offshore Industry Strategy Committee and Working	OSPAR - Biodiversity and Ecosystem Committee and Working	Arctic Council - Arctic Contaminants Action Program; Arctic	Arctic Council - Emergency preparedness, Prevention and response; Protection of	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)										
Policy cycle stage	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries – Specific (salmon)	Fisheries - Specific (Marine Mammals)	Pollution – LBS,	Pollution - MBS	Biodiversity - General	Pollution - LBS	Pollution - MBS	Biodiversity - General
	ICES				Substances Committees and Working Groups	Groups	Groups	Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Planning decision-making	NEAFC - Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council	OSPAR Commission	OSPAR Commission	OSPAR Commission	Arctic Council	Arctic Council	Arctic Council
Implementation	Countries	Countries	Countries	NAMMCO Secretariat – Joint NAMMCO Control Scheme for Hunting	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries	Countries	Countries
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement	Conservation and Management Measures Compliance	NASCO Council	NAMMMCO Council Committee on Inspection and	OSPAR Commission, Main Committees and Working	OSPAR Commission, Main Committees and Working	OSPAR Commission, Main Committees and Working	Arctic Council	Arctic Council	Arctic Council

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)										
Policy cycle stage	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries – Specific (salmon)	Fisheries - Specific (Marine Mammals)	Pollution – LBS,	Pollution - MBS	Biodiversity - General	Pollution - LBS	Pollution - MBS	Biodiversity - General
	(PECCOE)	Committee (CMMCC)		Observation	Groups	Groups	Groups			
Data and information	Countries ICES	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	NAMMCO Countries NAMMCO Secretariat	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Countries Secretariat	Countries Secretariat	Countries Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	1	0	1	0	0	0	0	0.3
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
1 and 10	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
2 and 10	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
3 and 9	0	0	0	0	0	0	0	0
3 and 10	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
4 and 9	0	0	0	0	0	0	0	0
4 and 10	0	0	0	0	0	0	0	0
5 and 6	0	1	0	1	1	1	1	0.7
5 and 7	0	1	0	1	1	1	1	0.7
5 and 8	0	0	0	0	0	0	0	0
5 and 9	0	0	0	0	0	0	0	0
5 and 10	0	0	0	0	0	0	0	0
6 and 7	0	1	0	1	1	1	1	0.7
6 and 8	0	0	0	0	0	0	0	0

6 and 9	0	0	0	0	0	0	0	0
6 and 10	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
7 and 9	0	0	0	0	0	0	0	0
7 and 10	0	0	0	0	0	0	0	0
8 and 9	0	1	0	1	0	1	1	0.6
8 and 10	0	1	0	1	0	1	1	0.6
9 and 10	0	1	0	1	0	1	1	0.6
Average	0.02	0.13	0.02	0.13	0.07	0.13	0.13	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the ten issues is 0.1 out of a possible 1.

3 Conclusions

None of the fisheries arrangements (NEAFC, ICCAT, NAMMCO and NASCO) appear to be integrated while the three arrangements for pollution and biodiversity appear to have the Arctic Council as an integrating arrangement for one set of issues and the OSPAR Convention for a second set of similar issues relating to pollution and biodiversity.

Additionally, the specific biodiversity arrangements for marine mammals and polar bears do not appear to have any formal linkages. It needs to be said that, the Arctic Council is not a binding arrangement so its implementation is voluntary and country dependent. It does appear that the Arctic Council has the potential to develop into an informal overall policy coordinating organization, although as mentioned, its policy coordination role with respect to fisheries is weak. As such, this LME has been assigned an overall integration score of 1.0 due to the presence of the Arctic Council with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Canadian High Arctic North Greenland Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Canadian High Arctic North Greenland Shelf LME	Completeness	Integration	Engagement
	77%	1.0	75%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp. <http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

PAME. 2013. Large Marine Ecosystems (LMEs) of the Arctic Area: Revision of the Arctic LME Map. [http://www.pame.is/images/Documents/PAME revised LME map with explanatory text 15 Aug 2013 - Vefur.pdf](http://www.pame.is/images/Documents/PAME_revised_LME_map_with_explanatory_text_15_Aug_2013_-_Vefur.pdf)

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Canary Current LME

1 The system to be governed

The system is the Canary Current LME. This includes the marine waters under the jurisdiction of Morocco, Mauritania, Senegal, Guinea-Bissau, the Canary Islands (Spain), Gambia, Cape Verde. GIS analysis shows that portions of the LMEs of mainland Spain and Portugal as well as Madeira (Portugal) also lie within the LME (Table 1). These countries are not typically part of the governance arrangements for marine issues. However, the amount of overlap of these countries with the LME is minimal.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter I-3) so a review is not provided here. This assessment is also informed by the PRODOC (FAO/GEF 2009) CCLME Preliminary TDA (CCLME Project 2013).

2 Governance arrangements

2.1 Transboundary issues to be governed

The issues to be addressed by governance were identified in the preliminary TDA (2006):

- Fisheries - declining or vulnerable small pelagic resources
- Fisheries - declining demersal finfish fisheries
- Fisheries - uncertain status of tuna resources
- Biodiversity - decline and vulnerability of elasmobranchs (sharks & rays)
- Biodiversity - decline of marine turtles
- Biodiversity - decline of cetaceans
- Biodiversity - alien invasive species
- Habitat modification - disappearance and destruction of mangroves and wetlands
- Habitat modification - degradation and modification of seabed habitat and seamounts
- Pollution - Changing salinity upstream of river mouths
- Pollution - hydrocarbons pollution (localized)
- Pollution - LBS (nutrients, sediments and pesticides).

Table 1. Percentage of LME area taken up by the EEZ of each country and the High Seas	
Country (N to S)	Percent of LME area
Morocco	46
Mauritania	14
Senegal	12
Guinea-Bissau	1
Spain – Canary Islands	18
Gambia	2
Cape Verde	3
Spain – Mainland	<1
Portugal – Mainland	2
Portugal - Madeira	2
High Seas	1
The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.	

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements. The TDA indicates a preference for three main categories of issues - fisheries, pollution, and habitat modification – and for addressing biodiversity issues under one of these headings. However, the extent to which this can be done (from a governance process perspective) will depend on the degree to which the issues share a responsible agency. For example, while the decline and vulnerability of elasmobranchs or sea turtles may be primarily a biodiversity issue, they may be caused largely by fishing and can therefore be addressed within the fisheries arrangement. Indeed, in many countries protection of these species is under fisheries legislation. IUU fishing by foreign vessels is a matter of concern that must be taken up within arrangements for fisheries.

2.2 Identify transboundary arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Abidjan Convention – Abidjan Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region
 - a. Protocol Concerning Co-operation in Combating Pollution in Cases of Emergency in the Western and Central African Region – Emergency Protocol
 - b. Protocol concerning the Cooperation in the Protection and Development of the Marine and Coastal Environment from Land-Based Sources and the Activities (LBSA) in the Western, Central and Southern Africa Region - LBS Protocol – not yet in force
2. RCFCASBA - Regional Convention on Fisheries Cooperation among African States Bordering on the Atlantic Ocean (Dakar Convention, 1992) 1995. This gives rise to ATLAFCO (COMHAFAT in French), the Ministerial Conference on Fisheries Cooperation among African States bordering the Atlantic Ocean.
3. CECAF - FAO Fishery Committee for the Eastern Central Atlantic (COPACE in French)
 - a. Scientific Sub-Committee
 - i. Working Group for Small Pelagics
 - ii. Working Group for Demersal Species
 - iii. Working Group for Artisanal Fisheries
4. ICCAT - International Commission for the Conservation of Atlantic Tunas
5. NEPAD - New Partnership for Africa's Development - COSMAR - Coastal and Marine Secretariat (NEPAD), Nairobi
6. PRCM - Charter of the West African Regional Marine and Coastal Conservation Partnership (PRCM), 2012
7. SRFC – Subregional Fisheries Commission (CSRFP in French)(membership includes Guinea and Sierra Leone not in LME, but not Morocco), 1985

- a. SRFC Access Conventions (1989 and 1993)
- b. SRFC Hot Pursuit Convention 1993 (and associated 1993 Protocol)
- 8. Gambia River Development Authority (Guinea, Guinea-Bissau, Senegal)
- 9. Senegal River Development Authority (Mali, Mauritania, Senegal)
- 10. Action Plan for the protection and Development of the Marine Environment and Coastal Areas of the West and Central African Region , 1981

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Canary Current LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Canary Current LME (area = 1,118,022km ²)			
Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME ¹
Abidjan Convention and Protocols	8	32	D
CECAF	8	100	C
COMHAFAT	5	100	C
ICCAT	1	100	C
SRFC	24	33	D

The extent of country membership in these bodies and instruments for the Canary Current LME is shown in Table 3.

Table 3. Country membership in marine agreements relevant to the Canary Current LME								
LME coastal countries	Agreement							
	Abidjan Convention	Abidjan – Emergency Protocol	Abidjan-LBSA Protocol ²	PRCM ³	COMHAFAT	CECAF	SRFC	ICCAT
Morocco	N	N	N	N	B	C	N	B
Mauritania	B	B	B	C	B	C	B	B
Senegal	B	B		C	B	C	B	B
Guinea-Bissau	B	B		C	B	C	B	
Spain – Canary I.	N	N	N	N	N	C	N	
The Gambia	B	B	B	C	B	C	B	

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

² Not Yet in Force

³ Also Guinea and Sierra Leone

Cape Verde				C	B	C	B	B
% engagement	80	80	40	100	100	100	100	57
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed								

2.2.1 *Assessment of issues*

The arrangements for individual issues are shown in Tables 4 a-d. These are summarized in table 5

Table 4a: Canary Current LME¹ – Transboundary arrangement for fisheries - small pelagic resources

Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	SRFC Coordinating Committee	LME	3	CCLME Project	<ul style="list-style-type: none">• SRFC does not include Morocco so cannot adequately manage stocks shared with this country• Area of responsibility extends beyond CCLME to EEZ of Cape Verde, Guinea and Sierra Leone• CECAF covers:<ul style="list-style-type: none">○ EEZs of all countries of the CCLME○ EEZs of all countries of the GCLME○ EEZs of Madeira (Portugal) and Canary Islands (Spain)○ Adjacent High Seas• While CECAF votes, its decisions are not binding, only advisory and compliance is voluntary. Its decisions also go to SRFC whose decisions are not binding either.• For SRFC member countries. CECAF assists with non SRFC member countries• Working Group for Artisanal Fisheries should also have a role but is not very operational due to lack of funding,
Policy decision-making	SRFC Conference of Ministers ATLAFCO for broader coordination outside CCLME Region	LME	2		
Planning analysis and advice	SRFC Coordinating Committee CECAF Scientific Sub-Committee with Working Group for Small Pelagics	LME	3		
Planning decision-making	Session of CECAF (comprising fishery administrators and scientists)	LME	2		
Implementation	SRFC Coordinating Committee Countries	LME/ National	1		
Review and evaluation	CECAF Scientific Sub-Committee	LME	2		
Data and information	CECAF Scientific Sub-Committee with Working Group for Small Pelagics Countries	LME	2	CCLME Project Partner countries and organisations provide support (e.g. Russia, EU)	
Overall total and % completeness >>			15/21= 71%		

Table 4b: Canary Current LME – Transboundary arrangement for fisheries - demersal finfish and shrimps					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	SRFC Coordinating Committee	LME	3	CCLME Project	<ul style="list-style-type: none">• SRFC does not include Morocco so cannot adequately manage stocks shared with this country• Area of responsibility extends beyond CCLME to EEZ of Cape Verde, Guinea and Sierra Leone• How does its responsibility relate to ATLAFCO?• CECAF covers:<ul style="list-style-type: none">○ EEZs of all countries of the CCLME○ EEZs of all countries of the GCLME○ EEZs of Madeira (Portugal) and Canary Islands (Spain)○ Adjacent High Seas• While CECAF votes, its decisions are not binding, only advisory and compliance is voluntary. Its decisions also go to SRFC whose decisions are not binding either.• For SRFC member countries. CECAF assists with non SRFC member countries• Working Group for Artisanal Fisheries should also have a role but is not very operational due to lack of funding,
Policy decision-making	SRFC Conference of Ministers	LME	2		
Planning analysis and advice	CECAF Scientific Sub-Committee with Working Group for Demersal Species	LME	3		
Planning decision-making	CECAF	LME	2		
Implementation	SRFC Coordinating Committee Countries, CECAF Technical Working Group	LME/ national	1		
Review and evaluation	CECAF Scientific Sub-Committee Working Group for Demersal Species	LME	2		
Data and information	CECAF Scientific Sub-Committee Working Group for Demersal Species Countries	LME	2	Partner countries and organisations provide support (e.g. Russia, EU)	
Overall total and % completeness >>			15/21 = 71%		

Table 4c: Canary Current LME – Transboundary arrangement for fisheries - tuna					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	LME	3		<ul style="list-style-type: none">• Only Cape Verde, Guinea, Morocco and Senegal are members of ICCAT• There is no regionally coordinated approach to ICCAT• There are stocks of small tunas occurring mainly within the LME for which ICCAT has a mandate but does little regarding management, other than catch monitoring (recreational fishing)• There are trophic interactions between the oceanic tunas (large scale distribution) and small pelagics in the LME that require linkages in management
Policy decision-making	ICCAT Commission	LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	LME	3		
Planning decision-making	ICCAT Commission	LME	3		
Implementation	Countries	LME	0		
Review and evaluation	SCRS and Conservation and Management Measures Compliance Committee (CMMCC)	LME	3		
Data and information	SCRS and Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	LME	3		
Overall total and % completeness >>			17/21 = 81%		

Table 4d: Canary Current LME – Transboundary arrangement for (a) Pollution – LBS (nutrients, sediments, pesticides) and MBS (hydrocarbons) and (b) biodiversity - General					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Abidjan Convention RCUUNEP contribute	Supra-LME	1	CCLME Project, IUCN, PRCM	<ul style="list-style-type: none">• According to the Convention all the above issues can be dealt with by this one arrangement, although sub-processes will be needed for each issue.• The Abidjan Convention includes the majority of GCLME countries (14 of 16).• It indicates that it will seek to address issues in collaboration with the GCLME Project, but the mode of interaction does not appear to be formal• This arrangement will be strengthened when the 2012 LBS Protocol comes into force Biodiversity <ul style="list-style-type: none">• issues appear to be fully covered by the Abidjan Convention although only MPAs are mentioned in this regard rather than biodiversity specific measures• There is a manatee program that is species specific. Habitat modification <ul style="list-style-type: none">• This issue which is raised as priority in the TDA is also broadly covered by the Abidjan Convention.• There is a mangrove charter under the PRCM and countries are seeking to change this to a Protocol under the Abidjan Convention
Policy decision-making	Abidjan Convention COP	Supra-LME	1		
Planning analysis and advice	Abidjan Convention RCU	Supra-LME	1		
Planning decision-making	Abidjan Convention COP	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Abidjan Convention RCU	Supra-LME	1		
Data and information	Abidjan Convention RCU/countries	Supra-LME	1		
Overall total and % completeness >>			7/21 = 33%		

2.2.2 Issues mentioned in the TDA but not addressed above:

Biodiversity - alien invasive species

There are apparently multiple sources of the perceived threat, e.g. ballast water, introductions from aquaculture, introductions from aquaria. This is a rather specific issue that seems to have been included with pollution in the TDA for want of a more appropriate location. However, it is an issue of serious concern that probably needs its own arrangement within the Abidjan convention as it does not fit under an existing arrangement.

Pollution - Changing salinity upstream of river mouths

This issue appears to be related to water extraction upstream in rivers. It would appear to be a complex issue, with components of habitat degradation, including loss of, or changes in, coastal wetlands with the primary transboundary effect being on marine fisheries through loss of nursery habitat?

Table 5: Canary Current LME governance architecture - System summaryⁱⁱ

IW category: LME	Countries: Morocco, Mauritania, Senegal, Guinea-Bissau, Spain – Canary Islands, The Gambia, Cape Verde		System name: Canary Current		Region: Eastern Atlantic
Complete these columns then assess issues using the arrangements tables			After completing the arrangements tables, complete these columns		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries - small pelagic resources	8		71		Morocco with 46% of the area of the LME is not a part of the SRCF
Fisheries - demersal finfish and shrimps	8		71		
Fisheries - tuna	8		81		ICCAT is responsible for these species Atlantic Ocean-wide
Pollution - LBS	8		33		The Abidjan Convention LBS Protocol is not yet in force
Pollution - MBS	8		33		
Biodiversity- general (includes mangrove and wetland degradation flagged in the TDA)	8		33		The agreement on mangrove conservation is being promoted as a protocol to the Abidjan Convention
Biodiversity – alien invasive species	8		0		There is no arrangement, and one is needed
	System architecture completeness index >>		46%		<< System priority for intervention

2.3 Assess transboundary integration of arrangements within systems

The assessment of transboundary integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 5a-e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 10 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-e)

Policy cycle stage	Fisheries - small pelagic resources	Fisheries - demersal finfish and shrimps	Fisheries - tuna	Pollution – LBS and MBS	Biodiversity - general (mangroves and wetland)
Policy analysis and advice	SRFC CC	SRFC CC	ICCAT	Abidjan Convention RCU	Abidjan Convention RCU
Policy decision-making	SRFC Conf of Ministers ATLAFCO	SRFC Conf of Ministers ATLAFCO	ICCAT	Abidjan Convention COP	Abidjan Convention COP
Planning analysis and advice	SRFC CC CECAF Scientific Sub-Committee	SRFC CC CECAF Scientific Sub-Committee	ICCAT	Abidjan Convention RCU	Abidjan Convention RCU
Planning decision-making	Session of CECAF	Session of CECAF	ICCAT	Abidjan Convention COP	Abidjan Convention COP
Implementation	SRFC CC Countries	SRFC CC Countries	ICCAT	Countries	Countries
Review and evaluation	CECAF Scientific Sub-Committee	CECAF Scientific Sub-Committee	ICCAT	Abidjan Convention RCU	Abidjan Convention RCU
Data and information	CECAF Scientific Sub-Committee	CECAF Scientific Sub-Committee	ICCAT	Abidjan Convention RCU/countries IUCN, UNEP,	Abidjan Convention RCU/countries IUCN, UNEP,

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.								
Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	1	1	1	1	1	1	1	1
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
4 and 5	1	1	1	1	0	1	1	0.9
4 and 6	1	1	1	1	0	1	1	0.9
5 and 6	1	1	1	1	0	1	1	0.9
Average	0.3	0.3	0.3	0.3	0.1	0.3	0.3	0.2

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this LME, integration across the arrangements for the six issues is consistently low with 0.2 out of a possible 1.

While the potential country membership of the arrangements for fisheries in areas under national jurisdiction is a good fit to the LME, the absence of Morocco (whose EEZ comprises 46% of the LME), from the SRFC, results in a substantial governance gap for resources that extend into its waters. This may be somewhat moderated by its involvement in CECAF and COMHAFAT which deal with technical and policy issues respectively.

The fact that decisions taken in CECAF and SRFC are not binding, seriously weakens these arrangements. Also, because implementation and monitoring of ICCAT decisions are solely the responsibility of countries, this seriously weakens these arrangements.

The Abidjan Convention is currently a relatively weak arrangement for pollution and biodiversity, as there are no protocols to give effect to its intent in these areas. Furthermore, the convention area does not extend to Mauritania and Morocco, and therefore only covers half of the LME.

While there appears to be potential for good integration of fisheries issues for resources within national jurisdiction, through the COMHAFAT, CECAF and SRFC, these do not appear to be well integrated with tuna fisheries under ICCAT.

There is also the potential for integration of pollution and biodiversity issues under the Abidjan Convention. However, as noted above the convention area only covers half of the LME.

There does not appear to be any organisation other than COMHAFAT that has the geographical coverage to integrate and coordinate across the full range of issues required for EBM. COMHAFAT also has membership of all coastal countries in this LME. While COMHAFAT is strictly a fisheries organization, an EAF as defined by FAO would include attention to pollution and biodiversity issues connected with fisheries.

3 Conclusions

In this LME, the two arrangements for fisheries (SRFC and CECAF) in the areas within national jurisdiction are closely connected. So are the two arrangements for pollution and biodiversity that fall under the Abidjan Convention. However neither of these pairs appears to be integrated with each other or with the tuna arrangement. No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Canary Current LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Canary Current LME	Completeness	Integration	Engagement
	46%	0.2	80%

4 References

CCLME Project. 2013. Draft TDA.

FAO/GEF. 2009. Project Document for Protection of the Canary Current Large Marine Ecosystem (CCLME). 65 p.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Owen, 2001. Legal and institutional aspects of management arrangements for shared stocks with reference to small pelagics in northwest Africa. FAO, Rome

PRCM. 2012. Charter of the West African Regional Marine and Coastal Conservation (PRCM)

PRCM 2012. Regional partnership for marine and coastal conservation in West Africa: Strategy document 2012-2016 – Synthesis, 17 pp.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

UNEP. 2005. Tayaa, M., Saine, A., Ndiaye, G. and Deme, M. Canary Current, GIWA Regional Assessment 41. University of Kalmar, Kalmar, Sweden. www.giwa.net/publications/r41.phtml

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱTable notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱTable notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Caribbean Sea LME

1 The system to be governed

The system is the Caribbean Sea LME. This includes the marine waters of the countries shown in Table 1.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter XV-49), so a review is not provided here. This assessment is also informed by the TDAs (Heileman 2011, Phillips 2011, Mahon et al 2011).

Table 1. Percentage of Caribbean LME area taken up by the EEZ of each country and the High Seas (area = 3,246,144km²)

Country	Percent of LME area	Country	Percent of LME area
Antigua and Barbuda	0.1	Netherlands Antilles (Aruba, Bonaire, Curacao, St. Eustatius)	2.1
Bahamas	7.2	Netherlands (St. Maarten)	0.4
Barbados	0.4	Nicaragua	2.0
Belize	1.1	Panama	4.4
Colombia	14.4	Saint Kitts and Nevis	0.3
Costa Rica	0.8	Saint Lucia	0.5
Cuba	9.4	St. Vincent and the Grenadines	1.1
Dominica	0.5	Trinidad and Tobago	0.9
Dominican Republic	6.5	United Kingdom (Anguilla)	<0.1
France (Guadeloupe and Martinique)	1.2	United Kingdom (British Virgin Islands)	<0.1
France (St. Martin)(St. Barthelemy)	<0.1	United Kingdom (Cayman Islands)	3.6
Grenada	0.8	United Kingdom (Montserrat)	0.2
Guatemala	<0.1	United Kingdom (TCI)	1.2
Haiti	3.8	Puerto Rico and US Virgin Islands	4.3
Honduras	7.3	United States	0.5
Jamaica	7.5	Venezuela	13.7
Colombia - Jamaica	0.6	High Seas	0.6
Mexico	2.7		

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Issues to be governed

The issues to be addressed by governance were identified in the TDAs (Phillips 2011, Heileman 2011, Mahon et al 2011):

- Unsustainable fisheries
- Habitat modification
- Pollution

Following is a list showing the three broad issues and their nested sub-issues, each of which is considered to require a separate governance arrangement within the Regional Governance Framework.

- Unsustainable use of the fisheries resources
 - Unsustainable use of reef fisheries ecosystems – reef fishes and other biodiversity
 - Unsustainable use of lobster fisheries ecosystems
 - Central America – North Central/South Central stocks (Groups II and III)
 - Northern stock (Group I)
 - Southern stock (Group IV)
 - Unsustainable use of pelagic fisheries ecosystem
 - Large pelagics– coastal and oceanic
 - Eastern Caribbean flyingfish
- Marine pollution
 - Land-based sources of pollution
 - Marine based sources of pollution
- Coastal and marine habitat degradation and destruction (wetlands/mangroves)

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention).
 - a. Protocol Concerning Co-operation in Combating Oil Spills in the Wider Caribbean Region which was also adopted in 1983 and entered into force on 11 October 1986;
 - b. Protocol Concerning Specially Protected Areas and Wildlife (SPAW) in the Wider Caribbean Region which was adopted on 18 January 1990. The Protocol entered into force on 18 June 2000;
 - c. Protocol Concerning Pollution from Land-Based Sources and Activities which was adopted on 6 October 1999. The Protocol entered into force on 13 August 2010.
2. Caribbean Regional Fisheries Mechanism (CRFM)

3. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
4. Latin American Organization for Fisheries Development (OLDEPESCA)
5. Organization for Central American Fisheries and Aquaculture Sector (OSPECA)
6. Western Central Atlantic Fisheries Commission (WECAFC)
7. Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)
8. The Strategic Action Programme for the Sustainable Management of the Shared Living Marine Resources of the Caribbean and North Brazil Shelf Large Marine Ecosystems (CLME+SAP)
9. Caribbean Action Plan, 1981

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Caribbean Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with the Caribbean Sea LME			
Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME ¹
Cartagena Convention and Protocols	49	100	C
CRFM	42	26	D
ICCAT	3	100	C
OLDEPESCA	27	58	D
OSPESCA	37	24	D
WECAFC	18	100	C
IAC		100	C
CLME+SAP			

The extent of country membership in these bodies and instruments for the Caribbean LME is shown in Table 3.

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Caribbean Sea LME

Coastal countries in the LME	Agreements									
	Cartagena				CRFM	ICCAT	OLDEPESCA	OSPESCA	WECAFC	IAC
	Convention	Oil Spills Protocol	LBS Protocol	SPAW Protocol						
Antigua and Barbuda	B	B	B		B		N	N	C	
Bahamas	B	B	B		B		N	N	C	
Barbados	B	B		B	B	B		N	C	
Belize	B	B	B	B	B	B	B	B	C	B
Colombia	B	B		B	N			N	C	
Costa Rica	B	B			N		B	B		B
Cuba	B	B		B	N		B	N	C	
Dominica	B	B			B		N	N	C	
Dominican Republic	B	B	B	B	N			B	C	
France	B	B	B	B	N	B	N	N	C	
Grenada	B	B	B	B	B			N	C	
Guatemala	B	B			N	B		B	C	B
Haiti	B				B			N	C	
Honduras	B				N	B	B	B	C	B
Jamaica	B	B			B			N	C	
Mexico	B	B		C	N	B	B	N	C	B
Netherlands ²	B	B		B	N		N	N		
Nicaragua	B	B			N	B	B	B	C	C
Panama	B	B	B	B	N	B		B	C	B
St. Kitts and Nevis	B	B			B		N	N	C	
Saint Lucia	B	B	B	B	B		N	N	C	
St. Vincent/Grenadines	B	B		B	B	B	N	N	C	
Trinidad and Tobago	B	B	B	B	B	B		N	C	
UK ³	B	B			B	B	N	N	C	
UK (Montserrat)					B	B	N	N	C	
United States ⁴	B	B	B	B	N	B	N	N	C	B
Venezuela	B	B		B	N	B	B	N	C	B
% engagement	93	85	37	52	100	52	44	100	92	30
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed										

² Netherlands Antilles including St. Maarten, Aruba, Bonaire, Curacao, St. Eustatius

³ United Kingdom Overseas Territories including Anguilla, British Virgin Islands, Cayman Islands, Turks and Caicos,

⁴ This also includes two US territories: Puerto Rico and US Virgin Islands

2.2.1 Assessment of issues

The arrangements in place for the issues identified are shown in Tables 4a-i. These are summarized in Table 5.

Table 4a: Caribbean Sea LME ¹ – Transboundary arrangements for fisheries - EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CRFM Secretariat CRFM Forum	Sub-LME	3	OSPESCA WECAFC OLDEPESCA OECS	The CRFM is responsible for fisheries in the waters of CARICOM countries, and for representing these countries with external for fishing interests
Policy decision-making	CRFM Ministerial Council	Sub-LME	1		
Planning analysis and advice	CRFM Secretariat CRFM Forum CRFM Scientific WGs	Sub-LME	2		
Planning decision-making	CRFM Ministerial Council	Sub-LME	1		
Implementation	CRFM Secretariat CPs	Sub-LME National	1		
Review and evaluation	CRFM Secretariat CRFM Forum	Sub-LME	2		
Data and information	CRFM Secretariat	Sub-LME	2		
Overall total and % completeness >>			12/21 = 57%%		

Table 4b: Caribbean Sea LME – Transboundary arrangements for fisheries - EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	OSPESCA – Directors of Fisheries and Aquaculture Commission	Supra-LME	3	OLDEPESCA CPPS	OSPESCA members includes 6 of the 10 countries in the LME that are part of the Central American isthmus and as such, does not include Mexico nor the three South American countries of Colombia, Peru and Ecuador. Furthermore, none of the Central American countries are members of CPPS due to its area of competence How do the countries in the LME reconcile overlaps this apparent division of the LME by arrangements when they technically address the same fisheries but cover different parts of the LME? For countries who are members of more than one agreement, what is the current relationship between their interactions with each organization?
Policy decision-making	OSPESCA - Council of Ministers	Supra-LME	2		
Planning analysis and advice	OSPESCA – Directors of Fisheries and Aquaculture Commission	Supra-LME	3		
Planning decision-making	OSPESCA Member countries	Supra-LME National	2		
Implementation	OSPESCA Member Countries	National	2		
Review and evaluation	OSPESCA - Council of Ministers	LME	2		
Data and information	OSPESCA Member Countries OSPESCA Secretariat	National Supra-LME	2		
Overall total and % completeness >>			16/21 = 76%		

Table 4c: Caribbean Sea LME – Transboundary arrangements for fisheries - EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	WECAFC Scientific Advisory group, and WGs. Commission	Supra-LME	2	CRFM OSPESCA OLDEPESCA OECS	
Policy decision-making	WECAFC Commission	Supra-LME	0		
Planning analysis and advice	Working Groups and Partners	Supra-LME	2		
Planning decision-making	WECAFC Commission	Supra-LME	0		
Implementation	Countries Partner Organizations	National LME	0		
Review and evaluation	Working Groups and Commission	Sub-LME	1		
Data and information	Countries, FAO HQ and Working Groups	National Supra-LME	1		
Overall total and % completeness >>			6/21 = 29%%		

Table 4d: Caribbean LME – Transboundary arrangements for fisheries - general					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	OLDEPESCA - Board and Technical Committee Expert Groups	Supra-LME	2	WECAFC	US is not a member of OLDEPESCA How significant is OLDEPESCA to the members of this LME?
Policy decision-making	OLDEPESCA - Council of Ministers	Supra-LME	1		
Planning analysis and advice	OLDEPESCA - Board and Technical Committee Expert Groups	Supra-LME	2		
Planning decision-making	Countries	National	1		
Implementation	Countries	National	1		
Review and evaluation	OLDEPESCA - Council of Ministers	Supra-LME	1		
Data and information	Countries OLDEPESCA – Secretariat	National Supra-LME	1		
Overall total and % completeness >>			9/21 = 43%		

Table 4e. Caribbean Sea LME – Transboundary arrangement for fisheries – HMS (tuna and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3	The Billfish Foundation (TBF), International Game Fish Association (IGFA) GCFI	Mexico and US are members but not Cuba
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			17/21 = 80%		

Table 4f. Caribbean Sea LME – Transboundary arrangement for Pollution – LBS					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	LBS Scientific and Technical Advisory Committee (STAC)	Supra-LME	3		To what extent are the Cartagena Convention and its protocols significant agreements in the arrangement for Pollution and Biodiversity in the LME?
Policy decision-making	IGM LBS CoP	Supra-LME	1		
Planning analysis and advice	LBS Scientific and Technical Advisory Committee (STAC) CIMAB-RAC- Cuba IMA-RAC-Trinidad	Supra-LME	2		
Planning decision-making	LBS CoP	Supra-LME	1		
Implementation	Countries RCUs RACs	National Supra-LME	2		
Review and evaluation	LBS STAC	Supra-LME	2		
Data and information	Countries RCUs RACs	National Supra-LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4g. Caribbean Sea LME – Transboundary arrangement for Pollution – MBS					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Cartagena Conv - OSP Scientific and Technical Advisory Committee (STAC), OSP COP	Supra-LME	3	MEXUS -Gulf	The bilateral agreement between Mexico and the US to prevent pollution from oil spills and other hazardous substances has a joint action plan that is the responsibility of the US Coast Guard and the Secretaria de Marina-Armada de Mexico.
Policy decision-making	Cartagena Conv. – IGM, Oil Spill CoP	Supra-LME	1		
Planning analysis and advice	Cartagena Conv. - Scientific and Technical Advisory Committee (STAC),RAC/REMPEITC-Carib	Supra-LME	2		
Planning decision-making	Cartagena Conv. - Oil Spill CoP	Supra-LME	1		
Implementation	Cartagena Conv. – Countries, RCUs,RACs	National Supra-LME	2		
Review and evaluation	Cartagena Conv. - Oil Spill STAC	Supra-LME	2		
Data and information	Cartagena Conv. – Countries, RCUs, RACs	National Supra-LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4h. Caribbean Sea LME – Transboundary arrangement for Biodiversity – General (PAs, Habitat alteration and depleted non-commercial species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Cartagena Convention SPAW Protocol Scientific and Technical Advisory Committee (STAC) SPAW COP	Supra-LME	3	TNC, CoML	Cuba and US are parties to the SPAW Protocol but not Mexico.
Policy decision-making	SPAW IGM and CoP	Supra-LME	2		
Planning analysis and advice	SPAW Scientific and Technical Advisory Committee (STAC) RAC-SPAW Guadeloupe	Supra-LME	2		
Planning decision-making	SPAW CoP	Supra-LME	2		
Implementation	SPAW Countries RCUs RACs	National Supra-LME	2		
Review and evaluation	SPAW STAC	Supra-LME	2		
Data and information	SPAW Countries RCUs RACs	Supra-LME	2		
Overall total and % completeness >>			15/21 = 71%		

Table 4i: Caribbean Sea LME – Transboundary Arrangements for Biodiversity – Turtles					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		Both USA and Mexico are parties to the IAC, but not Cuba
Policy decision-making	IAC Consultative Committee and CoP	Supra-LME	3		
Planning analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Planning decision-making	IAC CoP	Supra-LME	3		
Implementation	IAC Countries	National	0		
Review and evaluation	IAC Countries	National	1		
Data and information	IAC Countries	National	1		
Overall total and % completeness >>			12/21 = 57%		

2.2.2 Issues mentioned in the TDA but not addressed above:

Table 5: Caribbean Sea LME governance architecture - System summary ⁱⁱ					
IW category: LME	Countries:		System name: Caribbean Sea LME		Region: WC Atlantic
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – EEZ	27		57		CRFM
Fisheries – EEZ	27		76		OSPECA
Fisheries – EEZ	27		29		WECAFC
Fisheries – EEZ	27		43		OLDESPECA
Fisheries - HMS	27		80		
Pollution - LBS	27		62		
Pollution - MBS	27		62		
Biodiversity – General	27		71		
Biodiversity - Specific (sea turtles)	27		57		
	System architecture completeness index >>		60%		<< System priority for intervention

2.3 Assess transboundary integration of arrangements within systems

The assessment of transboundary integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Table 5) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 5)

Policy cycle stage	Fisheries – EEZ (CRFM)	Fisheries – EEZ (OSPESCA)	Fisheries – EEZ (WECAFC)	Fisheries – EEZ (OLDEPESCA)	Fisheries - HMS	Pollution - LBS	Pollution - MBS	Biodiversity – General	Biodiversity - Specific (sea turtles)
Policy analysis and advice	CRFM Secretariat CRFM Forum	OSPESCA – Directors of Fisheries and Aquaculture Commission	WECAFC SAG, and WGs. Commission	OLDEPESCA - Board and Technical Committee Expert Groups	ICCAT SCRS	LBS STAC	Cartagena - OSP STAC, OSP COP	Cartagena SPAW Protocol STAC SPAW COP	IAC Consultative and Scientific Committees
Policy decision-making	CRFM Ministerial Council	OSPESCA - Council of Ministers	WECAFC Commission	OLDEPESCA - Council of Ministers	ICCAT Commission	IGM LBS CoP	Cartagena – IGM, OSP CoP	SPAW IGM and CoP	IAC Consultative Committee and CoP
Planning analysis and advice	CRFM Secretariat CRFM Forum CRFM Scientific WGs	OSPESCA – Directors of Fisheries and Aquaculture Commission	Working Groups and Partners	OLDEPESCA - Board and Technical Committee Expert Groups	ICCAT SCRS and Species Panels	LBS STAC CIMAB-RAC- Cuba IMA-RAC- Trinidad	Cartagena Conv. – OSP STAC, RAC/R EMPEITC- Carib	SPAW STAC RAC-SPAW Guadeloupe	IAC Consultative and Scientific Committees
Planning decision-making	CRFM Ministerial Council	OSPESCA Member countries	WECAFC Commission	Countries	ICCAT Commission	LBS CoP	Cartagena Conv. - Oil Spill CoP	SPAW CoP	IAC CoP
Implementation	CRFM Secretariat CPs	OSPESCA Member Countries	Countries Partner Organizations	Countries	Countries	Countries RCU RACs	Cartagena Conv. – Countries, RCU, RACs	SPAW Countries RCU RACs	IAC Countries
Review and evaluation	CRFM Secretariat CRFM Forum	OSPESCA - Council of Ministers	Working Groups and Commission	OLDEPESCA - Council of Ministers	CMMCC)	LBS STAC	Cartagena Conv. - Oil Spill STAC	SPAW STAC	IAC Countries
Data and information	CRFM Secretariat	OSPESCA Member Countries OSPESCA Secretariat	Countries, FAO HQ and Working Groups	Countries OLDEPESCA – Secretariat	PWG	Countries RCU RACs	Cartagena Conv. – Countries, RCU, RACs	SPAW Countries RCU RACs	IAC Countries

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	1	1	1	0	0	0	0	0.4
1 and 3	0	0	1	0	1	1	1	0.6
1 and 4	0	0	0	0	0	0	0	-
1 and 5	0	0	0	0	0	0	0	-
1 and 6	0	0	0	0	0	0	0	-
1 and 7	0	0	0	0	0	0	0	-
1 and 8	0	0	0	0	0	0	0	-
1 and 9	0	0	0	0	0	0	0	-
2 and 3	0	0	1	0	1	1	1	0.6
2 and 4	0	0	0	0	0	0	0	-
2 and 5	0	0	0	0	0	0	0	-
2 and 6	0	0	0	0	0	0	0	-
2 and 7	0	0	0	0	0	0	0	-
2 and 8	0	0	0	0	0	0	0	-
2 and 9	0	0	0	0	0	0	0	-
3 and 4	0	0	0	0	0	0	0	-
3 and 5	0	0	0	0	0	0	0	-
3 and 6	0	0	0	0	0	0	0	-
3 and 7	0	0	0	0	0	0	0	-
3 and 8	0	0	0	0	0	0	0	-
3 and 9	0	0	0	0	0	0	0	-
4 and 5	0	0	0	0	0	0	0	-
4 and 6	0	0	0	0	0	0	0	-
4 and 7	0	0	0	0	0	0	0	-
4 and 8	0	0	0	0	0	0	0	-
4 and 9	0	0	0	0	0	0	0	-
5 and 6	0	0	0	0	0	0	0	-
5 and 7	0	0	0	0	0	0	0	-
5 and 8	0	0	0	0	0	0	0	-
5 and 9	1	1	1	1	1	1	1	1.0
6 and 7	1	1	1	1	1	1	1	1.0
6 and 8	1	1	1	1	1	1	1	1.0
6 and 9	0	0	0	0	0	0	0	-
7 and 8	1	1	1	1	1	1	1	1.0
7 and 9	0	0	0	0	0	0	0	-
8 and 9	0	0	0	0	0	0	0	0.4
Average	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.2

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the six issues is 0.2 out of a possible 1.

3 Conclusions

Three arrangements for fisheries in this LME - CRFM, OSPESCA and WECAFC - are connected. OLDEPESCA is minimally connected within the LME. None of the fisheries arrangements are connected with ICCAT. The arrangements for pollution and biodiversity that fall under the Cartagena Convention are connected via the CEP, but do not appear well connected with fisheries or with the IAC. No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Caribbean Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Caribbean Sea LME	Completeness	Integration	Engagement
	60%	0.2	68%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 4 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Celtic-Biscay Shelf LME

1 The system to be governed

The system is the Celtic-Biscay Shelf LME. It is situated in the Northeast Atlantic Ocean, and covers an area of about 756,000 km². This LME includes the marine waters of France, Ireland and the United Kingdom as indicated in Table 1. All coastal countries in this LME are within the European Union.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter 37), so a review is not provided here.

Table 1. Percentage of Celtic-Biscay Shelf LME area taken up by the EEZ of each country and the High Seas (area = 756,000 km ²)	
Country (N to S)	Percent of LME area
France	23.9
Ireland	36.6
United Kingdom including Guernsey and Jersey	36.0
High Seas	3.5

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 37 (Sherman and Hempel, 2009) as follows:

- Fisheries
 - intensively exploited or depleted stocks (mollusks, seaweed, herring, redfish, sand eel and mackerel)
- Biodiversity
 - alterations to the seabed; introduction of non-indigenous species
- Pollution
 - (LBS) eutrophication (sewage, agriculture, and fish farming); microbiological contamination threats from industrial discharges, inorganic and organic compounds, mercury (associated with paper mill industries), and PAHs
- Pollution
 - (MBS) threats from shipping accidents, pollution and oil spills

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
2. International Council for the Exploration of the Sea (ICES)
3. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)

4. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)
5. North-East Atlantic Fisheries Commission (NEAFC)
6. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)
7. Agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances (Bonn Agreement)
8. Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)
9. European Union Common Fisheries Policy (CFP)
10. European Union Maritime Policy

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Celtic-Biscay Shelf LME is shown in Table 2.

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	100	C
International Council for the Exploration of the Sea (ICES)	5	100	C
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	4	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	4	100	C
North-East Atlantic Fisheries Commission (NEAFC)	6	100	C
Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)	5	100	C
Agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances (Bonn Agreement)	45	77	D
Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)	36	100	C
European Union Common Fisheries Policy (CFP)	20	95	D
European Union Maritime Policy	20	95	D

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

The extent of country membership in these bodies and instruments for the Celtic-Biscay Shelf LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Celtic-Biscay Shelf LME									
Coastal countries in the LME	Agreements								
	ICCAT	ICES	NAMMCO	NASCO	NEAFC	OSPAR	Bonn	ASCOBANS	EU-CFP
France	B	B				B	B	B	B
Ireland		B				B	B	C	B
United Kingdom including Guernsey, Jersey	B	B				B	B	B	B
% engagement	67	100	0	0	0	100	100	67	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed									

2.2.1 Assessment of issues

The governance arrangements for the issues identified above are presented in Tables 4 a-h. They are summarised in table 5.

Table 4a: Celtic-Biscay Shelf LME ⁱ – Transboundary Arrangement for Fisheries – Specific (salmon)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	Supra-LME	3	ICES	Only Denmark is a member Dependent on ICES for scientific advice
Policy decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	Supra-LME	3		
Planning decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat and International Atlantic Salmon Research Board	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4b: Celtic-Biscay Shelf LME – Transboundary Arrangement for fisheries - Marine Mammals					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3		
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4c: Celtic-Biscay Shelf LME – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		Only Denmark is a member of NEAFC ICES named in NEAFC to provide scientific advice
Policy decision-making	NEAFC - Commission	Supra-LME	3		
Planning analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		
Planning decision-making	NEAFC - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Supra-LME	3		
Data and information	Countries ICES	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4d. Celtic-Biscay Shelf LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4e: Celtic-Biscay Shelf LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS) and Biodiversity (General)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	OSPAR – 5 main Committees and their Working Groups a) Biodiversity and Ecosystem b) Eutrophication Strategy c) Hazardous Substances d) Offshore Industry Strategy e) Radioactive Substances	Supra-LME	3		
Policy decision-making	OSPAR Commission	Supra-LME	3		
Planning analysis and advice	OSPAR – 5 main Committees and their Working Groups	Supra-LME	3		
Planning decision-making	OSPAR Commission	Supra-LME	3		
Implementation	Countries OSPAR Commission Special Studies OSPAR Secretariat	National Supra-LME	1		
Review and evaluation	OSPAR Commission, Main Committees and Working Groups	Supra-LME	3		
Data and information	Countries OSPAR Secretariat	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4f: Celtic-Biscay Shelf LME – Transboundary Arrangement for Biodiversity – Specific (Small cetaceans)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ASCOBANS Advisory Committee	Supra-LME	3	Arctic Council CMS	
Policy decision-making	Meeting of the Parties	Supra-LME	2		
Planning analysis and advice	ASCOBANS Advisory Committee	Supra-LME	3		
Planning decision-making	Meeting of the Parties	Supra-LME	1		
Implementation	Contracting Parties	National	0		
Review and evaluation	Meeting of the Parties	Supra-LME	2		
Data and information	Contracting Parties, Secretariat, Advisory Committee, Coordinating Authorities	National Supra-LME	2		
Overall total and % completeness >>			13 /21 = 62%		

Table 4g: Celtic-Biscay Shelf LME – Transboundary Arrangement for Fisheries – EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3	Arctic Council	
Policy decision-making	European Commission	Supra-LME	2		
Planning analysis and advice	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3		
Planning decision-making	European Commission	Supra-LME	3		
Implementation	Contracting Parties Scientific, Technical and Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	National Supra-LME	2		
Review and evaluation	Commission STECF	Supra-LME	3		
Data and information	Contracting Parties Commission STECF Advisory Councils	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4h: Celtic-Biscay Shelf LME – Transboundary Arrangement for Pollution – MBS					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Bonn Agreement – Contracting Parties	National	2	Arctic Council	
Policy decision-making	Meeting of the Parties	Supra-LME	1		
Planning analysis and advice	Contracting Parties	National	2		
Planning decision-making	Meeting of the Parties	Supra-LME	1		
Implementation	Contracting Parties	National	0		
Review and evaluation	Meeting of the Parties	Supra-LME	1		
Data and information	Contracting Parties	National	1		
Overall total and % completeness >>			8 /21 = 38%		

Table 5: Celtic-Biscay Shelf LME governance architecture - System summary ⁱⁱ					
IW category: LME		Countries: France, Ireland, United Kingdom	System name: : Celtic-Biscay Shelf LME		Region: North East Atlantic
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – EEZ/ABNJ	3		86%		NEAFC
Fisheries – large pelagics (tunas and tuna-like)	3		86%		ICCAT
Fisheries – specific (salmon)	3		57%		NASCO
Fisheries - Marine Mammals	3		71%		NAMMCO
Fisheries - EEZ	3		90%		CFP
Pollution - LBS	3		90%		OSPAR
Pollution - MBS	3		90%		OSPAR
Pollution – MBS	3		38%		Bonn
Biodiversity – small cetaceans	3		62%		ASCOBANS
	System architecture completeness index >>		74%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-h) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 5)									
Policy cycle stage	Fisheries - Salmon	Fisheries – marine mammals	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries - EEZ	Pollution – LBS	Pollution – MBS	Pollution - MBS	Biodiversity - Specific
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	NEAFC - PEMAS ICES	ICCAT Standing Committee on Research and Statistics (SCRS)	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	OSPAR – 5 main Committees and their Working Groups	OSPAR – 5 main Committees and their Working Groups	Bonn Agreement – Contracting Parties	ASCOBANS Advisory Committee
Policy decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	NEAFC - Commission	ICCAT Commission	European Commission	OSPAR Commission	OSPAR Commission	Meeting of the Parties	Meeting of the Parties
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	NAMMCO Man. Comm and Sci. Comm	NEAFC - PEMAS ICES	ICCAT SCRS and Species Panels	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	OSPAR – 5 main Committees and their Working Groups	OSPAR – 5 main Committees and their Working Groups	Contracting Parties	ASCOBANS Advisory Committee
Planning decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	NEAFC - Commission	ICCAT Commission	European Commission	OSPAR Commission	OSPAR Commission	Meeting of the Parties	Meeting of the Parties
Implementation	Countries	Countries Secretariat – Joint NAMMCO	Countries	Countries	Contracting Parties Scientific, Technical and	Countries OSPAR Commission Special	Countries OSPAR Commission Special	Contracting Parties	Contracting Parties

		Control Scheme for Hunting			Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	Studies OSPAR Secretariat	Studies OSPAR Secretariat		
Review and evaluation	NASCO Council	NAMMMCO Council Committee on Inspection and Observation	NEAFC - PECCOE	ICCAT CMMCC	Commission STECF	OSPAR Commission, Main Committees and Working Groups	OSPAR Commission, Main Committees and Working Groups	Meeting of the Parties	Meeting of the Parties
Data and information	Countries NASCO Secretariat and IASRB	Countries NAMMCO Secretariat	Countries ICES	ICCAT PWG	Contracting Parties Commission STECF Advisory Councils	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Contracting Parties	Contracting Parties, Secretariat, Advisory Committee, Coordinating Authorities

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
3 and 9	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
4 and 9	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
5 and 7	0	0	0	0	0	0	0	0
5 and 8	0	0	0	0	0	0	0	0
5 and 9	0	0	0	0	0	0	0	0
6 and 7	1	1	1	1	1	1	1	1
6 and 8	0	0	0	0	0	0	0	0
6 and 9	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
7 and 9	0	0	0	0	0	0	0	0
8 and 9	0	0	0	0	0	0	0	0
Average	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the issues is 0.03 out of a possible 1.

3 Conclusions

The policy cycles relating to the key issues of fisheries and pollution are associated with well-established arrangements that are among the strongest globally. However, there does not appear to be much integration among these processes. Given that all coastal countries in this LME are within the European Union, the EU CFP may provide an additional level of integration among fisheries bodies and between fisheries and environmental issues. This LME has been assigned an overall integration score of 1.0 due to the presence of the European Union Maritime Policy with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Celtic-Biscay Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Celtic-Biscay Shelf LME	Completeness	Integration	Engagement
	74%	1.0	59%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
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- 2 = DI centrally coordinated, reviewed and shared^{ix}
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End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 5 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Central Arctic LME

1 The system to be governed

The system is the Central Arctic LME. This LME is the largest of the Arctic LMEs. While the Arctic is made up of several large seas, it is essentially a semi-enclosed ocean shared by the surrounding countries. Out of a total of over 6 million km², the Central Arctic LME covers an area of about 3.3 million km² (Table 1)

This LME comprises essentially the deep basins of the Arctic Ocean with the Lomonosov Ridge separating the Eurasian basins from the Canada basin.

An overview of this LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009 (Chapter X-29: Arctic Ocean), so an individual review is not provided here. This assessment is also informed by Large Marine Ecosystems (LMEs) of the Arctic Area: Revision of the Arctic LME Map (PAME, 2013)

Table 1. Percentage of Central Arctic LME area taken up by the EEZ of each country and the High Seas (area = 3,318,271 km²)

Country	Percent of LME area
Canada	9.8
Denmark (Greenland)	6.7
Norway	2.4
Russia	15.0
High Seas	66.0

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified as follows:

- Fisheries
 - exploitation of sea mammals
- Biodiversity
 - endangered marine species (walruses and whales)
- Pollution
 - land-based sources of pollution, particularly POPs and heavy metals, shipping, dumping and the exploitation of offshore hydrocarbon.
- Climate Change
 - Increased warming is expected; significant impact from climatic variability

2.2 Identify arrangements for each transboundary issue

Regional governance is important because of the unique character of this LME. As such, the key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)
2. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
3. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
4. Agreement on the Conservation of Polar Bears (ACPB)
5. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)
6. International Council for the Exploration of the Sea (ICES)
7. North-East Atlantic Fisheries Commission (NEAFC)
8. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)

The extent to which the geographical areas of coverage of these bodies and instruments overlap the Central Arctic LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with the Central Arctic LME			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
Arctic Council (AC)	18.1	100	C
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	18	D
International Council for the Exploration of the Sea (ICES)	4	18	D
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	3	18	D
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	3	18	D
North-East Atlantic Fisheries Commission (NEAFC)	4	15	D
Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR)	4	16	D
Agreement on the Conservation of Polar Bears (ACPB)		100	C

The extent of country membership in these bodies and instruments for the Central Arctic LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Central Arctic LME								
LME coastal countries	Agreement							
	AC	ICCAT	NAMMCO	NASCO	ICES	NEAFC	OSPAR	ACPB
Canada	C	B		B	B	N		B
Denmark (Greenland)	C		B	B		B	B	
Norway	C	B	B	B	B	B	B	B

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Russia	C	B		B	B	B		B
% engagement	100	75	50	100	75	100	25	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed								

2.2.1 *Assessment of transboundary issues*

The arrangements for individual issues are shown in Tables 4 a-g. These are summarized in table 5.

Table 4a: Central Arctic LME ¹ – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		Canada is a non-cooperating member of NEAFC. While NEAFC covers part of this LME, how important exactly is this arrangement to the Central Arctic LME? ICES named in NEAFC to provide scientific advice
Policy decision-making	NEAFC - Commission	Supra-LME	3		
Planning analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		
Planning decision-making	NEAFC - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Supra-LME	3		
Data and information	Countries ICES	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4b. Central Arctic LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		While ICCAT covers part of this LME, is it a critical arrangement for the LME? Might it increase with time due to climate change?
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			17/21 = 80%		

Table 4c: Central Arctic LME – Transboundary arrangement for fisheries – specific (salmon)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICES NASCO Secretariat and its Commissions	Supra-LME	3	ICES	All countries are members of NASCO ICES named in NASCO to provide scientific advice While NASCO covers part of this LME, is it a critical arrangement for the LME? Might it increase with time due to climate change?
Policy decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Planning analysis and advice	NASCO Three Commissions NASCO Secretariat ICES	Supra-LME	3		
Planning decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4d: Central Arctic LME – Transboundary Arrangement for Biodiversity - Protection of Marine Mammals (Polar Bears)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ACPB – IUCN Polar Bear Specialist Group and Country experts	Supra-LME National	1	Arctic Council	All 4 coastal states are members of ACPB although Russia has only signed, not ratified The arrangement only covers some 18% of the eastern part of the LME
Policy decision-making	ACPB- Countries	National	0		
Planning analysis and advice	ACPB – IUCN Polar Bear Specialist Group and Country experts	Supra-LME National	2		
Planning decision-making	ACPB Countries	National	0		
Implementation	ACPB Countries	National	0		
Review and evaluation	ACPB - IUCN Polar Bear Specialist Group	Supra-LME	2		
Data and information	ACPB – IUCN Polar Bear Specialist Group and Country experts	National Supra-LME	3		
Overall total and % completeness >>			8/21 = 38%		

Table 4e: Central Arctic LME – Transboundary Arrangement for Fisheries – Specific (Marine Mammals)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3	Arctic Council	Norway and Denmark (through Greenland and Faroe islands) are members of NAMMCO but Russia and Canada are not.
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4f: Central Arctic LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS) and Biodiversity					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	OSPAR – 5 main Committees and their Working Groups a) Biodiversity and Ecosystem b) Eutrophication Strategy c) Hazardous Substances d) Offshore Industry Strategy e) Radioactive Substances	Supra-LME	3	Arctic Council	Canada and Russia are not members of OSPAR The arrangement only covers some 15% of the LME
Policy decision-making	OSPAR Commission	Supra-LME	3		
Planning analysis and advice	OSPAR – 5 main Committees and their Working Groups	Supra-LME	3		
Planning decision-making	OSPAR Commission	Supra-LME	3		
Implementation	Countries OSPAR Commission Special Studies OSPAR Secretariat	National Supra-LME	1		
Review and evaluation	OSPAR Commission, Main Committees and Working Groups	Supra-LME	3		
Data and information	Countries OSPAR Secretariat	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4g: Central Arctic LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; Conservation of Arctic Flora and Fauna; Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC)	All countries are members of the Arctic Council
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; Conservation of Arctic Flora and Fauna; Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 5: Central Arctic LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Denmark, Norway, Russia	System name: Barents Sea		Region: Arctic
Complete these columns then assess issues using the arrangements tables			After completing the arrangements tables, complete these columns		
Trans-boundary issue ²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – general	4		86%		
Fisheries – large pelagics (tunas and tuna-like)	4		86%		
Fisheries – specific (salmon)	4		57%		
Pollution (LBS)	4		90%		
Pollution (LBS)	4		67%		
Pollution (MBS)	4		67%		
Pollution (MBS)	4		90%		
Biodiversity – General	4		90%		
Biodiversity - General	4		67%		
Fisheries – Specific (Marine Mammals)	4		71%		
Biodiversity – Specific (Polar Bears)	4		38%		
	System architecture completeness index >>		74%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

The impacts associated with climate change in the Arctic are not specifically addressed as they are manifested in the transboundary fisheries, pollution and biodiversity concerns of the region.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-g) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-g)

Policy cycle stage	Fisheries - General	Fisheries - HMS	Fisheries - Specific	Pollution – LBS,	Pollution - MBS	Biodiversity - General	Fisheries Specific Marine Mammals	Biodiversity – Polar Bears	Pollution - LBS	Pollution - MBS	Biodiversity - General
Policy analysis and advice	NEAFC - Permanent Committee on Management and Science (PEMAS) ICES	ICCAT Standing Committee on Research and Statistics (SCRS)	ICES NASCO Secretariat and its Commissions	OSPAR – Eutrophication Strategy Hazardous Substances Radioactive Substances Committees and Working Groups	OSPAR - Offshore Industry Strategy Committee and Working Groups	OSPAR Biodiversity and Ecosystem Committee and Working Groups	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	ACPB – IUCN Polar Bear Specialist Group and Country experts	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Policy decision-making	NEAFC - Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	OSPAR Commission	OSPAR Commission	OSPAR Commission	NAMMCO Council	ACPB- Countries	Arctic Council	Arctic Council	Arctic Council
Planning analysis and advice	NEAFC - Permanent Committee on	ICCAT SCRS and Species Panels	NASCO Three Commissions NASCO Secretariat	OSPAR – Eutrophication Strategy Hazardous	OSPAR - Offshore Industry Strategy	OSPAR - Biodiversity and Ecosystem	NAMMCO Management Committee and	ACPB – IUCN Polar Bear Specialist	Arctic Council - Arctic Contaminants Action	Arctic Council - Emergency preparedness, Prevention	Arctic Council Conservation of Arctic Flora and Fauna;

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-g)											
Policy cycle stage	Fisheries - General	Fisheries - HMS	Fisheries - Specific	Pollution – LBS,	Pollution - MBS	Biodiversity - General	Fisheries Specific Marine Mammals	Biodiversity – Polar Bears	Pollution - LBS	Pollution - MBS	Biodiversity - General
	Management and Science (PEMAS) ICES		ICES	Substances Radioactive Substances Committees and Working Groups	Committee and Working Groups	Committee and Working Groups	Scientific Committee	Group and Country experts	Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Planning decision-making	NEAFC - Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	OSPAR Commission	OSPAR Commission	OSPAR Commission	NAMMCO Council	ACPB Countries	Arctic Council	Arctic Council	Arctic Council
Implementation	Countries	Countries	Countries	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	NAMMCO Secretariat – Joint NAMMCO Control Scheme for Hunting	ACPB Countries	Countries	Countries	Countries

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-g)

Policy cycle stage	Fisheries - General	Fisheries - HMS	Fisheries - Specific	Pollution – LBS,	Pollution - MBS	Biodiversity - General	Fisheries Specific Marine Mammals	Biodiversity – Polar Bears	Pollution - LBS	Pollution - MBS	Biodiversity - General
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Conservation and Management Measures Compliance Committee (CMMCC)	NASCO Council	OSPAR Commission, Main Committees and Working Groups	OSPAR Commission, Main Committees and Working Groups	OSPAR Commission, Main Committees and Working Groups	NAMMMCO Council Committee on Inspection and Observation ACPB - IUCN Polar Bear Specialist Group	ACPB - IUCN Polar Bear Specialist Group	Arctic Council	Arctic Council	Arctic Council
Data and information	Countries ICES	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Countries OSPAR Secretariat	NAMMCO and ACPB Countries NAMMCO Secretariat ACPB – IUCN Polar Bear Specialist Group and Country experts	ACPB – IUCN Polar Bear Specialist Group and Country experts	Countries Secretariat	Countries Secretariat	Countries Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	1	0	1	0	0	0	0	0.29
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
1 and 10	0	0	0	0	0	0	0	0
1 and 11	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
2 and 10	0	0	0	0	0	0	0	0
2 and 11	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
3 and 9	0	0	0	0	0	0	0	0
3 and 10	0	0	0	0	0	0	0	0
3 and 11	0	0	0	0	0	0	0	0
4 and 5	0	1	0	1	1	1	1	0.71
4 and 6	0	1	0	1	1	1	1	0.71
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
4 and 9	0	0	0	0	0	0	0	0
4 and 10	0	0	0	0	0	0	0	0
4 and 11	0	0	0	0	0	0	0	0
5 and 6	0	1	0	1	1	1	1	0.71
5 and 7	0	0	0	0	0	0	0	0
5 and 8	0	0	0	0	0	0	0	0

5 and 9	0	0	0	0	0	0	0	0
5 and 10	0	0	0	0	0	0	0	0
5 and 11	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
6 and 8	0	0	0	0	0	0	0	0
6 and 9	0	0	0	0	0	0	0	0
6 and 10	0	0	0	0	0	0	0	0
6 and 11	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
7 and 9	0	0	0	0	0	0	0	0
7 and 10	0	0	0	0	0	0	0	0
7 and 11	0	0	0	0	0	0	0	0
8 and 9	0	0	0	0	0	0	0	0
8 and 10	0	0	0	0	0	0	0	0
8 and 11	0	0	0	0	0	0	0	0
9 and 10	0	1	0	1	0	1	1	0.57
9 and 11	0	1	0	1	0	1	1	0.57
10 and 11	0	1	0	1	0	1	1	0.57
Average	0.02	0.11	0.02	0.11	0.05	0.11	0.11	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the eleven issues is 0.1 out of a possible 1.

3 Conclusions

None of the three fisheries arrangements (NEAFC, ICCAT and NASCO) appear to be integrated while the three arrangements for pollution and biodiversity (NAMMCO, ACPB and OSPAR) appear to have the Arctic Council as an integrating arrangement for one set of issues and OSPAR for a similar set of issues. However, the Arctic Council is not a binding arrangement so its implementation is voluntary and country dependent. It does appear that the Arctic Council has the potential to develop into an informal overall policy coordinating organization, although as mentioned, its policy coordination role with respect to fisheries is weak. As such, the LME has been assigned an overall integration score of 1.0 due to the presence of the Arctic Council with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Central Arctic LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Central Arctic LME	Completeness	Integration	Engagement
	73%	1.0	78%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

PAME. 2013. Large Marine Ecosystems (LMEs) of the Arctic Area: Revision of the Arctic LME Map.

http://www.pame.is/images/Documents/PAME_revised_LME_map_with_explanatory_text_15_Aug_2013_-_Vefur.pdf

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
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Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the East Bering Sea LME

1 The system to be governed

The system is the East Bering Sea LME. The LME is bounded by the Bering Strait to the North, by the Alaskan Peninsula and Aleutian Island chain to the South, and by a coastline to the east that is thousands of miles in length. Jurisdiction over the marine waters is shared by the US and Russia, with some 171,000 km² or just over 13 % being high seas (Table 1.)

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009 (Chapter XIV-45), so a review is not provided here.

Table 1. Percentage of East Bering Sea LME area taken up by the EEZ of each country and the High Seas (area = 1,296,019 km²)

Country	Percent of LME area
US	84.6
Russia	2.0
High Seas	13.4

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 45 (Sherman and Hempel, 2009). While the LME appears to have minimal transboundary issues in need of attention, the following have been highlighted

- Fisheries
 - declining Chinook and chum salmon stocks due to overfishing, bycatch and loss of freshwater spawning and rearing habitat
 - IUU fishing, especially for Pollock and Halibut in Bering Sea donut hole
- Pollution
 - LBS (logging, mining and oil and gas development)
 - increasing levels of toxic contaminants by long-range air and oceanic transport in marine mammals
- Biodiversity
 - threatened Steller sea lion population
 - habitat modification resulting from logging, mining and oil and gas development

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Convention for the Conservation of Anadromous Stocks in The North Pacific Ocean (NPAFC)
2. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
3. International Pacific Halibut Commission (IPHC)/Convention for the Preservation of the Halibut Fishery (IPHC)
4. Convention on Conservation and Management of Pollock Resources in the Central Bering Sea (CCBSP)
5. The North Pacific Marine Science Organization (PICES)
6. Agreement on the Conservation of Polar Bears (ACPB)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the East Bering Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with the East Bering Sea LME			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
Convention on Conservation and Management of Pollock Resources in the Central Bering Sea (CCBSP)	100	11	B
International Pacific Halibut Commission (IPHC)/Convention for the Preservation of the Halibut Fishery (IPHC)	9	56	D
Convention for the Conservation of Anadromous Stocks in The North Pacific Ocean (NPAFC)	1	11	D
The North Pacific Marine Science Organization (PICES)	5	100	C
Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)	<1	31	D
Arctic Council	7.1	100	D
Agreement on the Conservation of Polar Bears (ACPB)		100	C

The extent of country membership in these bodies and instruments for the East Bering Sea LME is shown in Table 3.

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the East Bering Sea LME							
Coastal countries in the LME	Agreements						
	CCBSP	IPHC	NPAFC	PICES	WCPFC	AC	ACPB
United States	B	B	B	B	B	C	B
Russia	B	N	B	B		C	B
% engagement	100	100	100	100	50	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed							

While the area of competence of the WCPFC covers some 33% of the LME, an assessment of this arrangement was not completed for this arrangement due to the absence of a tuna fishery in the LME (Sherman and Hempel 2009, Chapter XIV-45)

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-f. They are summarised in table 5

Table 4a: East Bering Sea LME ⁱ – Transboundary Arrangements for Fisheries – specific (anadromous species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NPAFC – Committee on Scientific Research and Statistics and its Science sub-committee and working groups	LME	3	PICES	
Policy decision-making	NPAFC - Commission	LME	1		
Planning analysis and advice	NPAFC– Committee on Scientific Research and Statistics and its Science sub-committee and working groups	LME	3		
Planning decision-making	NPAFC - Commission	LME	1		
Implementation	Countries	National	0		
Review and evaluation	NPAFC - Committee on Enforcement	LME	3		
Data and information	NPAFC – Committee on Scientific Research and Statistics and its Science sub-committee and working groups	LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4b: East Bering Sea LME – Transboundary Arrangements for Fisheries – Specific (High Seas Pollock)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CCBSP – Scientific and Technical Committee	LME	3	PICES?	All decisions of substance are made by consensus, all other decisions are made by simple majority
Policy decision-making	CCBSP - CoP	LME	1		
Planning analysis and advice	CCBSP – Scientific and Technical Committee	LME	3		
Planning decision-making	CCBSP - CoP	LME	1		
Implementation	Countries	National	3		
Review and evaluation	CCBSP- CoP	LME	2		
Data and information	CCBSP – Scientific and Technical Committee Countries	LME/National	3		
Overall total and % completeness >>			16/21 = 76%		

Table 4c: East Bering Sea LME – Transboundary Arrangements for Fisheries – Specific (Halibut)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board.	LME	3	PICES	Russia is not a member
Policy decision-making	IPHC - Commission	LME	3		
Planning analysis and advice	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board.	LME	3		
Planning decision-making	IPHC - Commission	LME	3		
Implementation	Countries	National	2		
Review and evaluation	IPHC – Conference Board	LME	3		
Data and information	IPHC – Conference Board	LME	3		
Overall total and % completeness >>			20/21 = 95%		

Table 4d:East Bering Sea LME – Transboundary arrangement for fisheries – HMS (Tuna and tuna-like)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	Supra-LME	3	IUCN PIF/FFA	Given the geographic location of the LME, how important is this arrangement? Note that Sherman and Hempel (2009) show some tuna and bill fish catch in the LME hence the arrangement was included.
Policy decision-making	WCPFC Commission.	Supra-LME	3		
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	Supra-LME	3		
Planning decision-making	WCPFC Commission.	Supra-LME	3		
Implementation	Countries WCPFC Secretariat FFA	Supra-LME	2		
Review and evaluation	The Technical and Compliance Committee (TCC)	Supra-LME	2		
Data and information	SPC OFP	Supra-LME	3		
Overall total and % completeness >>			19/21 = 90%		

Table 4e: East Bering Sea LME – Transboundary Arrangement for Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; Conservation of Arctic Flora and Fauna; Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC) PICES?	All countries are members of the Arctic Council
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; Conservation of Arctic Flora and Fauna; Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 4f: East Bering Sea LME – Transboundary Arrangement for Biodiversity - Protection of Marine Mammals					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ACPB – IUCN Polar Bear Specialist Group and Country experts	Supra-LME National	1	Arctic Council	Both coastal states are members of ACPB although Russia has only signed, not ratified The arrangement only covers some 18% of the eastern part of the LME
Policy decision-making	ACPB- Countries	National	0		
Planning analysis and advice	ACPB – IUCN Polar Bear Specialist Group and Country experts	Supra-LME National	2		
Planning decision-making	ACPB Countries	National	0		
Implementation	ACPB Countries	National	0		
Review and evaluation	ACPB - IUCN Polar Bear Specialist Group	Supra-LME	2		
Data and information	ACPB – IUCN Polar Bear Specialist Group and Country experts	National Supra-LME	3		
Overall total and % completeness >>			8/21 = 38%		

Table 5: East Bering LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: United States, Russia	System name: East Bering		Region: North East Pacific
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – Specific (anadromous species)	2		62%		
Fisheries – Specific (High Seas Pollock)	2		76%		
Fisheries – Specific (Halibut)	2		95%		
Fisheries – HMS (Tuna and tuna-like)	2		90%		
Pollution (LBS)	2		67%		
Pollution (MBS)	2		67%		
Biodiversity – General	2		67%		
Biodiversity - Specific	2		38%		
	System architecture completeness index >>		70%		<< System priority for intervention

2.2.2 Issues mentioned but not addressed above:

There are no specific regional agreements relating to biodiversity, habitat modification, land-based sources or marine-based sources of pollution other than the voluntary Arctic Council. This is hardly unlikely given the bulk of the LME is primarily under USA jurisdiction and arrangements relating to these issues would focus on US federal or state (Alaska) legislation.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-f) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)								
Policy cycle stage	Fisheries – Specific (Anadromous)	Fisheries – Specific (Pollock)	Fisheries - Specific (Halibut)	Fisheries - HMS	Pollution - LBS	Pollution - MBS	Biodiversity - General	Biodiversity - Specific
Policy analysis and advice	NPAFC – Committee on Scientific Research and Statistics and its Science sub-committee and working groups PICES	CCBSP – Scientific and Technical Committee PICES	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board. PICES	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	ACPB – IUCN Polar Bear Specialist Group and Country experts
Policy decision-making	NPAFC – Commission	CCBSP - CoP	IPHC - Commission	WCPFC Commission.	Arctic Council	Arctic Council	Arctic Council	ACPB- Countries
Planning analysis and advice	NPAFC– Committee on Scientific Research and Statistics and its Science sub-committee and working groups PICES	CCBSP – Scientific and Technical Committee PICES	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	ACPB – IUCN Polar Bear Specialist Group and Country experts

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)								
Policy cycle stage	Fisheries – Specific (Anadromous)	Fisheries – Specific (Pollock)	Fisheries - Specific (Halibut)	Fisheries - HMS	Pollution - LBS	Pollution - MBS	Biodiversity - General	Biodiversity - Specific
			PICES					
Planning decision-making	NPAFC – Commission	CCBSP - CoP	IPHC - Commission	WCPFC Commission.	Arctic Council	Arctic Council	Arctic Council	ACPB Countries
Implementation	Countries	Countries	Countries	Countries WCPFC Secretariat FFA	Countries	Countries	Countries	ACPB Countries
Review and evaluation	NPAFC - Committee on Enforcement	CCBSP- CoP	IPHC – Conference Board	The Technical and Compliance Committee (TCC)	Arctic Council	Arctic Council	Arctic Council	ACPB - IUCN Polar Bear Specialist Group
Data and information	NPAFC – Committee on Scientific Research and Statistics and its Science sub-committee and working groups	CCBSP – Scientific and Technical Committee Countries	IPHC – Conference Board	SPC OFP	Countries Secretariat	Countries Secretariat	Countries Secretariat	ACPB – IUCN Polar Bear Specialist Group and Country experts

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	1	0	1	0	0	0	0	0.29
1 and 3	1	0	1	0	0	0	0	0.29
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
2 and 3	1	0	1	0	0	0	0	0.29
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
5 and 6	0	1	0	1	0	1	1	0.57
5 and 7	0	1	0	1	0	1	1	0.57
5 and 8	0	0	0	0	0	0	0	0
6 and 7	0	1	0	1	0	1	1	0.57
6 and 8	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
Average	0.14	0.14	0.14	0.14	0	0.14	0.14	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the eight issues is 0.1 out of a possible 1.

3 Conclusions

The four fisheries arrangements (NPAFC, CCBSP, IPHC and WCPFC) are each unique, addressing specific types of fisheries. The only area for commonality appears to be in the form of scientific advice being provided with input from PICES in arrangements relating to halibut, Pollock and anadromous species. Additionally, the member countries are primarily responsible for implementation across all of the arrangements. However it is worth noting that the arrangement for highly migratory tunas appear to have little to no formal integration with the other fisheries arrangements.

The Arctic Council provides for some level of integration across pollution (LBS and MBS) and for biodiversity (general) in the part of the LME that is covered by the Arctic Council. However, overall, no integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the East Bering Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

East Bering Sea LME	Completeness	Integration	Engagement
	70%	0.1	93%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1.

Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

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Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the East China Sea LME

1 The system to be governed

The system is the East China Sea LME bordered by the China mainland, northern coast of Taiwan, Japanese Archipelago, and southern coast of the Korean Peninsula (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009 (Chapter X-22), so a review is not provided here.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by Sherman and Hempel (2009) as follows:

- Fisheries
 - increase in exploitation of commercial stock
 - decline in major high value demersal fisheries (such as Croaker)
 - fisheries resources and aquaculture operations affected by HAB
- Pollution
 - LBS (nutrients, sediments and pesticides)
 - increase in frequency of major harmful algal blooms (HABs) with wide geographical distribution
 - MBS (hydrocarbons and heavy metal pollution)
- Biodiversity/Habitat Modification
 - unprecedented rapid industrial development and population growth altering coastal and nearshore habitat
 - dramatic reduction in mangrove wetland area

Table 1. Percentage of East China Sea LME area taken up by the EEZ of each country and the High Seas (area = 722,310 km²)

Country	Percent of LME area
China	33.0
Disputed (conflict zone)	9.4
Japan	29.4
Joint Regime (Japan-Korea)	10.7
South Korea	11.7
Taiwan	5.4
High Seas	0.5

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Asia Pacific Fisheries Commission (APFIC)
2. North Pacific Marine Science Organisation (PICES)

3. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
4. Partnerships in the Environmental Management for the Seas of East Asia (PEMSEA)
5. Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific (NOWPAP)
 - a. Special Monitoring and Coastal Environment Assessment Regional Activity Centre- CEARAC, Toyama, Japan;
 - b. Marine Environmental Emergency Preparedness and Response Regional Activity Centre- MERRAC, Taejon, Republic of Korea
 - c. Pollution Monitoring Regional Activity Centre- POMRAC, Vladivostok, Russian Federation.
 - d. Data and Information Network RAC- DINRAC, Beijing, China
6. Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)
7. Action Plan for the Protection and Development of the Marine and Coastal Areas of the East Asian Region, 1981

The extent to which the geographical area of coverage of these bodies and instruments overlaps the East China Sea LME is shown in Table 2.

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
Asia Pacific Fisheries Commission (APFIC)	1	10	D
The North Pacific Marine Science Organization (PICES)	1	45	D
Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)	1	100	C
Partnerships in the Environmental Management for the Seas of East Asia (PEMSEA)			
Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific (NOWPAP)			
Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)			

The extent of country membership in these bodies and instruments for the East China Sea LME is shown in Table 3.

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the East China Sea LME						
LME coastal countries	Agreement					
	APFIC	PICES	WCPFC	PEMSEA	NOWPAP	Dugong MOU
China	B	B	B	C	C	
Taiwan	N	N	N	N	N	N
Japan	B	B	B	C	C	
South Korea	B	B	B	C	C	
% engagement	100	100	100	100	100	0
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed						

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-d. They are summarised in table 5

Table 4a: East China Sea LME ¹ – Transboundary arrangement for fisheries – HMS (Tuna and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	Supra-LME	3	IUCN PIF/FFA	<ul style="list-style-type: none"> • None of the countries have ratified the WCPFC Agreement but China, Japan and Korea have signed. What the implications of this, if any, given that there is negligible high seas area in the LME? • Fishing mortality on key non-target oceanic species, including sharks, seabirds and sea turtles is covered under this arrangement. • The FFA area of competence does not extend into the LME. How does this affect the role of the FFA in the WCPFC in the area of the LME?
Policy decision-making	WCPFC Commission.	Supra-LME	3		
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	Supra-LME	3		
Planning decision-making	WCPFC Commission.	Supra-LME	3		
Implementation	CPs WCPFC Secretariat FFA	Supra-LME	2		
Review and evaluation	The Technical and Compliance Committee (TCC)	Supra-LME	2		
Data and information	SPC OFP	Supra-LME	3		
Overall total and % completeness >>			19/21 = 90%		

Table 4b: East China Sea LME – Transboundary arrangement for fisheries – EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	FAO Secretariat	Supra-LME	1	SEAFDEC PICES	SEAFDEC Process is purely advisory. SEAFDEC has a MOU with ASEAN and provides technical advice in fisheries under the ASEAN SEAFDEC Strategic Partnership. SEAFDEC also has a memorandum of understanding with FAO.
Policy decision-making	APFIC Commission	Supra-LME	1		
Planning analysis and advice	FAO Secretariat	Supra-LME	1		
Planning decision-making	APFIC Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	FAO Secretariat Countries	Supra-LME National	2		
Data and information	FAO Secretariat Countries	Supra-LME National	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4c: East China Sea LME – Transboundary arrangement for Pollution – LBS and MBS oil spills

Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2	PEMSEA	<p>CEARAC's main activities are to monitor and assess harmful algal blooms, to develop new monitoring tools using remote sensing and to assess land-based sources of marine litter. It does not cover the full range of LBS pollution.</p> <p>MERRAC is to develop effective regional cooperative measures in response to marine pollution incidents including oil and hazardous and noxious substances. It is also working on MBS of marine litter.</p> <p>POMRAC is responsible for cooperation regarding atmospheric deposition of contaminants and river and direct inputs of contaminants to the marine and coastal environment.</p>
Policy decision-making	NOWPAP-IGM	Supra-LME	1		
Planning analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		
Planning decision-making	NOWPAP-IGM	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	CEARAC, MERRAC	Supra-LME	1		
Data and information	DINRAC, MERRAC, CEARAC	Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 4d: East China Sea LME – Transboundary arrangement for biodiversity - specific (dugong)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CPs	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	CPs	Supra-LME	2		
Planning analysis and advice	CPs	Supra-LME	2		
Planning decision-making	CPs	Supra-LME	2		
Implementation	CPs	Supra-LME National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 5: East China Sea LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: China, Taiwan, Japan, Korea		System name: East China Sea	Region: East Asia
Complete these columns then assess issues using the arrangements tables			After completing the arrangements tables, complete these columns		
Trans-boundary issue ²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – HMS (Tuna and tuna-like)	4		90%		
Fisheries – EEZ	4		38%		
Pollution – LBS	4		38%		
Pollution - MBS	4		38%		
Biodiversity	4		0%		
Biodiversity – specific (dugong)	4		52%		CMS MOU
	System architecture completeness index >>		43%%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

Concerns regarding coastal degradation of both the physical and biological (flora and fauna) coastal and near shore environment arising from increasing population were raised. While PEMSEA addresses integrated coastal issues, including biodiversity in the regions, it is a partnership and while its successes have been many, it does not have the status of a regional conventional so follow through by countries is voluntary.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-c) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Policy cycle stage	Fisheries - HMS	Fisheries - EEZ	Pollution – LBS	Pollution - MBS	Biodiversity - specific (dugongs)
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	FAO Secretariat	NOWPAP-RCU, CEARAC, MERRAC	NOWPAP-RCU, CEARAC, MERRAC	MOU CPs
Policy decision-making	WCPFC Commission.	APFIC Commission	NOWPAP-IGM	NOWPAP-IGM	MOU CPs
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	FAO Secretariat	NOWPAP-RCU, CEARAC, MERRAC	NOWPAP-RCU, CEARAC, MERRAC	MOU CPs
Planning decision-making	WCPFC Commission.	APFIC Commission	NOWPAP-IGM	NOWPAP-IGM	MOU CPs
Implementation	Countries WCPFC Secretariat FFA	Countries	Countries	Countries	MOU CPs
Review and evaluation	The Technical and Compliance Committee (TCC)	FAO Secretariat Countries	CEARAC, MERRAC	CEARAC, MERRAC	Secretariat
Data and information	SPC OFP	FAO Secretariat Countries	DINRAC, MERRAC, CEARAC	DINRAC, MERRAC, CEARAC	MOU CPs

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
3 and 4	1	1	1	1	0	1	1	0.86
3 and 5	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
Average	0.10	0.10	0.10	0.10	0	0.10	0.10	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the five issues is 0.1 out of a possible 1.

3 Conclusions

The two arrangements for fisheries in this LME (WCPFC and APFIC) each cover high sea highly migratory tuna and tuna-like fisheries and the fisheries within national jurisdiction. There does not appear to be any formal connection between the two arrangements, possibly since they have different areas of competence. For the pollution, NOWPAP potentially serves an integrating function but it does not appear to be linked to the fisheries arrangements, despite the impacts of pollution on the fisheries. Significantly, no formal arrangement for biodiversity was identified in this LME, despite the consequences arising from biodiversity loss as identified in the report for this LME by Sherman and Hempel (2009). It may be assumed that PEMSEA, with its concern for coastal management issues has addressed this issue but PEMSEA depends on voluntary action. No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the East China Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

East China Sea LME	Completeness	Integration	Engagement
	43%	0.1	83%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Faroe Plateau LME

1 The system to be governed

The system is the Faroe Plateau LME. It surrounds the Faroe Islands in the northeast Atlantic Ocean. It is a well-defined and geographically uniformed system, with a surface area of about 105,000 km² almost entirely within the marine waters of the Faroe Islands, Denmark (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter 38), so a review is not provided here.

Table 1. Percentage of Faroe Plateau LME area taken up by the EEZ of each country and the High Seas (area = 105,000 km ²)	
Country (N to S)	Percent of LME area
Denmark (Faeroe Islands)	98.1
United Kingdom	1.5

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified in Chapter 38 (Sherman and Hempel 2009) as follows:

- Fisheries
 - high proportion of collapsed stocks
- Pollution
 - (LBS) long distance transport of pollutants by ocean atmospheric currents from the highly industrialized countries; bioaccumulation of mercury in whales, pelagic fish, and seabirds;

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)
2. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
3. International Council for the Exploration of the Sea (ICES)
4. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
5. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)
6. North-East Atlantic Fisheries Commission (NEAFC)

7. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Faroe Plateau LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Faroe Plateau LME (area = 104,595 km ²)			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
Arctic Council (AC)	0.2	30.4	D
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	<1	100	C
International Council for the Exploration of the Sea (ICES)	1	100	C
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	1	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	1	100	C
North-East Atlantic Fisheries Commission (NEAFC)	1	100	C
Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)	1	100	C

The extent of country membership in these bodies and instruments for the Faroe Plateau LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Faroe Plateau LME							
Coastal countries in the LME	Agreements						
	ICCAT	ICES	NAMMCO	NASCO	NEAFC	OSPAR	AC
Denmark (Faroe Islands)			B	B	B	B	C
United Kingdom	B	B	N			B	N
% engagement	50	50	100	50	50	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed							

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-f. They are summarised in Table 5.

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 4a: Faroe Plateau LME ⁱ – Transboundary Arrangement for Fisheries – Specific (salmon)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	Supra-LME	3	ICES	Only Denmark is a member Dependent on ICES for scientific advice
Policy decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	Supra-LME	3		
Planning decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat and International Atlantic Salmon Research Board	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4b: Faroe Plateau LME – Transboundary Arrangement for fisheries - Marine Mammals					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3		Only Denmark is a member of NAMMCO.
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4c: Faroe Plateau LME – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		Only Denmark is a member of NEAFC ICES named in NEAFC to provide scientific advice
Policy decision-making	NEAFC - Commission	Supra-LME	3		
Planning analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		
Planning decision-making	NEAFC - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Supra-LME	3		
Data and information	Countries ICES	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4d. Faroe Plateau LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4e: Faroe Plateau LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS) and Biodiversity (General)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	OSPAR – 5 main Committees and their Working Groups a) Biodiversity and Ecosystem b) Eutrophication Strategy c) Hazardous Substances d) Offshore Industry Strategy e) Radioactive Substances	Supra-LME	3	Arctic Council ICES (as observer)?	
Policy decision-making	OSPAR Commission	Supra-LME	3		
Planning analysis and advice	OSPAR – 5 main Committees and their Working Groups	Supra-LME	3		
Planning decision-making	OSPAR Commission	Supra-LME	3		
Implementation	Countries OSPAR Commission Special Studies OSPAR Secretariat	National Supra-LME	1		
Review and evaluation	OSPAR Commission, Main Committees and Working Groups	Supra-LME	3		
Data and information	Countries OSPAR Secretariat	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4f: Faroe Plateau LME – Transboundary Arrangement General – Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC)	
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 5: Faroe Plateau LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Denmark (Faroe Islands), United Kingdom	System name: Faroe Plateau		Region: North East Atlantic
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – EEZ/ABNJ	3		86%		NEAFC
Fisheries – large pelagics (tunas and tuna-like)	3		86%		ICCAT
Fisheries – specific (salmon)	3		57%		NASCO
Fisheries - Marine Mammals	3		71%		NAMMCO
Pollution - LBS	3		90%		OSPAR
Pollution - MBS	3		90%		OSPAR
Pollution - LBS	3		67%		Arctic Council
Pollution - MBS	3		67%		Arctic Council
	System architecture completeness index >>		77%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-f) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table5)								
Policy cycle stage	Fisheries - Salmon	Fisheries – marine mammals	Fisheries – EEZ/ABNJ	Fisheries - HMS	Pollution – LBS	Pollution – MBS	Pollution – LBS	Pollution – MBS
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	NEAFC - Permanent Committee on Management and Science (PEMAS) ICES	ICCAT Standing Committee on Research and Statistics (SCRS)	OSPAR – 5 main Committees and their Working Groups	OSPAR – 5 main Committees and their Working Groups	Arctic Council – ACAP, AMAP, CAFF, EPPR, PAME, SAO	Arctic Council – ACAP, AMAP, CAFF, EPPR, PAME, SAO
Policy decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	NEAFC - Commission	ICCAT Commission	OSPAR Commission	OSPAR Commission	Arctic Council	Arctic Council
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	NAMMCO Man. Comm and Sci. Comm	NEAFC - PEMAS ICES	ICCAT SCRS and Species Panels	OSPAR – 5 main Committees and their Working Groups	OSPAR – 5 main Committees and their Working Groups	Arctic Council - ACAP, AMAP, CAFF, EPPR, PAME, SAO	Arctic Council - ACAP, AMAP, CAFF, EPPR, PAME, SAO
Planning decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	NEAFC - Commission	ICCAT Commission	OSPAR Commission	OSPAR Commission	Arctic Council	Arctic Council
Implementation	Countries	Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	Countries	Countries	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries	Countries
Review and evaluation	NASCO Council	NAMMMCO Council Committee on Inspection and Observation	NEAFC - PECCOE	ICCAT CMMCC	OSPAR Commission, Main Committees and Working Groups	OSPAR Commission, Main Committees and Working Groups	Arctic Council	Arctic Council
Data and information	Countries NASCO Secretariat and IASRB	Countries NAMMCO Secretariat	Countries ICES	ICCAT PWG	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Countries Secretariat	Countries Secretariat

Table 7. Assessment of integration among arrangements for the Faroe Plateau LME. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
5 and 6	1	1	1	1	1	1	1	1
5 and 7	0	0	0	0	0	0	0	0
5 and 8	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
6 and 8	0	0	0	0	0	0	0	0
7 and 8	1	1	1	1	1	1	1	1
Average	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the issues is 0.1 out of a possible 1.

3 Conclusions

The policy cycles relating to the key issues of fisheries and pollution are associated with well-established arrangements that are among the strongest globally. However, there does not appear to be much integration among these processes. Since the LME is largely a single country one and Denmark has a focus on EBM, the integration may be taking place at the national level. Nevertheless, this LME has been assigned an overall integration score of 1.0 due to the EU

Maritime Policy which functions as an overall policy coordinating mechanism for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Faroe Plateau LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Faroe Plateau LME	Completeness	Integration	Engagement
	77%	1.0	71%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 5 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Greenland Sea LME

1 The system to be governed

The system is the Greenland Sea LME. It has a surface area of 519,593 km². It primarily extends from Eastern Greenland, with the majority of the LME falling within the maritime domain of Denmark and the remainder within the marine waters of Iceland and Norway. There is no area of high seas in the LME (Table 1).

This LME comprises what was previously the East Greenland Shelf LME plus an additional offshore area to the north. Therefore, an overview that pertains largely to the coastal shelf area of this LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter XIII - 39: East Greenland Shelf). This assessment is also informed by Large Marine Ecosystems (LMEs) of the Arctic Area: Revision of the Arctic LME Map (PAME, 2013)

Table 1. Percentage of the Greenland Sea LME area taken up by the EEZ of each country and the High Seas (area = 519,593 km²)

Country	Percent of LME area
Denmark (Greenland)	78.7
Iceland	12.9
Norway (Jan Mayen)	8.5

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 39 (Sherman and Hempel, 2009) as follows:

- Fisheries
 - high proportion of collapsed stocks; overfishing; decimation of several whale species; slow recovery of the overexploited right whale;
- Pollution
 - high levels of PCB and DDT; presence of persistent organic pollutants (POPs)
- Climate change
 - environmental consequences and biological effects

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)
2. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
3. International Council for the Exploration of the Sea (ICES)
4. Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)
5. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
6. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)
7. North-East Atlantic Fisheries Commission (NEAFC)
8. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)
9. Agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances (Bonn Agreement)
10. Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)
11. European Union Common Fisheries Policy (CFP)
12. European Union Maritime Policy

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Greenland Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with the Greenland Sea LME			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of Agreement to LME ¹
Arctic Council (AC)	6	88	C
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	100	C
International Council for the Exploration of the Sea (ICES)	8	100	C
Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)	<1	<1	D
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	6	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	6	100	C
North-East Atlantic Fisheries Commission (NEAFC)	9	100	C
Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention)	9	100	C

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 2: Spatial overlap of transboundary agreements with the Greenland Sea LME			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of Agreement to LME ¹
Agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances (Bonn Agreement)			
Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)			
European Union Common Fisheries Policy (CFP)			

The extent of country membership in these bodies and instruments for the Greenland Sea LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Greenland Sea LME										
Coastal countries in the LME	Agreements									
	AC	ICCAT	ICES	NAMMCO	NASC O	NEAF C	OSPAR	ASCOBANS	Bonn Agreement	EU-CFP
Denmark	C		B			B	B	B	B	B
Iceland	C	B	B	B	N	B	B			B
Norway	C	B	B	B	B	B	B	C	B	
% engagement	100	67	100	67	50	100	100	33	67	67
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed										

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4a to 4i. They are summarised in Table 5

Table 4a: Greenland Sea LME ¹ – Transboundary Arrangement for Pollution – Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC)	
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 4b. Greenland Sea LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4c: Greenland Sea LME – Transboundary Arrangement for Fisheries – Specific (Marine Mammals)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3	Arctic Council	
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	NAMMCO Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	NAMMCO Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4d: Greenland Sea LME – Transboundary arrangement for fisheries – specific (salmon)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICES NASCO Secretariat and its Commissions	Supra-LME	3		ICES named in NASCO to provide scientific advice
Policy decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Planning analysis and advice	NASCO Three Commissions NASCO Secretariat ICES	Supra-LME	3		
Planning decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4e: Greenland Sea LME – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		All countries are members of NEAFC ICES named in NEAFC to provide scientific advice
Policy decision-making	NEAFC - Commission	Supra-LME	3		
Planning analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		
Planning decision-making	NEAFC - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Supra-LME	3		
Data and information	Countries ICES	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4f: Greenland Sea LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS) and Biodiversity (General)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	OSPAR – 5 main Committees and their Working Groups a) Biodiversity and Ecosystem b) Eutrophication Strategy c) Hazardous Substances d) Offshore Industry Strategy e) Radioactive Substances	Supra-LME	3	Arctic Council ICES (as observer)	
Policy decision-making	OSPAR Commission	Supra-LME	3		
Planning analysis and advice	OSPAR – 5 main Committees and their Working Groups	Supra-LME	3		
Planning decision-making	OSPAR Commission	Supra-LME	3		
Implementation	Countries OSPAR Commission Special Studies OSPAR Secretariat	National Supra-LME	1		
Review and evaluation	OSPAR Commission, Main Committees and Working Groups	Supra-LME	3		
Data and information	Countries OSPAR Secretariat	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4g: Greenland Sea LME – Transboundary Arrangement for Biodiversity – Specific (Small cetaceans)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ASCOBANS Advisory Committee	Supra-LME	3	Arctic Council CMS	
Policy decision-making	Meeting of the Parties	Supra-LME	2		
Planning analysis and advice	ASCOBANS Advisory Committee	Supra-LME	3		
Planning decision-making	Meeting of the Parties	Supra-LME	1		
Implementation	Contracting Parties	National	0		
Review and evaluation	Meeting of the Parties	Supra-LME	2		
Data and information	Contracting Parties, Secretariat, Advisory Committee, Coordinating Authorities	National Supra-LME	2		
Overall total and % completeness >>			13 /21 = 62%		

Table 4h: Greenland Sea LME – Transboundary Arrangement for Fisheries – EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3	Arctic Council	
Policy decision-making	European Commission	Supra-LME	2		
Planning analysis and advice	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3		
Planning decision-making	European Commission	Supra-LME	3		
Implementation	Contracting Parties Scientific, Technical and Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	National Supra-LME	2		
Review and evaluation	Commission STECF	Supra-LME	3		
Data and information	Contracting Parties Commission STECF Advisory Councils	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4i: Greenland Sea LME – Transboundary Arrangement for Pollution – MBS					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Bonn Agreement – Contracting Parties	National	2	Arctic Council	
Policy decision-making	Meeting of the Parties	Supra-LME	1		
Planning analysis and advice	Contracting Parties	National	2		
Planning decision-making	Meeting of the Parties	Supra-LME	1		
Implementation	Contracting Parties	National	0		
Review and evaluation	Meeting of the Parties	Supra-LME	1		
Data and information	Contracting Parties	National	1		
Overall total and % completeness >>			8 /21 = 38%		

Table 5: Greenland Sea LME governance architecture - System summary ⁱⁱ							
IW category: Marine region		Countries: Denmark, Norway, Iceland		System name: Iceland Shelf LME		Region: Arctic	
Complete these columns then assess issues using the arrangements tables				After completing the arrangements tables, complete these columns			
Trans-boundary issue ²		Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations	
Fisheries – EEZ/ABNJ		3		86%		NEAFC	
Fisheries – large pelagics (tunas and tuna-like)		3		86%		ICCAT	
Fisheries – specific (marine mammals)		3		71%		NAMMCO	
Fisheries – specific (salmon)		3		57%		NASCO	
Fisheries – EEZ		3		90%		EU-CFP	
Pollution (LBS)		3		90%		OPSAR	
Pollution (LBS)		3		67%		AC	
Pollution (MBS)		3		67%		AC	
Pollution (MBS)		3		90%		OSPAR	
Pollution (MBS)		3		38%		Bonn	
Biodiversity – General		3		90%		OSPAR	
Biodiversity – General		3		67%		AC	
Biodiversity – Specific		3		62%		ASCOBANS	
		System architecture completeness index >>		74%		<< System priority for intervention	

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-4i) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-i)													
Policy cycle stage	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries – Specific (salmon)	Fisheries - Specific (Marine Mammals)	Fisheries - EEZ	Pollution - MBS	Pollution – LBS,	Pollution - MBS	Biodiversity - General	Biodiversity - Specific	Pollution - LBS	Pollution - MBS	Biodiversity - General
Policy analysis and advice	NEAFC - Permanent Committee on Management and Science (PEMAS) ICES	ICCAT Standing Committee on Research and Statistics (SCRS)	ICES NASCO Secretariat and its Commissions	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Bonn Agreement – Contracting Parties	OSPAR – Eutrophication Strategy Hazardous Substances Radioactive Substances Committees and Working Groups	OSPAR - Offshore Industry Strategy Committee and Working Groups	OSPAR Biodiversity and Ecosystem Committee and Working Groups	ASCOBANS Advisory Committee	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme ; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Policy decision-making	NEAFC - Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council	European Commission	Meeting of the Parties	OSPAR Commission	OSPAR Commission	OSPAR Commission	Meeting of the Parties	Arctic Council	Arctic Council	Arctic Council
Planning analysis and advice	NEAFC - Permanent Committee on Management and Science (PEMAS) ICES	ICCAT SCRS and Species Panels	NASCO Three Commissions NASCO Secretariat ICES	NAMMCO Management Committee and Scientific Committee	Advisory Councils Scientific, Technical and Economic Committee for Fisheries	Contracting Parties	OSPAR – Eutrophication Strategy Hazardous Substances Radioactive Substances Committees and Working Groups	OSPAR - Offshore Industry Strategy Committee and Working Groups	OSPAR - Biodiversity and Ecosystem Committee and Working Groups	ASCOBANS Advisory Committee	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and	Arctic Council - Emergency preparedness, Prevention and response; Protection	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-i)													
Policy cycle stage	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries – Specific (salmon)	Fisheries - Specific (Marine Mammals)	Fisheries - EEZ	Pollution - MBS	Pollution – LBS,	Pollution - MBS	Biodiversity - General	Biodiversity - Specific	Pollution - LBS	Pollution - MBS	Biodiversity - General
					(STECF)		Groups				Assessment programme SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Groups; Task Forces; Senior Arctic Officials (SAO)
Planning decision-making	NEAFC - Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council	European Commission	Meeting of the Parties	OSPAR Commission	OSPAR Commission	OSPAR Commission	Meeting of the Parties	Arctic Council	Arctic Council	Arctic Council
Implementation	Countries	Countries	Countries	NAMMCO Secretariat – Joint NAMMCO Control Scheme for Hunting	Contracting Parties Scientific, Technical and Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	Contracting Parties	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	Contracting Parties	Countries	Countries	Countries
Review and evaluation	NEAFC - Permanent	Conservation and	NASCO Council	NAMMMCO Council	Commission STECF	Meeting of the Parties	OSPAR Commission,	OSPAR Commission	OSPAR Commission	Meeting of the Parties	Arctic Council	Arctic Council	Arctic Council

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-i)													
Policy cycle stage	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries – Specific (salmon)	Fisheries - Specific (Marine Mammals)	Fisheries - EEZ	Pollution - MBS	Pollution – LBS,	Pollution - MBS	Biodiversity - General	Biodiversity - Specific	Pollution - LBS	Pollution - MBS	Biodiversity - General
	Committee on Control and Enforcement (PECCOE)	Management Measures Compliance Committee (CMMCC)		Committee on Inspection and Observation			Main Committees and Working Groups	Main Committees and Working Groups	Main Committees and Working Groups				
Data and information	Countries ICES	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	NAMMCO Countries NAMMCO Secretariat	Contracting Parties Commission STECF Advisory Councils	Contracting Parties	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Contracting Parties, Secretariat, Advisory Committee, Co-ordinating Authorities	Countries Secretariat	Countries Secretariat	Countries Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	1	0	1	0	0	0	0	0.3
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
1 and 10	0	0	0	0	0	0	0	0
1 and 11	0	0	0	0	0	0	0	0
1 and 12	0	0	0	0	0	0	0	0
1 and 13	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
2 and 10	0	0	0	0	0	0	0	0
2 and 11	0	0	0	0	0	0	0	0
2 and 12	0	0	0	0	0	0	0	0
2 and 13	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
3 and 9	0	0	0	0	0	0	0	0
3 and 10	0	0	0	0	0	0	0	0
3 and 11	0	0	0	0	0	0	0	0
3 and 12	0	0	0	0	0	0	0	0
3 and 13	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0

4 and 9	0	0	0	0	0	0	0	0
4 and 10	0	0	0	0	0	0	0	0
4 and 11	0	0	0	0	0	0	0	0
4 and 12	0	0	0	0	0	0	0	0
4 and 13	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
5 and 7	0	0	0	0	0	0	0	0
5 and 8	0	0	0	0	0	0	0	0
5 and 9	0	0	0	0	0	0	0	0
5 and 10	0	0	0	0	0	0	0	0
5 and 11	0	0	0	0	0	0	0	0
5 and 12	0	0	0	0	0	0	0	0
5 and 13	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
6 and 8	0	0	0	0	0	0	0	0
6 and 9	0	0	0	0	0	0	0	0
6 and 10	0	0	0	0	0	0	0	0
6 and 11	0	0	0	0	0	0	0	0
6 and 12	0	0	0	0	0	0	0	0
6 and 13	0	0	0	0	0	0	0	0
7 and 8	0	1	0	1	1	1	1	0.7
7 and 9	0	1	0	1	1	1	1	0.7
7 and 10	0	0	0	0	0	0	0	0
7 and 11	0	0	0	0	0	0	0	0
7 and 12	0	0	0	0	0	0	0	0
7 and 13	0	0	0	0	0	0	0	0
8 and 9	0	1	0	1	1	1	1	0.7
8 and 10	0	0	0	0	0	0	0	0
8 and 11	0	0	0	0	0	0	0	0
8 and 12	0	0	0	0	0	0	0	0
8 and 13	0	0	0	0	0	0	0	0
9 and 10	0	0	0	0	0	0	0	0
9 and 11	0	0	0	0	0	0	0	0
9 and 12	0	0	0	0	0	0	0	0
9 and 13	0	0	0	0	0	0	0	0
10 and 11	0	0	0	0	0	0	0	0
10 and 12	0	0	0	0	0	0	0	0
10 and 13	0	0	0	0	0	0	0	0
11 and 12	0	1	0	1	0	1	1	0.6
11 and 13	0	1	0	1	0	1	1	0.6
12 and 13	0	1	0	1	0	1	1	0.6
Average	0.01	0.1	0.01	0.1	0.04	0.1	0.1	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the nine issues is 0.1 out of a possible 1.

3 Conclusions

None of the fisheries arrangements (NEAFC, ICCAT, NAMMCO, NASCO and EU-CFP) appear to be integrated while the three arrangements for pollution and biodiversity appear to have the Arctic Council as an integrating arrangement for one set of issues and the OSPAR Convention for a second set of similar issues relating to pollution and biodiversity. Additionally, the specific biodiversity arrangements for marine mammals and polar bears do not appear to have any formal linkages. It needs to be said that, the Arctic Council is not a binding arrangement so its implementation is voluntary and country dependent.

It does appear that the Arctic Council has the potential to develop into an informal overall policy coordinating organization, although as mentioned, its policy coordination role with respect to fisheries is weak.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For Greenland Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Greenland Sea LME	Completeness	Integration	Engagement
	74%	0.1	75%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

PAME. 2013. Large Marine Ecosystems (LMEs) of the Arctic Area: Revision of the Arctic LME Map.

http://www.pame.is/images/Documents/PAME_revised_LME_map_with_explanatory_text_15_Aug_2013_-_Vefur.pdf

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Guinea Current LME

1 The system to be governed

The system is the Guinea Current LME. This includes the marine waters of the countries shown in Table 1 and a significant area of High Seas.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter I-2), so a review is not provided here. This assessment is also informed by the TDA, Project Document and SAP (GCLME Project 2006, GCLME Project 2007).

2 Governance arrangements

2.1 Issues to be governed

The key transboundary issues were summarized in the TDA (GCLME Project 2006) as follows:

- Decline in GCLME fish stocks and unsustainable harvest of living resources;
- uncertainty regarding ecosystem status, integrity (changes in community composition, vulnerable species and biodiversity, introduction of alien species) and the yields in a highly variable environment including effects of global climate change;
- Deterioration in water quality (chronic and catastrophic) from land and sea-based activities, eutrophication, and harmful algal blooms
- Habitat destruction and alteration including inter-alia modifications and seafloor and coastal zone, degradation of coastalscapes, coastal erosion.

The TDA further breaks these down into 12 specific problems. Based on these the following key transboundary issues to be addressed by governance arrangements were identified:

- Fisheries - decline in GC CLME fish stocks and sustainable harvest of living resources
 - Small pelagics

Table 1. Percentage of Guinea Current LME area taken up by the EEZ of each coastal country and the High Seas (area = 1 910 412 km²)

Country	Percent of LME area
Angola	1.1
Benin	1.6
Cameroon	0.7
Democratic Republic Congo	<0.1
Equatorial Guinea	4.4
Gabon	9.9
Ghana	10.7
Guinea	5.7
Guinea Bissau	4.9
Ivory Coast (Côte d'Ivoire)	9.0
Joint Regime (Nigeria - Sao Tome and Principe)	1.7
Liberia	12.7
Nigeria	9.4
Republique du Congo	2.1
Sao Tome and Principe	5.3
Senegal	0.7
Sierra Leone	8.3
Togo	0.8
High Seas	11.1
The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.	

- Demersal finfish and shrimps
- HMS – tunas and tuna-like species
- Biodiversity
 - Habitat destruction and alteration including inter-alia modifications and seafloor and coastal zone, degradation of coastalscapes, coastal erosion.
- Pollution - deterioration in water quality (chronic and catastrophic) from land and sea-based activities, eutrophication, and harmful algal blooms

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify transboundary arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Abidjan Convention – Abidjan Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region
 - a. Protocol Concerning Co-operation in Combating Pollution in Cases of Emergency in the Western and Central African Region – Emergency Protocol
 - b. Protocol concerning the Cooperation in the Protection and Development of the Marine and Coastal Environment from Land-Based Sources and the Activities (LBSA) in the Western, Central and Southern Africa Region - LBS Protocol – not yet in force
2. CECAF - FAO Fishery Committee for the Eastern Central Atlantic (COPACE in French)
 - a. Scientific Sub-Committee
 - i. Working Group for Small Pelagics,
 - ii. Working Group for Demersal Species,
 - iii. Working Group for Artisanal Fisheries.
3. RCFCASBA - Regional Convention on Fisheries Cooperation among African States Bordering on the Atlantic Ocean (Dakar Convention, 1992) 1995. This gives rise to ATLAFCO (COMHAFAT in French), the Ministerial Conference on Fisheries Cooperation among African States bordering the Atlantic Ocean.
4. ICCAT - International Commission for the Conservation of Atlantic Tunas
5. NEPAD - New Partnership for Africa's Development - COSMAR - Coastal and Marine Secretariat (NEPAD), Nairobi
6. SRFC – Subregional Fisheries Commission (CSRP in French)(membership includes Guinea and Sierra Leone in LME and several countries in the adjacent Canary Current LME), 1985

7. PRCM - Charter of the West African Regional Marine and Coastal Conservation Partnership (PRCM), 2012¹
8. Regional Fisheries Committee for the Gulf of Guinea (COREP)
9. Fisheries Committee for the West-Central Gulf of Guinea (FCWC)
10. Strategic Action Programme (SAP) for the Guinea Current Large Marine Ecosystem (GCLME)
11. Action Plan for the protection and Development of the Marine Environment and Coastal Areas of the West and Central African Region, 1981

Multipurpose regional bodies

12. The Economic Community of Central African States (ECCAS)
13. The Economic Community for Livestock, Meat and Fisheries Resources (CEBEVIRAH), a subsidiary body to the Economic Monetary Community of Central African States (CEMAC)
14. The Economic Community of West African States (ECOWAS)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Guinea Current LME is shown in Table 2.

Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME ²
Abidjan Convention	36	87	D
CECAF	13	98	C
COMHAFAT	8	100	C
COREP	91	18	B
FCWC	97	44	B
ICCAT	2	100	C
SRFC	25	20	D

The extent of country membership in these bodies and instruments for the Guinea Current LME is shown in Table 3.

¹Countries involved in the PRCM correspond to the countries represented in the Sub-Regional Fisheries Commission (SRFC)

²A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Guinea Current LME									
Coastal countries	Agreements								
	Abidjan	Abidjan (Emergency)	Abidjan (LBSA)	CECAF	COMHA FAT	COREP	FCWC	SRFC	ICCAT
Angola				C	B	N	N	N	B
Benin	B	B		C	B	N	B	N	
Cameroon	B	B		C	B	B	N	N	
Dem. Rep. Congo				C	B	B	N	N	
Equatorial Guinea				C	B	N	N	N	B
Gabon	B	B		C	B	B	N	N	B
Ghana	B	B		C	B	N	B	N	B
Guinea	B	B		C	B	N	N	B	B
Guinea Bissau	B	B		C	B	N	N	B	
Ivory Coast (Côte d'Ivoire)	B	B		C	B	N	B	N	B
Liberia	B	B		C	B	N	B	N	
Nigeria	B	B		C	B	N	B	N	B
Rep. du Congo	B	B		C		B	N	N	
Sao Tome and Principe				C	B	B	N	N	B
Senegal	B	B		C	B	N	N	B	B
Sierra Leone	B	B		C	B	N	N	B	B
Togo	B	B		C	B	N	B	N	
% engagement	76	76		100	94	100	100	100	59
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed									

2.2.1 Assessment of issues

The arrangements in place for the issues identified are shown in Tables 4a-d. These are summarized in Table 5.

Table 4a: Guinea Current LME ⁱ – Transboundary arrangement for fisheries - small pelagic resources					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	COREP Technical Committee FCWC Advisory and Coordinating Committee SRFC Coordinating Committee	LME	3	Partner countries and organisations provide support (e.g. Russia, EU)	<ul style="list-style-type: none">• Each of these three bodies only covers a part of the LME: SRFC only covers the northernmost area of GCLME (Guinea and Sierra Leone) and area of responsibility extends north into CCLME (it is not generally considered as a Gulf of Guinea organisation); COREP covers five countries in the central Gulf of Guinea; FCWC covers six countries in the Eastern Gulf of Guinea.• ATLAFCO has a broad policy coordination mandate along the entire western coast of Africa• CECAF covers:<ul style="list-style-type: none">○ EEZs of all countries of the GCLME○ EEZs of all countries of the CCLME○ Adjacent High Seas• While CECAF votes, its decisions are not binding, only advisory and compliance is voluntary. Its decisions also go to COREP, FCWC and SRFC whose decisions are not binding either.• Organisational support for COREP, FCWC and SRFC member countries. CECAF assists with non-member countries• Working Group for Artisanal Fisheries should also have a role but is not very operational due to lack of funding,
Policy decision-making	COREP Council of Ministers FCWC Conference of Ministers SRFC Conference of Ministers ATLAFCO for broader coordination outside GCLME Region	LME	2		
Planning analysis and advice	CECAF Scientific Sub-Committee with Working Group for Small Pelagics COREP Technical Committee and scientific subcommittee FCWC Advisory and Coordinating SRFC Coordinating Committee	LME	3		
Planning decision-making	Session of CECAF (comprising fishery administrators and scientists)	LME	2		
Implementation	COREP Secretariat FCWC Secretariat SRFC Coordinating Committee Countries	LME/ National	1		
Review and evaluation	CECAF Scientific Sub-Committee	Supra-LME	2		
Data and information	CECAF Scientific Sub-Committee with Working Group for Small Pelagics Countries	Supra-LME	2		
Overall total and % completeness >>			15/21= 71%		

Table 4b: Guinea Current LME – Transboundary arrangement for fisheries - demersal finfish and shrimps					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	COREP Technical Committee FCWC Advisory and Coordinating Committee SRFC Coordinating Committee	LME	3	Partner countries and organisations provide support (e.g. Russia, EU)	<ul style="list-style-type: none">• Each of these three bodies only covers a part of the LME: SRFC only covers the northernmost area of GCLME (Guinea and Sierra Leone) and area of responsibility extends north into CCLME (it is not generally considered as a Gulf of Guinea organisation); COREP covers five countries in the central Gulf of Guinea; FCWC covers six countries in the Eastern Gulf of Guinea.• ATLAFCO has a broad policy coordination mandate along the entire western coast of Africa• CECAF covers:<ul style="list-style-type: none">○ EEZs of all countries of the GCLME○ EEZs of all countries of the CCLME○ Adjacent High Seas• While CECAF votes, its decisions are not binding, only advisory and compliance is voluntary. Its decisions also go to COREP, FCWC and SRFC whose decisions are not binding either.• Organisational support for COREP, FCWC and SRFC member countries. CECAF assists with non-member countries• Working Group for Artisanal Fisheries should also have a role but is not very operational due to lack of funding,
Policy decision-making	COREP Council of Ministers FCWC Conference of Ministers SRFC Conference of Ministers ATLAFCO for broader coordination outside GCLME Region	LME	2		
Planning analysis and advice	CECAF Scientific Sub-Committee with Working Group for Demersal Species COREP Technical Committee and scientific subcommittee FCWC Advisory and Coordinating SRFC Coordinating Committee	LME	3		
Planning decision-making	Session of CECAF (comprising fishery administrators and scientists)	LME	2		
Implementation	COREP Secretariat FCWC Secretariat SRFC Coordinating Committee Countries	LME/ National	1		
Review and evaluation	CECAF Scientific Sub-Committee with Working Group for Demersal Species	LME	2		
Data and information	CECAF Scientific Sub-Committee with Working Group for Demersal Species Countries	LME	2		
Overall total and % completeness >>			15/21= 71%		

Table 4c: Guinea Current LME – Transboundary arrangement for Summary for fisheries - tuna					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	LME	3		<ul style="list-style-type: none"> • Nine of the 16 coastal countries in this LME are members of ICCAT • Is there a regionally coordinated approach to ICCAT? • Are there are stocks of small tunas occurring mainly within the LME for which ICCAT has a mandate but does little regarding management, other than catch monitoring (recreational fishing) • Are there trophic interactions between the oceanic tunas (large scale distribution) and small pelagics in the LME that require linkages in management
Policy decision-making	ICCAT Commission	LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	LME	3		
Planning decision-making	ICCAT Commission	LME	3		
Implementation	Countries	LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	LME	3		
Overall total and % completeness >>			17/21 = 81%		

Table 4d:Guinea Current LME – Transboundary arrangement for (a) Pollution – LBS (nutrients, sediments, pesticides) and and MBS (hydrocarbons) and (b) biodiversity - general					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Abidjan Convention RCU	Supra-LME	1		<ul style="list-style-type: none">• According to the Convention all the above issues can be dealt with by this one arrangement, although sub-processes will be needed for each issue.• The Abidjan Convention includes the majority of GCLME countries (14 of 16).• It indicates that it will seek to address issues in collaboration with the GCLME Project, but the mode of interaction does not appear to be formal• This arrangement will be strengthened when the 2012 LBS Protocol comes into force <p>Biodiversity</p> <ul style="list-style-type: none">• Issues appear to be fully covered by the Abidjan Convention although only MPAs are mentioned in this regard rather than biodiversity specific measures• There is a manatee program that is species specific. <p>Habitat modification</p> <ul style="list-style-type: none">• This issue which is raised as priority in the TDA is also broadly covered by the Abidjan Convention.• There is a mangrove charter under the PRCM and countries are seeking to change this to a Protocol under the Abidjan Convention
Policy decision-making	Abidjan Convention COP	Supra-LME	1		
Planning analysis and advice	Abidjan Convention RCU	Supra-LME	1		
Planning decision-making	Abidjan Convention COP	Supra-LME	1		
Implementation	RCU/Countries	National	1		
Review and evaluation	Abidjan Convention RCU	Supra-LME	1		
Data and information	Abidjan Convention RCU/countries	Supra-LME	1		
Overall total and % completeness >>			7/21 = 33%		

2.2.2 Issues mentioned in the TDA but not addressed above:

Table 5: Guinea Current LME governance architecture - System summary ⁱⁱ					
IW category: LME		Countries: See Table 1	System name: Guinea Current LME		Region: South Atlantic
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue ²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries - small pelagic resources			71		Three sub-regional commissions, CECAF and COMHAFAT
Fisheries - demersal finfish and shrimps			71		
Fisheries - tuna			81		ICCAT
Pollution - LBS			33		Abidjan
Pollution - MBS			33		
Biodiversity- general			33		Abidjan
	System architecture completeness index >>		54%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables5) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table5)					
Policy cycle stage	Fisheries –Small pelagics	Fisheries – Demersal finfish and shrimps	Fisheries - Tuna	Pollution - - LBS and MBS	Biodiversity – general (including habitat modification)
Policy analysis and advice	COREP Technical Committee FCWC Advisory and Coordinating Committee SRFC Coordinating Committee	COREP Technical Committee FCWC Advisory and Coordinating Committee SRFC Coordinating Committee	ICCAT Standing Committee on Research and Statistics (SCRS)	Abidjan Convention RCU	Abidjan Convention RCU IUCN, UNEP contribute

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table5)					
Policy cycle stage	Fisheries –Small pelagics	Fisheries – Demersal finfish and shrimps	Fisheries - Tuna	Pollution - - LBS and MBS	Biodiversity – general (including habitat modification)
Policy decision-making	COREP Council of Ministers FCWC Conference of Ministers SRFC Conference of Ministers ATLAFCO for broader coordination outside GCLME Region	COREP Council of Ministers FCWC Conference of Ministers SRFC Conference of Ministers ATLAFCO for broader coordination outside GCLME Region	ICCAT Commission	Abidjan Convention COP	Abidjan Convention COP
Planning analysis and advice	CECAF Scientific Sub-Committee with Working Group for Small Pelagics COREP Technical Committee and scientific subcommittee FCWC Advisory and Coordinating SRFC Coordinating Committee	CECAF Scientific Sub-Committee with Working Group for Demersal Species COREP Technical Committee and scientific subcommittee FCWC Advisory and Coordinating SRFC Coordinating Committee	ICCAT SCRS and Species Panels	Abidjan Convention RCU	Abidjan Convention RCU
Planning decision-making	Session of CECAF (comprising fishery administrators and scientists)	Session of CECAF (comprising fishery administrators and scientists)	ICCAT Commission	Abidjan Convention COP	Abidjan Convention COP
Implementation	COREP Secretariat FCWC Secretariat SRFC Coordinating Committee Countries	COREP Secretariat FCWC Secretariat SRFC Coordinating Committee Countries	Countries	RCU/Countries	Countries
Review and evaluation	CECAF Scientific Sub-Committee	CECAF Scientific Sub-Committee with Working Group for Demersal Species	Conservation and Management Measures Compliance Committee (CMMCC)	Abidjan Convention RCU	Abidjan Convention RCU
Data and information	CECAF Scientific Sub-Committee with Working Group	CECAF Scientific Sub-Committee with Working Group	Permanent Working for the Improvement of ICCAT Statistics	Abidjan Convention RCU/countries	Abidjan Convention RCU/countries

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 5)					
Policy cycle stage	Fisheries –Small pelagics	Fisheries – Demersal finfish and shrimps	Fisheries - Tuna	Pollution - - LBS and MBS	Biodiversity – general (including habitat modification)
	for Small Pelagics Countries	for Demersal Species Countries	and Conservation Measures (PWG)		

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.								
Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	1	1	1	1	1	1	1	1
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
4 and 5	1	1	1	1	0	1	1	0.9
4 and 6	1	1	1	1	0	1	1	0.9
5 and 6	1	1	1	1	0	1	1	0.9
Average	0.3	0.3	0.3	0.3	0.1	0.3	0.3	0.2

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the six issues is 0.2 out of a possible 1.

The policy processes for small pelagic and demersal fisheries in areas under national jurisdiction are complex and fragmented. At the policy and technical levels COMHAFAT and CECAF respectively have the broad geographical coverage required for EBM. Management decision-making and implementation however is where fragmentation occurs being distributed among three subregional RFBs. Whereas, these RFBs include all but two of the countries in the LME, the extent to which their activities are harmonised is unclear. The fact that decisions taken in

CECAF and the three RFBs are not binding, seriously weakens these arrangements. Also, the fact that implementation and monitoring of ICCAT decisions are solely the responsibility of countries seriously weakens that arrangement.

The Abidjan Convention is currently a relatively weak arrangement for pollution and biodiversity, as there are no protocols to give effect to its intent for these issues. There appears to be potential for good integration of fisheries issues for resources within national jurisdiction through the COMHAFAT and CECAF, especially if the three subregional RFBs can be harmonized. However, these do not appear to be well integrated with tuna fisheries under ICCAT.

The fact that the Abidjan Convention area does potentially include all countries in the GCLME does indicate its potential for dealing comprehensively with these transboundary issues. The question remains as to what the role of the IGCC is likely to be and whether it should be COMHAFAT or the Abidjan convention (or some combination of the two) that assumes overarching responsibility for integration and coordination across the full range of issues required for EBM. COMHAFAT also has membership of all coastal countries in this LME. While COMHAFAT is strictly a fisheries organization, an EAF as defined by FAO would include attention to pollution and biodiversity issues connected with fisheries.

3 Conclusions

The two arrangements (COMHAFAT and CECAF) for fisheries in the areas within national jurisdiction are closely connected. So are the arrangements for pollution and biodiversity that fall under the Abidjan Convention. However neither of these pairs appears to be integrated with each other or with the tuna arrangement ICCAT. No agreed integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be identified. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal. It appears that the Interim Guinea Current Commission (IGCC) was been established with a view overall integration and coordination of marine ecosystem governance issues. However, the current status and level of acceptance among the countries and other organisations in the region, of the IGCC's role in overarching coordination is unclear.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Guinea Current LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Guinea Current LME	Completeness	Integration	Engagement
	54%	0.2	78%

4 References

GCLME Project. 2005. Guinea Current Large Marine Ecosystem (GCLME) Transboundary Diagnostic Analysis. GCLME Project PCU, Ghana.

GCLME Project. 2007. Guinea Current Large Marine Ecosystem (GCLME) Strategic Action Programme. GCLME Project PCU, Ghana.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.
<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱTable notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱTable notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 4 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Gulf of Mexico LME

1 The system to be governed

The system is the Gulf of Mexico (GoM) LME, an approximate 1.5 million km² semi-enclosed oceanic basin with a water volume of roughly 2.5×10^{15} m³. Its basin is shared by Mexico, the US and Cuba. (Table 1)

In terms of its marine area, Mexico has jurisdiction over 735,438 km² of the GoM, the US has 700,172 km² and Cuba 55,862 km² (Yoskowitz et al., 2013). It should be noted that while Cuba is not a coastal state within the LME, its EEZ does extend into the LME. There are also two areas (Western and Eastern Gaps) totaling some 35,000 km² that falls beyond the national jurisdiction of the three countries. While all three countries share maritime borders with each other, the involvement of Cuba in the governance of the GoM LME has been minimal due to long-standing differences affecting international relations with the US. However, there is a clear recognition of the importance of Cuba's participation to the successful implementation of integrated management initiatives in the GoM (TDA, 2011, p.25).

Table 1. Percentage of Gulf of Mexico LME area taken up by the EEZ of each country and the High Seas (area = 1,526,331 km ²)	
Country	Percent of LME area
Cuba	3.6
Mexico	47.9
United States	45.8
High Seas	2.7
The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.	

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter XV- 50), so a review is not provided here. This assessment is also informed by the GoM LME TDA (GEF/UNIDO, 2011), the Gulf of Mexico SAP, NOAA Integrated Ecosystem Assessment Program for the Gulf of Mexico and the report by Yoskowitz et al. (2013) entitled *Gulf 360: State of the Gulf of Mexico*.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified in the TDA (2011) and summarized in the SAP and focus on impacts arising from high fishing pressure, oil and gas production, pollution, shoreline development, hydrologic changes through artificial drainage, agriculture, and nutrient loading:

- Fisheries
 - Non-optimal harvesting of commercial species (over-fishing, fishing undersized organisms and reproductive adults, dumping of by-catch)
 - IUU fishing

- Pollution
 - LBS (nutrients, sediments, pesticides, trace metals and emerging pollutants)
 - MBS (hydrocarbons)
- Biodiversity
 - Habitat alteration and/or loss, particularly wetlands and marine areas due to hypoxia
 - Depleted non-commercial species and associated marine flora and fauna
 - Alien invasive species

From a transboundary governance perspective, it is possible and desirable to combine several of the above issues under single governance arrangements. The TDA (2011) indicated a preference for three main categories of transboundary issues, each with sub issues - fisheries, biodiversity, pollution (both land-based and marine-based) and identified the concerns arising from climate change as a cross-cutting issue. In addition to these major issue areas (with their sub-issues as identified above), the TDA (2011) also identified potential root causes responsible for the identified transboundary issues including: incomplete information and understanding of ecosystem functioning; difficulty in assigning value for ecosystem services; current inability to promote an ecosystem approach and insufficient coordination between governments. It is important to note that issues that were the responsibility of a single country, such as over-capitalization of the fishing fleet and economic inefficiencies, were not included in this assessment even though this issue might be present in more than one country in the system. Additionally, climate change induced sea-level rise and increasing frequency and severity of storms, although listed as problems in the GoM TDA (2011), were excluded from the assessment of governance arrangements in the system since no regional level agreements are currently in place to address this global issue.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Cartagena Convention – Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention).

This is a comprehensive, umbrella agreement for the protection and development of the marine environment. This regional environmental convention provides the legal framework for cooperative regional and national actions in the Wider Caribbean Region, including the GoM. The Convention is supplemented by

- a. Protocol Concerning Co-operation in Combating Oil Spills in the Wider Caribbean Region which was also adopted in 1983 and entered into force on 11 October 1986;
- b. Protocol Concerning Specially Protected Areas and Wildlife (SPA) in the Wider Caribbean Region which was adopted on 18 January 1990. The Protocol entered into force on 18 June 2000;

- c. Protocol Concerning Pollution from Land-Based Sources and Activities which was adopted on 6 October 1999. The Protocol entered into force on 13 August 2010.
2. WECAFC - FAO Western Central Atlantic Fishery Commission
 - a. OSPESCA/WECAFC/CRFM/CFMC Working Group on Spiny Lobster
 - b. WECAFC/OSPESCA/CRFM/CFMC Working Group on Recreational Fisheries
 - c. CFMC/OSPESCA/WECAFC/CRFM Queen Conch Working Group
 - d. CFMC/WECAFC Spawning Aggregations Working Group
3. ICCAT - International Commission for the Conservation of Atlantic Tunas
4. Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)
5. Latin American Organization for Fisheries Development (OLDEPESCA)
6. MEX-US 1980 Agreement of Cooperation between the US and Mexico regarding Pollution of the Marine Environment by Discharges of Hydrocarbons and other Hazardous Substances.
7. Gulf of Mexico Strategic Action Program (SAP)
8. Gulf of Mexico Alliance (GOMA)
 - a. US-Mexico Habitat Conservation and Restoration Team
 - b. Tri-national Initiative for Marine Science and Conservation in the Gulf of Mexico and Western Caribbean

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Gulf of Mexico LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Gulf of Mexico LME			
Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME ¹
Cartagena Convention and Protocols	23	100	C
ICCAT	2	100	C
OLDEPESCA	11	50	D
WECAFC	8	100	C
IAC		100	C

The extent of country membership in these bodies and instruments for the Gulf of Mexico LME is shown in Table 3.

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Gulf of Mexico LME									
Coastal countries in the LME	Agreements								
	Cartagena	Carta gena - Oil spills	Carta gena - LBS	Carta gena - SPAW	MEXUS - GULF	ICCAT	IAC	OLDE- PESCA	WECAFC
Cuba	B	B		B	N			B	C
Mexico	B	B		C	B	B	B	B	C
United States	B	B	B	B	B	B	B	N	C
% engagement	100	100	33	67	100	67	67	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed									

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-g. They are summarised in table 5

Table 4a: Gulf of Mexico LME ¹ – Transboundary arrangements for fisheries - EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	OLDEPESCA - Board and Technical Committee Expert Groups	Supra-LME	2	WECAFC	US is not a member of OLDEPESCA How significant is OLDEPESCA to the members of this LME?
Policy decision-making	OLDEPESCA - Council of Ministers	Supra-LME	1		
Planning analysis and advice	OLDEPESCA - Board and Technical Committee Expert Groups	Supra-LME	2		
Planning decision-making	Countries	National	1		
Implementation	Countries	National	1		
Review and evaluation	OLDEPESCA - Council of Ministers	Supra-LME	1		
Data and information	Countries OLDEPESCA – Secretariat	National Supra-LME	1		
Overall total and % completeness >>			9/21 = 43%		

Table 4b: Gulf of Mexico LME – Transboundary arrangements for fisheries - EEZ-ABNJ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	WECAFC Scientific Advisory group, and WGs. Commission	Supra-LME	2	OLDEPESCA	What role, if any, does WECAFC play in this LME?
Policy decision-making	WECAFC Commission	Supra-LME	0		
Planning analysis and advice	Working Groups and Partners	Supra-LME	2		
Planning decision-making	WECAFC Commission	Supra-LME	0		
Implementation	Countries Partner Organizations	National LME	0		
Review and evaluation	Working Groups and Commission	Sub-LME	1		
Data and information	Countries, FAO HQ and Working Groups	National Supra-LME	1		
Overall total and % completeness >>			6/21 = 29%%		

Table 4c. Gulf of Mexico LME – Transboundary arrangement for fisheries – HMS (tuna and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3	The Billfish Foundation (TBF), International Game Fish Association (IGFA) GCFI	Mexico and US are members but not Cuba
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			17/21 = 80%		

Table 4d. Gulf of Mexico LME – Transboundary arrangement for Pollution – LBS					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	LBS Scientific and Technical Advisory Committee (STAC)	Supra-LME	3		To what extent is the Cartagena Convention and its protocols significant agreements in the arrangement for Pollution and Biodiversity in the LME?
Policy decision-making	IGM LBS CoP	Supra-LME	1		
Planning analysis and advice	LBS Scientific and Technical Advisory Committee (STAC) CIMAB-RAC- Cuba IMA-RAC-Trinidad	Supra-LME	2		
Planning decision-making	LBS CoP	Supra-LME	1		
Implementation	Countries RCUs RACs	National Supra-LME	2		
Review and evaluation	LBS STAC	Supra-LME	2		
Data and information	Countries RCUs RACs	National Supra-LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4e. Gulf of Mexico LME – Transboundary arrangement for Pollution – MBS					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Cartagena Conv - OSP Scientific and Technical Advisory Committee (STAC), OSP COP	Supra-LME	3	MEXUS -Gulf	The bilateral agreement between Mexico and the US to prevent pollution from oil spills and other hazardous substances has a joint action plan that is the responsibility of the US Coast Guard and the Secretaria de Marina-Armada de Mexico.
Policy decision-making	Cartagena Conv. – IGM, Oil Spill CoP	Supra-LME	1		
Planning analysis and advice	Cartagena Conv. - Scientific and Technical Advisory Committee (STAC), RAC/REMPEITC-Carib	Supra-LME	2		
Planning decision-making	Cartagena Conv. - Oil Spill CoP	Supra-LME	1		
Implementation	Cartagena Conv. – Countries, RCUs, RACs	National Supra-LME	2		
Review and evaluation	Cartagena Conv. - Oil Spill STAC	Supra-LME	2		
Data and information	Cartagena Conv. – Countries, RCUs, RACs	National Supra-LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4f. Gulf of Mexico LME – Transboundary arrangement for Biodiversity – Habitat alteration and depleted non-commercial species					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Cartagena Convention SPAW Protocol Scientific and Technical Advisory Committee (STAC) SPAW COP	Supra-LME	3	TNC, CoML	Cuba and U.S. are parties to the SPAW Protocol but not Mexico.
Policy decision-making	SPAW IGM and CoP	Supra-LME	2		
Planning analysis and advice	SPAW Scientific and Technical Advisory Committee (STAC) RAC-SPAW Guadeloupe	Supra-LME	2		
Planning decision-making	SPAW CoP	Supra-LME	2		
Implementation	SPAW Countries RCUs RACs	National Supra-LME	2		
Review and evaluation	SPAW STAC	Supra-LME	2		
Data and information	SPAW Countries RCUs RACs	Supra-LME	2		
Overall total and % completeness >>			15/21 = 71%		

Table 4g: Gulf of Mexico LME – Transboundary Arrangements for Biodiversity – Turtles					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		Both USA and Mexico are parties to the IAC, but not Cuba
Policy decision-making	IAC Consultative Committee and CoP	Supra-LME	3		
Planning analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Planning decision-making	IAC CoP	Supra-LME	3		
Implementation	IAC Countries	National	0		
Review and evaluation	IAC Countries	National	1		
Data and information	IAC Countries	National	1		
Overall total and % completeness >>			12/21 = 57%		

Table 5: Gulf of Mexico LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Argentina, Uruguay, United Kingdom	System name: Patagonian Shelf		Region: South Atlantic
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – General	3		43%		
Fisheries – General, excluding HMS	3		29%		
Fisheries –Tuna and tuna-like species	3		86%		
Pollution – LBS	3		62%		
Pollution - MBS	3		62%		
Biodiversity – habitat modification from dredging and deposition	3		71%		
Biodiversity – Turtles	3		57%		
	System architecture completeness index >>		58%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

Biodiversity - alien invasive species

There are apparently multiple sources of the perceived threat, e.g. ballast water, introductions from aquaculture, introductions from aquaria. This is a rather specific issue that seems to have been included with pollution in the TDA for want of a more appropriate location. However, it is an issue of serious concern that probably needs its own arrangement within the Cartagena Convention as it does not fit under an existing arrangement.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-g) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-g)							
Policy cycle stage	Fisheries - General	Fisheries – General, non HMS	Fisheries - HMS	Pollution – LBS	Pollution - MBS	Biodiversity – Habitat modification	Biodiversity - Turtles
Policy analysis and advice	OLDEPESCA - Board and Technical Committee Expert Groups	WECAFC Scientific Advisory group, and WGs. Commission	ICCAT Standing Committee on Research and Statistics (SCRS)	LBS Scientific and Technical Advisory Committee (STAC)	Cartagena Conv - OSP Scientific and Technical Advisory Committee (STAC), OSP COP	Cartagena Convention SPAW Protocol Scientific and Technical Advisory Committee (STAC) SPAW COP	IAC Consultative and Scientific Committees
Policy decision-making	OLDEPESCA - Council of Ministers	WECAFC Commission	ICCAT Commission	IGM LBS CoP	Cartagena Conv. – IGM, Oil Spill CoP	SPAW IGM and CoP	IAC Consultative Committee and CoP
Planning analysis and advice	OLDEPESCA - Board and Technical Committee Expert Groups	Working Groups and Partners	ICCAT SCRS and Species Panels	LBS Scientific and Technical Advisory Committee (STAC) CIMAB-RAC-Cuba IMA-RAC-Trinidad	Cartagena Conv. - Scientific and Technical Advisory Committee (STAC), RAC/RE MPEITC-Carib	SPAW Scientific and Technical Advisory Committee (STAC) RAC-SPAW Guadeloupe	IAC Consultative and Scientific Committees
Planning decision-making	Countries	WECAFC Commission	ICCAT Commission	LBS CoP	Cartagena Conv. - Oil Spill CoP	SPAW CoP	IAC CoP
Implementation	Countries	Countries Partner Organizations	Countries	Countries RCUs RACs	Cartagena Conv. – Countries, RCUs, RACs	SPAW Countries RCUs RACs	Countries
Review and evaluation	OLDEPESCA - Council of Ministers	Working Groups and Commission	Conservation and Management Measures Compliance Committee (CMMCC)	LBS STAC	Cartagena Conv. - Oil Spill STAC	SPAW STAC	Countries
Data and information	Countries OLDEPESCA – Secretariat	Countries, FAO HQ and Working Groups	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures	Countries RCUs RACs	Cartagena Conv. – Countries, RCUs, RACs	SPAW Countries RCUs RACs	Countries

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
4 and 5	1	1	1	1	1	1	1	1
4 and 6	1	1	1	1	1	1	1	1
4 and 7	0	0	0	0	0	0	0	0
5 and 6	1	1	1	1	1	1	1	1
6 and 7	0	0	0	0	0	0	0	0
Average	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.2

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this LME, integration across the arrangements for the seven issues is consistently low at 0.2 out of a possible 1.

3 Conclusions

In this LME, none of the arrangements for fisheries (OLDESPECA, WECAFC and ICCAT) appear to be closely connected. However, the arrangements for pollution and biodiversity within the LME are closely integrated within the Cartagena Convention. The specific biodiversity arrangement for turtles does not appear to be linked to any of the arrangements within the LME. Overall, no integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. However, this is not to suggest that there is not an abundance of collaboration and interactions amongst the fisheries arrangements through participation in each other's

meetings, complementing the integration found within the arrangements for pollution and biodiversity.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Gulf of Mexico LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Gulf of Mexico LME	Completeness	Integration	Engagement
	58%	0.2	81%

4 References

GEF/UNIDO. 2011. Integrated Assessment and Management of the Gulf of Mexico Large Marine Ecosystem Project: Transboundary Diagnostic Analysis. September 2011.

Gulf of Mexico Strategic Action Program. Summary available at http://www.boblme.org/eventDocs/GULF%20OF%20MEXICO_SAP.pdf

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English), 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme,

United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

NOAA's Integrated Ecosystem Assessment (n.d.) Available at
<http://www.st.nmfs.noaa.gov/iea/gulfofmexico.html>

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Yoskowitz, D., C. Leon, J. Gibeaut, B. Lupher, M. Lopez, C. Santos, G. Sutton and L. McKinney. 2013. Gulf 360: State of the Gulf of Mexico. Harte Research Institute for Gulf of Mexico Studies. Texas A & M University-Corpus Christi, Texas, 52p.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Gulf of Thailand LME

1 The system to be governed

The system is the Gulf of Thailand LME. It is located in Southeast Asia and bordered by Cambodia, Malaysia, Thailand and Vietnam. It covers a surface area of over 380,000 km² (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter VIII-11), so a review is not provided here. This assessment is also informed by the South China Sea TDA 2000 (which includes the Gulf of Thailand LME).

Table 1. Percentage of Gulf of Thailand LME area taken up by the EEZ of each country and the High Seas (area = 383,662 km ²)	
Country	Percent of LME area
Cambodia	12.4
Malaysia	21.0
Thailand	48.4
Vietnam	18.2
The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.	

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by Sherman and Hempel (2009) and TDA (2000) as follows:

- Fisheries
 - overexploitation of the local demersal fish stocks; excessive bycatch; destructive fishing
- Biodiversity
 - loss of unique biological diversity and the loss of mangrove services
 - habitat Modification - mangrove destruction; progressive degradation of coral reefs; degradation and/or widespread modification of seagrass habitats
- Pollution
 - liquid wastes from domestic, agricultural pesticides and industrial effluents, as well as sediments and solid wastes (severe in localized areas)
 - phytoplankton blooms, toxic and non-toxic algal blooms, paralytic shellfish poisoning in parts of the region
 - petroleum hydrocarbons and oil spills

2.2 Identify arrangements for each transboundary issue

Governance of the LME is shared by the four bordering countries. The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Asia Pacific Fisheries Commission (APFIC)

2. Pacific Islands Forum Fisheries Agency/South Pacific Forum Fisheries Agency Convention (PIF/FFA) (what role does this organization have in this LME?)
3. South East Asian Fisheries Development Center (SEAFDEC)
4. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
5. Coordinating Body on the Seas of East Asia (COBSEA)
6. Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)
7. Indian Ocean- South East Asian (IOSEA) Marine Turtle Memorandum of Understanding
8. Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)
9. Action Plan for the Protection and Development of the Marine and Coastal Areas of the East Asian Region, 1981

The extent to which the geographical area of coverage of these bodies and instruments overlap the Gulf of Thailand LME is shown in Table 2.

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
Asia Pacific Fisheries Commission (APFIC)	3	100	C
Pacific Islands Forum Fisheries Agency/South Pacific Forum Fisheries Agency Convention (FFA)	1	100	C
South East Asian Fisheries Development Center (SEAFDEC)	2	100	C
Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)	<1	100	C
Coordinating Body on the Seas of East Asia (COBSEA)		100	C
Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)		100	C
Indian Ocean- South East Asian (IOSEA) Marine Turtle Memorandum of Understanding			
Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)			

The extent of country membership in these bodies and instruments for the Gulf of Thailand LME is shown in Table 3.

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Gulf of Thailand LME								
LME coastal countries	Agreement							
	APFIC	FFA	SEAFDEC	WCPFC	COBSEA	PEMSEA	IOSEA	Dugong
Cambodia	B	N	C	N	C	C	C	
Malaysia	B	N	C		C	C	C	
Thailand	B	N	C		C	C	C	C
Vietnam	B	N	C		C	C	C	
% engagement	100	0	100	0	100	100	100	25
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed								

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-e. They are summarised in table 5

Table 4a: Gulf of Thailand LME ¹ – Transboundary arrangement for fisheries – HMS (tuna and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	Supra-LME	3	IUCN PIF/FFA	<ul style="list-style-type: none"> • None of the countries are members of WCPFC. What the implications of this, if any, given that there is no high seas area in the LME and virtually no catch for tuna and tuna-like species reported for the LME? • Fishing mortality on key non-target oceanic species, including sharks, seabirds and sea turtles is covered under this arrangement. • The PIF/FFA oversees the implementation of several treaties and agreements relating to HMS but even though its area of competence extends into the South China Sea LME, none of the countries of this LME are members. What are the implications of this for this LME?
Policy decision-making	WCPFC Commission.	Supra-LME	3		
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	Supra-LME	3		
Planning decision-making	WCPFC Commission.	Supra-LME	3		
Implementation	CPs WCPFC Secretariat FFA	Supra-LME	2		
Review and evaluation	The Technical and Compliance Committee (TCC)	Supra-LME	2		
Data and information	SPC OFP	Supra-LME	3		
Overall total and % completeness >>			19/21 = 90%		

Table 4b: Gulf of Thailand LME – Transboundary arrangement for fisheries – EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	FAO Secretariat	Supra-LME	1	SEAFDEC	SEAFDEC Process is purely advisory. SEAFDEC has a MOU with ASEAN and provides technical advice in fisheries under the ASEAN SEAFDEC Strategic Partnership. SEAFDEC also has a memorandum of understanding with FAO.
Policy decision-making	APFIC Commission	Supra-LME	1		
Planning analysis and advice	FAO Secretariat	Supra-LME	1		
Planning decision-making	APFIC Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	FAO Secretariat Countries	Supra-LME National	2		
Data and information	FAO Secretariat Countries	Supra-LME National	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4c: Gulf of Thailand LME – Transboundary arrangement for Pollution (LBS and MBS) and Biodiversity – Habitat Modification					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	COBSEA Secretariat PEMSEA Technical Committee	Supra-LME	1	APEC, ASEAN, PEMSEA and the SCS Project. Both COBSEA and ASEAN are inter-governmental groupings that share several member countries. The geographical focus (seas of Southeast Asia and southern part of the People's Republic of China) for the activities is similar. APEC is another inter-governmental grouping with a more extensive geographical coverage, which includes the East Asian Seas region.	Among the Regional Seas Programmes, East Asia has steered a unique course. There is no regional convention; instead the programme promotes compliance with existing environmental treaties and is based on member country goodwill. PEMSEA is the regional coordinating mechanism for the implementation of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA)
Policy decision-making	COBSEA PEMSEA Executive Committee	Supra-LME	1		
Planning analysis and advice	COBSEA Secretariat PEMSEA Technical Committee Countries	Supra-LME National	1		
Planning decision-making	Countries	National	1		
Implementation	Countries	National	2		
Review and evaluation	COBSEA PEMSEA Executive Committee	Supra-LME	0		
Data and information	Countries	National	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4d: Gulf of Thailand LME – Transboundary arrangement for Biodiversity - Specific (sea turtles)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		This is an MOU under CMS
Policy decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Planning analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		
Planning decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Implementation	IOSEA – sea turtle MOU CPs	National	0		
Review and evaluation	IOSEA – sea turtle MOU Secretariat	Supra-LME	2		
Data and information	IOSEA – sea turtle MOU CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 4e: Gulf of Thailand LME – Transboundary arrangement for biodiversity - specific (dugong)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CPs	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	CPs	Supra-LME	2		
Planning analysis and advice	CPs	Supra-LME	2		
Planning decision-making	CPs	Supra-LME	2		
Implementation	CPs	Supra-LME National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 5:Gulf of Thailand LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Cambodia, Malaysia, Thailand, Vietnam	System name: Gulf of Thailand		Region: East Asia
Complete these columns then assess issues using the arrangements tables			After completing the arrangements tables, complete these columns		
Trans-boundary issue ²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – HMS (Tuna and tuna-like)	4		90%		
Fisheries – EEZ	4		38%		
Pollution –LBS	4		38%		
Pollution – MBS	4		38%		
Biodiversity – Habitat Modification	4		38%		
Biodiversity – Specific	4		52%		
Biodiversity – specific (dugong)	4		52%		CMS MOU
	System architecture completeness index >>		50%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-e)							
Policy cycle stage	Fisheries – HMS	Fisheries – EEZ	Pollution – LBS	Pollution - MBS	Biodiversity - General	Biodiversity - Specific	Biodiversity - specific (dugongs)
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	FAO Secretariat	COBSEA Secretariat PEMSEA Technical Committee	COBSEA Secretariat PEMSEA Technical Committee	COBSEA Secretariat PEMSEA Technical Committee	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Policy decision-making	WCPFC Commission.	APFIC Commission	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	FAO Secretariat	COBSEA Secretariat PEMSEA Technical Committee Countries	COBSEA Secretariat PEMSEA Technical Committee Countries	COBSEA Secretariat PEMSEA Technical Committee Countries	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Planning decision-making	WCPFC Commission.	APFIC Commission	Countries	Countries	Countries	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Implementation	Countries WCPFC Secretariat FFA	Countries	Countries	Countries	Countries	IOSEA – sea turtle MOU CPs	MOU CPs
Review and evaluation	The Technical and Compliance Committee (TCC)	FAO Secretariat Countries	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	IOSEA – sea turtle MOU Secretariat	Secretariat
Data and information	SPC OFP	FAO Secretariat Countries	Countries	Countries	Countries	IOSEA – sea turtle MOU CPs	MOU CPs

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
3 and 4	1	1	1	0	0	1	0	0.57
3 and 5	1	1	1	0	0	1	0	0.57
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
4 and 5	1	1	1	0	0	1	0	0.57
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
5 and 7	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
Average	0.14	0.14	0.14	0	0	0.14	0	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the seven issues is 0.1 out of a possible 1.

3 Conclusions

The two arrangements for fisheries (APFIC and WCPFC) in the areas each cover high sea highly migratory tuna and tuna-like fisheries and the fisheries within national jurisdiction. There does not appear to be any formal connection between the two arrangements, possibly since they have different areas of competence. However, the arrangement for the regional seas programme cover both for pollution and biodiversity, falling under the Coordinating Body of the Seas of South east Asia (COBSEA), with linkages to the Partnership in Environmental Management for the Seas of East Asia (PEMSEA). However, the “within national jurisdiction” arrangement for fisheries and for pollution and biodiversity do not appear to be integrated with each other or with the tuna arrangement. Similarly, the specific biodiversity arrangement for turtles does not appear to be integrated with the other arrangements in the LME.

No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Gulf of Thailand LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Gulf of Thailand LME	Completeness	Integration	Engagement
	50%	0.1	75%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1.

Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Humboldt Current LME

1 The system to be governed

The system is the Humboldt Current LME. This includes the marine waters of the Pacific Ocean extending from 5°S to 47°S under the jurisdiction of Peru and Chile, although western boundary is said to extend beyond the EEZ to FAO area 87 (UNIDO, 2003). The LME covers a surface area of over 2.5 million km² and is shared among the member countries as indicated in Table 1. This system shows high climatic as well as oceanographic variability associated with seasonal, inter-annual, decadal and longer-term changes, with shifts between alternating anchovy and sardine regimes, often under the influence of El Niño (Heileman et al. 2009).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter XVII-56), so a review is not provided here. This assessment is also informed by the Humboldt Current LME Transboundary Diagnostic Assessment (UNIDO, 2003) and the Asia Pacific Economic Cooperation Workshop IV on Large Marine Ecosystems (2013).

Table 1. Percentage of Humboldt Current LME area taken up by the EEZ of each country and the High Seas (area = 2,536,991 km²)

Country	Percent of LME area
Argentina	0.2
Chile	63.0
Peru	25.5
High Seas	11.3

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified as follows:

- Fisheries
 - sub-optimal exploitation of fishery resources (over-fishing, undersized, reproductive females, under-exploitation)
 - insufficient knowledge of variability in the LME (temporal, spatial and biological production)
- Pollution
 - LBS (nutrients, sediments, metal mining and pesticides)
- Biodiversity
 - threats to biodiversity relevant to fish production
 - habitat deterioration in the coastal zone (physical alteration, dragging, use of explosives)

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements. However, the extent to which this can be done (from a governance process perspective) will depend on the degree to which the issues share a responsible agency. For example, while the decline and vulnerability of elasmobranchs or sea turtles may be primarily a biodiversity issue, they may be caused largely by fishing and can therefore be addressed within the fisheries arrangement

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Permanent Commission of the South Pacific (CPPS) - regional maritime organization responsible for the coordination of the maritime policies of its four Member States, Chile, Peru, Colombia, Ecuador.
2. The Framework Agreement for the Conservation of Living Marine Resources in the High Seas of the Southeast Pacific (Galapagos Agreement – not yet in force)
3. The Convention for the Protection of the Marine Environment and Coastal Areas of the South-East Pacific (Lima Convention, 1986) - The South-East Pacific Regional Seas Programme
 - a. Plan of Action for the Protection of the Marine Environment and Coastal Areas of the South-East Pacific
 - b. 3 Pollution Protocols – Hydrocarbon spills (1987), LBS (1986), radioactive (1995)
 - c. 1 Biodiversity Protocol – Management of marine and coastal protected areas (1994)
4. South Pacific Regional Fisheries Management Organization (SPRFMO) – area of LME that includes the high seas
5. Latin American Organization for Fisheries Development (OLDEPESCA)
6. Convention for the Strengthening of the Inter-American Tropical Tuna Commission (IATTC)
7. Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)
8. Action Plan for the Protection of the Marine Environment and Coastal Areas of the South-East Pacific, 1981

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Humboldt Current LME is shown in Table 2.

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
Permanent Commission for the South Pacific (CPPS)	27	100	C
Convention for the Strengthening of the Inter-American Tropical Tuna Commission (IATTC)	3	87	D
Convention for the Protection of the Marine Environment and Coastal Areas of the South-East Pacific - The Lima Convention (Lima)	36	92	D
Latin American Organization for Fisheries Development (OLDEPESCA)	7	20	D
Convention on the Conservation and Management of High Seas Fishery Resources in the South Pacific Ocean (SPRFMO)	<1	10	D
Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)		100	C

The extent of country membership in these bodies and instruments for the Humboldt Current LME is shown in Table 3.

LME coastal countries	Agreement									IAC
	Lima	Lima-LBS	Lima-Hydrocarbons	Lima-radio active	Lima-Management CMPAs	IATTC	OLDEPESCA	SPRFMO	CPPS	
Argentina	N	N	N	N	N	N		N	N	B
Chile	B	B	B	B	B	N		B	B	B
Peru	B	B	B	B	B	B	B	C	B	B
% engagement	100	100	100	100	100	100	33	50	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed										

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-f. They are summarised in table 5

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 4a: Humboldt Current LME ¹ – Transboundary Arrangements for fisheries – Straddling (ABNJ species excluding tunas)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	SPRFMO - Scientific Committee supported by the Eastern and Western Sub-regional Management committees. Compliance and Technical Committee.	Supra-LME	3	OLDEPESCA for the northern portion of the LME involving Peru as Chile is not a member of OLDEPESCA	Chile is a member but not Peru How significant is the division between the arrangements in the northern part of the LME to that of the southern part? This LME seems to have a split between the issues in the south and those in the north, suggesting that the mismatch between the LME boundaries and that of the regional sea may be significant. Is this in fact the case?
Policy decision-making	SPRFMO - Commission	Supra-LME	3		
Planning analysis and advice	SPRFMO - Scientific Committee supported by the Eastern and Western Sub-regional Management committees. Compliance and Technical Committee.	Supra-LME	3		
Planning decision-making	SPRFMO - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	SPRFMO – Compliance and Technical Committee	Supra-LME	3		
Data and information	Countries SPRFMO – Scientific Committee	National Supra-LME	2		
Overall total and % completeness >>			17/21 = 81%		

Table 4b: Humboldt Current LME – Transboundary arrangements for fisheries - EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CPPS - Executive Committee comprised of National Presidents, Working Groups for Scientific Affairs and Fisheries, International Maritime Law and the LIMA Plan of Action	LME	3	OLDEPESCA	<p>In the case of OLDEPESCA, the geographic area of competence only extends to Peru.</p> <p>How significant is the division between the arrangements in the northern part of the LME to that of the southern part?</p> <p>This LME seems to have a split between the issues in the south and those in the north, suggesting that the mismatch between the LME boundaries and that of the regional sea may be significant. Is this in fact the case?</p>
Policy decision-making	CPPS - Assembly	LME	2		
Planning analysis and advice	CPPS - Executive Committee comprised of National Presidents, Working Groups for Scientific Affairs and Fisheries, International Maritime Law and the LIMA Plan of Action	LME	3		
Planning decision-making	CPPS – Executive Committee	LME	2		
Implementation	Countries	National	2		
Review and evaluation	CPPS – Executive Committee	LME	2		
Data and information	Countries Secretariat	National LME	2		
Overall total and % completeness >>			16/21 = 76%		

Table 4c: Humboldt Current LME – Transboundary Arrangements for fisheries – HMS (tuna and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IATTC - Scientific Advisory Committee (Art XI Annex 4)	LME	3		Chile is not a member of the IATTC How significant is the division between the arrangements in the northern part of the LME to that of the southern part? This LME seems to have a split between the issues in the south and those in the north, suggesting that the mismatch between the LME boundaries and that of the regional sea may be significant. Is this in fact the case?
Policy decision-making	IATTC - Commission	LME	3		
Planning analysis and advice	IATTC - Scientific Advisory Committee (Art XI Annex 4)	LME	3		
Planning decision-making	IATTC - Commission	LME	3		
Implementation	Countries	National	0		
Review and evaluation	Committee for the Review of Implementation of Measures Adopted by the Commission	LME	3		
Data and information	Secretariat Countries	LME/National	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4d: Humboldt Current LME – Transboundary Arrangements for Pollution – LBS (Lima LBS Protocol) and MBS ((Lima Oil Spill and Radioactive Protocols)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CPPS Scientific Affairs Office and Economic Affairs Office	Supra-LME	3	IOC (SPINCAM Project includes Chile and Peru but also the other countries in the Lima Convention area.	Additional countries to those bordering the LME are also members of CPPS, including Ecuador, Colombia and Panama but Argentina is not a member. Given the size of patrimony in the LME held by Argentina, this is not a likely big issue. All 5 CPPS countries are members of all of the Lima Convention Protocols. Curiously Panama is not a party to the Convention but is a member of its Action Plan and all of its protocol. How significant is the division between the arrangements in the northern part of the LME to that of the southern part? This LME seems to have a split between the issues in the south and those in the north, suggesting that the mismatch between the LME boundaries and that of the regional sea may be significant. Is this in fact the case?
Policy decision-making	High Contracting Parties	LME	1		
Planning analysis and advice	CPPS Scientific Affairs Office and Economic Affairs Office	Supra-LME	3		
Planning decision-making	Executive Secretariat at CPPS	LME	1		
Implementation	Countries Executive Secretariat	National LME	1		
Review and evaluation	Executive Secretariat (at CPPS)	LME	2		
Data and information	Countries Executive Secretariat (at CPPS)	National LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4e: Humboldt Current LME – Transboundary Arrangements for Biodiversity - CMPAs and habitat deterioration (Lima Protocol on Management of coastal and marine protected areas)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CPPS Scientific Affairs Office and Economic Affairs Office	Supra-LME	3	IOC (SPINCAM Project includes Chile and Peru but also the other countries in the Lima Convention area.	Additional countries to those bordering the LME are also members of CPPS, including Ecuador, Colombia and Panama but Argentina is not a member. Given the size of patrimony in the LME held by Argentina, this is not a likely big issue. All 5 CPPS countries are members of all of the Lima Convention Protocols. Curiously Panama is not a party to the Convention but is a member of its action plan and all of its protocol. How significant is the division between the arrangements in the northern part of the LME to that of the southern part? This LME seems to have a split between the issues in the south and those in the north, suggesting that the mismatch between the LME boundaries and that of the regional sea may be significant. Is this in fact the case?
Policy decision-making	High Contracting Parties	LME	1		
Planning analysis and advice	CPPS Scientific Affairs Office and Economic Affairs Office	Supra-LME	3		
Planning decision-making	Executive Secretariat at CPPS	LME	1		
Implementation	Countries Executive Secretariat	National LME	1		
Review and evaluation	Executive Secretariat (at CPPS)	LME	2		
Data and information	Countries Executive Secretariat (at CPPS)	National LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4f: Humboldt Current LME – Transboundary Arrangements for Biodiversity - Turtles					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Policy decision-making	IAC Consultative Committee and CoP	Supra-LME	3		
Planning analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Planning decision-making	IAC CoP	Supra-LME	3		
Implementation	IAC Countries	National	0		
Review and evaluation	IAC Countries	National	1		
Data and information	IAC Countries	National	1		
Overall total and % completeness >>			12/21 = 57%		

Table 5: Humboldt Current LME governance architecture - System summary ⁱⁱ					
IW category: LME		Countries: Argentina, Chile, Peru	System name: Humboldt Current		Region: Southeast Pacific
Complete these columns then assess issues using the arrangements tables			After completing the arrangements tables, complete these columns		
Trans-boundary issue ²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – Straddling (ABNJ excluding tunas)	3		81%		
Fisheries –EEZ	3		78%		
Fisheries – HMS (tuna) in the northern part of the LME	3		86%		
Pollution – LBS	3		62%		
Pollution – MBS	3		62%		
Pollution - MBS	3		62%		
Biodiversity - CMPAs and habitat deterioration	3		62%		
Biodiversity – Specific (Turtles)	3		57%		
	System architecture completeness index >>		68%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-f) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)								
Policy cycle stage	Fisheries – Straddling (ABNJ)	Fisheries – EEZ	Fisheries - HMS	Pollution – LBS	Pollution - MBS	Pollution - MBS	Biodiversity - CMPAs and habitat modification	Biodiversity – Specific (Turtles)
Policy analysis and advice	SPRFMO - Scientific Committee supported by the Eastern and Western Sub-regional Management committees. Compliance and Technical Committee.	CPPS - Executive Committee comprised of National Presidents, Working Groups for Scientific Affairs and Fisheries, International Maritime Law and the LIMA Plan of Action	IATTC - Scientific Advisory Committee	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	IAC Consultative and Scientific Committees
Policy decision-making	SPRFMO - Commission	CPPS - Assembly	IATTC - Commission	High Contracting Parties	High Contracting Parties	High Contracting Parties	High Contracting Parties	IAC Consultative Committee and CoP
Planning analysis and advice	SPRFMO - Scientific Committee supported by the Eastern and Western Sub-regional Management committees. Compliance and Technical Committee.	CPPS - Executive Committee comprised of National Presidents, Working Groups for Scientific Affairs and Fisheries, International Maritime Law and the LIMA Plan of Action	IATTC - Scientific Advisory Committee	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	IAC Consultative and Scientific Committees
Planning decision-making	SPRFMO - Commission	CPPS – Executive Committee	IATTC - Commission	Executive Secretariat at CPPS	Executive Secretariat at CPPS	Executive Secretariat at CPPS	Executive Secretariat at CPPS	IAC CoP

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)								
Policy cycle stage	Fisheries – Straddling (ABNJ)	Fisheries – EEZ	Fisheries - HMS	Pollution – LBS	Pollution - MBS	Pollution - MBS	Biodiversity - CMPAs and habitat modification	Biodiversity – Specific (Turtles)
Implementation	Countries	Countries	Countries	Countries Executive Secretariat	Countries Executive Secretariat	Countries Executive Secretariat	Countries Executive Secretariat	IAC Countries
Review and evaluation	SPRFMO – Compliance and Technical Committee	CPPS – Executive Committee	Committee for the Review of Implementation of Measures Adopted by the Commission	Executive Secretariat (at CPPS)	Executive Secretariat (at CPPS)	Executive Secretariat (at CPPS)	Executive Secretariat (at CPPS)	IAC Countries
Data and information	Countries SPRFMO – Scientific Committee	Countries Secretariat	Secretariat Countries	Countries Executive Secretariat (at CPPS)	Countries Executive Secretariat (at CPPS)	Countries Executive Secretariat (at CPPS)	Countries Executive Secretariat (at CPPS)	IAC Countries

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
4 and 5	0	1	0	1	1	1	1	0.71
4 and 6	0	1	0	1	1	1	1	0.71
4 and 7	0	1	0	1	1	1	1	0.71
4 and 8	0	0	0	0	0	0	0	0
5 and 6	0	1	0	1	1	1	1	0.71
5 and 7	0	1	0	1	1	1	1	0.71
5 and 8	0	0	0	0	0	0	0	0
6 and 7	0	1	0	1	1	1	1	0.71
6 and 8	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
Average	0	0.21	0	0.21	0.21	0.21	0.21	0.2

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the eight issues is 0.2 out of a possible 1.

3 Conclusions

The arrangements for major issues within the jurisdiction of the countries are well integrated with both the CPPS and the Lima Convention and its protocols having formal linkages. However, the two arrangements for high seas fisheries (IATTC and SPRFMO) do not appear to have any formal linkages with each other or with the “within country” arrangements for fisheries, pollution and biodiversity. Nevertheless, this LME has been assigned an overall integration score of 1.0 due to the presence of the Permanent Commission for the South Pacific (CPPS) with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Humboldt Current LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Humboldt Current LME	Completeness	Integration	Engagement
	68%	1.0	88%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.
<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Iberian Coastal LME

1 The system to be governed

The system is the Iberian Coastal LME. It is a continental shelf region of the Eastern Atlantic Ocean with surface area of about 302,000 km² bordered by primarily by Spain and Portugal (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter 40), so a review is not provided here.

Table 1. Percentage of Iberian Coastal LME area taken up by the EEZ of each country and the High Seas (area = 302,000 km²)

Country (N to S)	Percent of LME area
France	0.8
Portugal	52.8
Spain	46.3
High Seas	0.2

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 40 (Sherman and Hempel, 2009) as follows:

- Fisheries
 - increasing number of collapsed stocks and commercially exploited stocks
- Pollution
 - increasing frequency and intensity of HABs (localized - restricted to estuaries and coastal lagoons); anthropogenic inputs and fluxes of nitrogen into areas susceptible to eutrophication
- Climate Change
 - coastal erosion; salt water intrusion into estuaries, coastal lagoons, wetlands and groundwater as sea level rises

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Fishery Committee for the Eastern Central Atlantic (CECAF)
2. Ministerial Conference on Fisheries Cooperation among African States Bordering the Atlantic Ocean (COMHAFAT)
3. The International Commission for the Conservation of Atlantic Tunas (ICCAT)

4. International Council for the Exploration of the Sea (ICES)
5. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
6. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)
7. North-East Atlantic Fisheries Commission (NEAFC)
8. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)
9. Agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances (Bonn Agreement)
10. Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)
11. European Union Common Fisheries Policy (CFP)
12. European Union Maritime Policy

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Iberian Coastal LME is shown in Table 2.

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
Fishery Committee for the Eastern Central Atlantic (CECAF)	<1	<1	D
Ministerial Conference on Fisheries Cooperation among African States Bordering the Atlantic Ocean (COMHAFAT)	<1	<1	D
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	<1	100	C
International Council for the Exploration of the Sea (ICES)	2	100	C
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	1	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	1	100	C
North-East Atlantic Fisheries Commission (NEAFC)	2	100	C
Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)	2	99	D
Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)	13	92	D
European Union Common Fisheries Policy (CFP)	8	100	C
European Union Maritime Policy	8	100	C

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

The extent of country membership in these bodies and instruments for the Iberian Coastal LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Iberian Coastal LME								
Coastal countries in the LME	Agreements							
	ICCAT	ICES	NAMMC O	NASCO	NEAFC	OSPAR	ASCO-BANS	EU-CFP
France	B	B				B	B	B
Portugal		B				B	C	B
Spain		B				B	C	B
% engagement	33	100	0	0	0	100	33	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed								

2.2.1 Assessment of issues

The governance arrangements for the issues identified above are presented in Tables 4 a-h. They are summarised in table 5.

Table 4a: Iberian Coastal LME ⁱ – Transboundary Arrangement for Fisheries – Specific (salmon)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	Supra-LME	3	ICES	Only Denmark is a member Dependent on ICES for scientific advice
Policy decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	Supra-LME	3		
Planning decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat and International Atlantic Salmon Research Board	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4b: Iberian Coastal LME – Transboundary Arrangement for fisheries - Marine Mammals					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3		
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4c: Iberian Coastal LME – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		Only Denmark is a member of NEAFC ICES named in NEAFC to provide scientific advice
Policy decision-making	NEAFC - Commission	Supra-LME	3		
Planning analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		
Planning decision-making	NEAFC - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Supra-LME	3		
Data and information	Countries ICES	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4d. Iberian Coastal LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4e: Iberian Coastal LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS) and Biodiversity (General)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	OSPAR – 5 main Committees and their Working Groups a) Biodiversity and Ecosystem b) Eutrophication Strategy c) Hazardous Substances d) Offshore Industry Strategy e) Radioactive Substances	Supra-LME	3		
Policy decision-making	OSPAR Commission	Supra-LME	3		
Planning analysis and advice	OSPAR – 5 main Committees and their Working Groups	Supra-LME	3		
Planning decision-making	OSPAR Commission	Supra-LME	3		
Implementation	Countries OSPAR Commission Special Studies OSPAR Secretariat	National Supra-LME	1		
Review and evaluation	OSPAR Commission, Main Committees and Working Groups	Supra-LME	3		
Data and information	Countries OSPAR Secretariat	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4f: Iberian Coastal LME – Transboundary Arrangement for Biodiversity – Specific (Small cetaceans)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ASCOBANS Advisory Committee	Supra-LME	3	Arctic Council CMS	
Policy decision-making	Meeting of the Parties	Supra-LME	2		
Planning analysis and advice	ASCOBANS Advisory Committee	Supra-LME	3		
Planning decision-making	Meeting of the Parties	Supra-LME	1		
Implementation	Contracting Parties	National	0		
Review and evaluation	Meeting of the Parties	Supra-LME	2		
Data and information	Contracting Parties, Secretariat, Advisory Committee, Coordinating Authorities	National Supra-LME	2		
Overall total and % completeness >>			13 /21 = 62%		

Table 4g: Iberian Coastal LME – Transboundary Arrangement for Fisheries – EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3	Arctic Council	
Policy decision-making	European Commission	Supra-LME	2		
Planning analysis and advice	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3		
Planning decision-making	European Commission	Supra-LME	3		
Implementation	Contracting Parties Scientific, Technical and Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	National Supra-LME	2		
Review and evaluation	Commission STECF	Supra-LME	3		
Data and information	Contracting Parties Commission STECF Advisory Councils	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4h: Iberian Coastal LME – Transboundary Arrangement for Pollution – MBS					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Bonn Agreement – Contracting Parties	National	2	Arctic Council	
Policy decision-making	Meeting of the Parties	Supra-LME	1		
Planning analysis and advice	Contracting Parties	National	2		
Planning decision-making	Meeting of the Parties	Supra-LME	1		
Implementation	Contracting Parties	National	0		
Review and evaluation	Meeting of the Parties	Supra-LME	1		
Data and information	Contracting Parties	National	1		
Overall total and % completeness >>			8 /21 = 38%		

Table 5: Iberian Coastal LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: France, Portugal, Spain		System name: Iberian Coastal LME	Region: North East Atlantic
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – EEZ/ABNJ	3		86%		NEAFC
Fisheries – large pelagics (tunas and tuna-like)	3		86%		ICCAT
Fisheries – specific (salmon)	3		57%		NASCO
Fisheries - Marine Mammals	3		71%		NAMMCO
Fisheries – EEZ	3		90%		CFP
Pollution - LBS	3		90%		OSPAR
Pollution - MBS	3		90%		OSPAR
Pollution – MBS	3		38%		Bonn
Biodiversity – Small Cetaceans	3		62%		ASCOBANS
	System architecture completeness index >>		74%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-h) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 5)									
Policy cycle stage	Fisheries - Salmon	Fisheries – marine mammals	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries - EEZ	Pollution – LBS	Pollution – MBS	Pollution - MBS	Biodiversity - Specific
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	NEAFC - PEMAS ICES	ICCAT Standing Committee on Research and Statistics (SCRS)	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	OSPAR – 5 main Committees and their Working Groups	OSPAR – 5 main Committees and their Working Groups	Bonn Agreement – Contracting Parties	ASCOBANS Advisory Committee
Policy decision-making	NASCO- Council and NE Atlantic Commission	NAMMCO Council	NEAFC - Commission	ICCAT Commission	European Commission	OSPAR Commission	OSPAR Commission	Meeting of the Parties	Meeting of the Parties
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	NAMMCO Man. Comm and Sci. Comm	NEAFC - PEMAS ICES	ICCAT SCRS and Species Panels	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	OSPAR – 5 main Committees and their Working Groups	OSPAR – 5 main Committees and their Working Groups	Contracting Parties	ASCOBANS Advisory Committee
Planning decision-making	NASCO- Council and NE Atlantic Commission	NAMMCO Council	NEAFC - Commission	ICCAT Commission	European Commission	OSPAR Commission	OSPAR Commission	Meeting of the Parties	Meeting of the Parties
Implementation	Countries	Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	Countries	Countries	Contracting Parties Scientific, Technical and Economic Committee for Fisheries	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	Contracting Parties	Contracting Parties

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 5)									
Policy cycle stage	Fisheries - Salmon	Fisheries – marine mammals	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries - EEZ	Pollution – LBS	Pollution – MBS	Pollution - MBS	Biodiversity - Specific
					(STECF) and its Expert Working Groups (EWGs)				
Review and evaluation	NASCO Council	NAMMMCO Council Committee on Inspection and Observation	NEAFC - PECCOE	ICCAT CMMCC	Commission STECF	OSPAR Commission, Main Committees and Working Groups	OSPAR Commission, Main Committees and Working Groups	Meeting of the Parties	Meeting of the Parties
Data and information	Countries NASCO Secretariat and IASRB	Countries NAMMCO Secretariat	Countries ICES	ICCAT PWG	Contracting Parties Commission STECF Advisory Councils	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Contracting Parties	Contracting Parties, Secretariat, Advisory Committee, Coordinating Authorities

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
3 and 9	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
4 and 9	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
5 and 7	0	0	0	0	0	0	0	0
5 and 8	0	0	0	0	0	0	0	0
5 and 9	0	0	0	0	0	0	0	0
6 and 7	1	1	1	1	1	1	1	1
6 and 8	0	0	0	0	0	0	0	0
6 and 9	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
7 and 9	0	0	0	0	0	0	0	0
8 and 9	0	0	0	0	0	0	0	0
Average	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the issues is 0.03 out of a possible 1.

3 Conclusions

The policy cycles relating to the key issues of fisheries and pollution are associated with well-established arrangements that are among the strongest globally. However, there does not appear to be much integration among these processes. Given that all coastal countries in this LME are within the European Union the EU CFP may provide an additional level of integration among fisheries bodies and between fisheries and environmental issues. As such, this LME has been assigned an overall integration score of 1.0 due to the presence of the European Union Maritime Policy with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Iberian Coastal LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Iberian Coastal LME	Completeness	Integration	Engagement
	74%	1.0	44%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 5 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Iceland Shelf LME

1 The system to be governed

The system is the Iceland Shelf LME. It has a surface area of 489,000 km². It primarily surrounds the island-nation of Iceland, accounting for about 80% of Iceland's EEZ and the remainder within the marine waters of Greenland, Norway and the High Seas. (Table 1)

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter XIX - 41), so a review is not provided here.

Table 1. Percentage of Iceland Shelf LME area taken up by the EEZ of each country and the High Seas (area = 489,000 km ²)	
Country (N to S)	Percent of LME area
Denmark (Greenland)	11.8
Iceland	81.2
Norway (Jan Mayen)	6.8
High Seas	0.3
The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.	

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 41 (Sherman and Hempel, 2009) as follows:

- Fisheries
 - overexploited stocks (cod, capelin)
- Pollution
 - (LBS) negligible in fishing grounds; occasional sewage contamination (localized)

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)
2. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
3. International Council for the Exploration of the Sea (ICES)
4. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
5. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)
6. North-East Atlantic Fisheries Commission (NEAFC)
7. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Iceland Shelf LME is shown in Table 2.

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
Arctic Council (AC)	2.4	88.3	D
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	100	C
International Council for the Exploration of the Sea (ICES)	3	100	C
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	2	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	2	100	C
North-East Atlantic Fisheries Commission (NEAFC)	4	100	C
Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)	4	100	C

The extent of country membership in these bodies and instruments for the Iceland Shelf LME is shown in Table 3.

Coastal countries in the LME	Agreements						
	AC	ICCAT	ICES	NAMMCO	NASCO	NEAFC	OSPAR
Denmark (Greenland)	C			B	B	B	B
Iceland	C	B	B	B	B	B	B
Norway (Jan Mayen)	C	B	B	B	B	B	B
% engagement	100	67	67	100	100	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed							

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-f. They are summarised in Table 5

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 4a: Iceland Shelf LME ¹ – Transboundary Arrangement for Pollution – Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC)	
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 4b. Iceland Shelf LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4c: Iceland Shelf LME – Transboundary Arrangement for Fisheries – Specific (Marine Mammals)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3	Arctic Council	
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	NAMMCO Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	NAMMCO Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4d: Iceland Shelf LME – Transboundary arrangement for fisheries – specific (salmon)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICES NASCO Secretariat and its Commissions	Supra-LME	3		ICES named in NASCO to provide scientific advice
Policy decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Planning analysis and advice	NASCO Three Commissions NASCO Secretariat ICES	Supra-LME	3		
Planning decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4e: Iceland Shelf LME – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		All countries are members of NEAFC ICES named in NEAFC to provide scientific advice
Policy decision-making	NEAFC - Commission	Supra-LME	3		
Planning analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		
Planning decision-making	NEAFC - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Supra-LME	3		
Data and information	Countries ICES	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4f: Iceland Shelf LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS) and Biodiversity (General)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	OSPAR – 5 main Committees and their Working Groups a) Biodiversity and Ecosystem b) Eutrophication Strategy c) Hazardous Substances d) Offshore Industry Strategy e) Radioactive Substances	Supra-LME	3	Arctic Council ICES (as observer)	
Policy decision-making	OSPAR Commission	Supra-LME	3		
Planning analysis and advice	OSPAR – 5 main Committees and their Working Groups	Supra-LME	3		
Planning decision-making	OSPAR Commission	Supra-LME	3		
Implementation	Countries OSPAR Commission Special Studies OSPAR Secretariat	National Supra-LME	1		
Review and evaluation	OSPAR Commission, Main Committees and Working Groups	Supra-LME	3		
Data and information	Countries OSPAR Secretariat	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 5: Iceland Shelf LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Denmark, Norway, Iceland	System name: Iceland Shelf LME		Region: Arctic
Complete these columns then assess issues using the arrangements tables			After completing the arrangements tables, complete these columns		
Trans-boundary issue ²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – EEZ/ABNJ	3		86%		NEAFC
Fisheries – large pelagics (tunas and tuna-like)	3		86%		ICCAT
Fisheries – specific (marine mammals)	3		71%		NAMMCO
Fisheries – specific (salmon)	3		57%		NASCO
Pollution (LBS)	3		90%		OSPAR
Pollution (LBS)	3		67%		AC
Pollution (MBS)	3		67%		AC
Pollution (MBS)	3		90%		OSPAR
Biodiversity – General	3		90%		OSPAR
Biodiversity – General	3		67%		AC
	System architecture completeness index >>		78%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a – 4f) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)										
Policy cycle stage	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries – Specific (salmon)	Fisheries - Specific (Marine Mammals)	Pollution – LBS,	Pollution - MBS	Biodiversity - General	Pollution - LBS	Pollution - MBS	Biodiversity - General
Policy analysis and advice	NEAFC - Permanent Committee on Management and Science (PEMAS) ICES	ICCAT Standing Committee on Research and Statistics (SCRS)	ICES NASCO Secretariat and its Commissions	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	OSPAR – Eutrophication Strategy Hazardous Substances Radioactive Substances Committees and Working Groups	OSPAR - Offshore Industry Strategy Committee and Working Groups	OSPAR Biodiversity and Ecosystem Committee and Working Groups	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Policy decision-making	NEAFC - Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council	OSPAR Commission	OSPAR Commission	OSPAR Commission	Arctic Council	Arctic Council	Arctic Council
Planning analysis and advice	NEAFC - Permanent Committee on Management and Science	ICCAT SCRS and Species Panels	NASCO Three Commissions NASCO Secretariat ICES	NAMMCO Management Committee and Scientific Committee	OSPAR – Eutrophication Strategy Hazardous Substances	OSPAR - Offshore Industry Strategy Committee	OSPAR - Biodiversity and Ecosystem Committee	Arctic Council - Arctic Contaminants Action Program;	Arctic Council - Emergency preparedness, Prevention and response;	Arctic Council Conservation of Arctic Flora and Fauna; SD Working

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)										
Policy cycle stage	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries – Specific (salmon)	Fisheries - Specific (Marine Mammals)	Pollution – LBS,	Pollution - MBS	Biodiversity - General	Pollution - LBS	Pollution - MBS	Biodiversity - General
	(PEMAS) ICES				Radioactive Substances Committees and Working Groups	and Working Groups	and Working Groups	Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)
Planning decision-making	NEAFC - Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council	OSPAR Commission	OSPAR Commission	OSPAR Commission	Arctic Council	Arctic Council	Arctic Council
Implementation	Countries	Countries	Countries	NAMMCO Secretariat – Joint NAMMCO Control Scheme for Hunting	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries	Countries	Countries
Review and evaluation	NEAFC - Permanent Committee on	Conservation and Management	NASCO Council	NAMMMCO Council Committee on	OSPAR Commission, Main	OSPAR Commission, Main	OSPAR Commission, Main	Arctic Council	Arctic Council	Arctic Council

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)										
Policy cycle stage	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries – Specific (salmon)	Fisheries - Specific (Marine Mammals)	Pollution – LBS,	Pollution - MBS	Biodiversity - General	Pollution - LBS	Pollution - MBS	Biodiversity - General
	Control and Enforcement (PECCOE)	Measures Compliance Committee (CMMCC)		Inspection and Observation	Committees and Working Groups	Committees and Working Groups	Committees and Working Groups			
Data and information	Countries ICES	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	NAMMCO Countries NAMMCO Secretariat	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Countries Secretariat	Countries Secretariat	Countries Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	1	0	1	0	0	0	0	0.3
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
1 and 10	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
2 and 10	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
3 and 9	0	0	0	0	0	0	0	0
3 and 10	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
4 and 9	0	0	0	0	0	0	0	0
4 and 10	0	0	0	0	0	0	0	0
5 and 6	0	1	0	1	1	1	1	0.7
5 and 7	0	1	0	1	1	1	1	0.7
5 and 8	0	0	0	0	0	0	0	0
5 and 9	0	0	0	0	0	0	0	0
5 and 10	0	0	0	0	0	0	0	0
6 and 7	0	1	0	1	1	1	1	0.7
6 and 8	0	0	0	0	0	0	0	0

6 and 9	0	0	0	0	0	0	0	0
6 and 10	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
7 and 9	0	0	0	0	0	0	0	0
7 and 10	0	0	0	0	0	0	0	0
8 and 9	0	1	0	1	0	1	1	0.6
8 and 10	0	1	0	1	0	1	1	0.6
9 and 10	0	1	0	1	0	1	1	0.6
Average	0.02	0.13	0.02	0.13	0.07	0.13	0.13	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the ten issues is 0.1 out of a possible 1.

3 Conclusions

None of the fisheries arrangements (NEAFC, ICCAT, NAMMCO and NASCO) appear to be integrated while the three arrangements for pollution and biodiversity appear to have the Arctic Council as an integrating arrangement for one set of issues and the OSPAR Convention for a second set of similar issues relating to pollution and biodiversity. Additionally, the specific biodiversity arrangements for marine mammals and polar bears do not appear to have any formal linkages. It needs to be said that, the Arctic Council is not a binding arrangement so its implementation is voluntary and country dependent.

It does appear that the Arctic Council has the potential to develop into an informal overall policy coordinating organization, although as mentioned, its policy coordination role with respect to fisheries is weak.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Iceland Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Iceland Shelf LME	Completeness	Integration	Engagement
	78%	0.1	90%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Indonesian Sea LME

1 The system to be governed

The system is the Indonesian Sea LME. It is located at the convergence of the Pacific and Indian Oceans, and is bordered by Indonesia and East Timor. It covers an area of over 2.4 million km² (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter VIII - 12), so a review is not provided here.

Table 1. Percentage of Indonesian Sea LME area taken up by the EEZ of each country and the High Seas (area = 2,447,530 km²)

Country	Percent of LME area
Timor-Leste	0.5
Indonesia	98.6
High Seas	0.9

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by Sherman and Hempel (2009) as follows:

- Fisheries
 - widespread overexploitation of pelagic species (shark, tuna and billfish)
 - use of fish poisons to catch aquarium and food fishes
 - collapse of live reef fish food industry in some areas; heavily and chronically overfished coral reefs; rapid decrease in reef-based fisheries
- Biodiversity
 - threatened and endangered species (sea turtle and dugong)
 - habitat modification causing major fragmentation and reduction in mangrove
 - catastrophic damage to coral reefs from the use of explosives and poisons
- Pollution
 - LBS - coastal pollution from domestic, agricultural and industrial wastes; severe eutrophication in urban areas; severe microbiological pollution; high siltation rates; severe chemical pollution from agricultural pesticides and industries (localized); widespread mercury contamination
 - MBS - oil spills, marine debris

2.2 Identify arrangements for each transboundary issue

The Indonesian Sea LME is governed by Indonesia and the recently independent state of East Timor. The LME falls within the UNEP-administered East Asian Regional Seas Programme and within the GEF-supported PEMSEA.

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Asia Pacific Fisheries Commission (APFIC)
2. Convention for the Conservation of the Southern Bluefin Tuna (CCSBT)
3. Pacific Islands Forum Fisheries Agency/South Pacific Forum Fisheries Agency Convention (FFA)
4. Agreement for the establishment of the Indian Ocean Tuna Commission (IOTC)
5. South East Asian Fisheries Development Center (SEAFDEC)
6. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
7. Coordinating Body on the Seas of East Asia (COBSEA)
8. Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)
9. Indian Ocean- South East Asian (IOSEA) Marine Turtle Memorandum of Understanding
10. Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)
11. Action Plan for the Protection and Development of the Marine and Coastal Areas of the East Asian Region, 1981
12. Coral Triangle Initiative – Coral Reefs, Fisheries and Food Security (CTI-CFF) – Regional Plan of Action and Agreement to Establish a CTI-CFF Regional Secretariat

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Indonesian Sea LME is shown in Table 2.

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
Asia Pacific Fisheries Commission (APFIC)	17	100	C
Convention for the Conservation of the Southern Bluefin Tuna (CCSBT)	<1	<1	D
Pacific Islands Forum Fisheries Agency/South Pacific Forum Fisheries Agency Convention (FFA)	3	93	D
Agreement for the establishment of the Indian Ocean Tuna Commission (IOTC)	<1	7	D
South East Asian Fisheries Development Center (SEAFDEC)	11	100	C
Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)	2	93	D
Coordinating Body on the Seas of East Asia (COBSEA)		100	C

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)		100	C
Indian Ocean- South East Asian (IOSEA) Marine Turtle Memorandum of Understanding			
Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)			

The extent of country membership in these bodies and instruments for the Indonesian Sea LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Indonesia Sea LME									
LME coastal countries	Agreement								
	APFIC	FFA	SEAFDEC	WCPFC	IOTC	COBSEA	PEMSEA	IOSEA	Dugong
Indonesia	B	N	C	C	B	C	C	C	
Timor-Leste	B		N	N		N	C		
% engagement	100	0	100	0	50	100	100	50	0
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed									

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-f. They are summarised in table 5

Table 4a: Indonesian Sea LME ¹ – Transboundary arrangement for fisheries – HMS (Tuna and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	Supra-LME	3	IUCN PIF/FFA IOTC	<ul style="list-style-type: none"> • This LME is primarily under Indonesia's jurisdiction. • Both WCPFC and IOTC have areas of competence in the LME although IOTC is only 7% of the LME. • Fishing mortality on key non-target oceanic species, including sharks, seabirds and sea turtles is covered under this arrangement. • The PIF/FFA oversees the implementation of several treaties and agreements relating to HMS but even though its area of competence extends into the Indonesian Sea LME, neither Indonesia nor Timor-Leste are members. What are the implications of this for the coastal countries in this LME?
Policy decision-making	WCPFC Commission.	Supra-LME	3		
Planning analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) and Scientific Committee FFA	Supra-LME	3		
Planning decision-making	WCPFC Commission.	Supra-LME	3		
Implementation	Countries WCPFC Secretariat FFA	National Supra-LME	2		
Review and evaluation	WCPFC Technical and Compliance Committee (TCC)	Supra-LME	2		
Data and information	SPC - OFP	Supra-LME National	3		
Overall total and % completeness >>			19/21 = 90%		

Table 4b. Indonesian Sea LME – Transboundary arrangement for fisheries – HMS (Tuna and tuna-like) in the Indian Ocean					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IOTC - Scientific Committee Sub-commission	Supra-LME	3	WCPFC	Only a very fraction of the LME is covered by this arrangement What role, if any, does IOTC play in the LME?
Policy decision-making	IOTC - Commission	Supra-LME	1		
Planning analysis and advice	IOTC - Scientific Committee Sub-commission	Supra-LME	3		
Planning decision-making	IOTC - Commission	Supra-LME	2		
Implementation	Countries	National	1		
Review and evaluation	Countries	National	2		
	IOTC - Scientific committee, sub-commissions, and working parties	Supra-LME			
Data and information	Countries IOTC - Secretariat	National Supra-LME	2		
Overall total and % completeness >>			14/21 = 67%		

Table 4c: Indonesian Sea LME – Transboundary arrangement for fisheries – EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	FAO Secretariat	Supra-LME	1	SEAFDEC	SEAFDEC Process is purely advisory. SEAFDEC has a MOU with ASEAN and provides technical advice in fisheries under the ASEAN SEAFDEC Strategic Partnership. SEAFDEC also has a memorandum of understanding with FAO.
Policy decision-making	APFIC Commission	Supra-LME	1		
Planning analysis and advice	FAO Secretariat	Supra-LME	1		
Planning decision-making	APFIC Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	FAO Secretariat Countries	Supra-LME National	2		
Data and information	FAO Secretariat Countries	Supra-LME National	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4d: Indonesian Sea LME – Transboundary arrangement for Pollution (LBS and MBS) and Biodiversity – Habitat Modification					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	COBSEA Secretariat PEMSEA Technical Committee	Supra-LME	1	APEC, ASEAN, PEMSEA and the SCS Project. Both COBSEA and ASEAN are inter-governmental groupings that share several member countries. The geographical focus (seas of Southeast Asia and southern part of the People's Republic of China) for the activities is similar. APEC is another inter-governmental grouping with a more extensive geographical coverage, which includes the East Asian Seas region.	<p>Among the Regional Seas Programmes, East Asia has steered a unique course. There is no regional convention; instead the programme promotes compliance with existing environmental treaties and is based on member country goodwill.</p> <p>PEMSEA is the regional coordinating mechanism for the implementation of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA)</p>
Policy decision-making	COBSEA PEMSEA Executive Committee	Supra-LME	1		
Planning analysis and advice	COBSEA Secretariat PEMSEA Technical Committee Countries	Supra-LME National	1		
Planning decision-making	Countries	National	1		
Implementation	Countries	National	2		
Review and evaluation	COBSEA PEMSEA Executive Committee	Supra-LME	0		
Data and information	Countries	National	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4e: Indonesian Sea LME – Transboundary arrangement for Biodiversity - Specific (sea turtles)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		This is an MOU under CMS
Policy decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Planning analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		
Planning decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Implementation	IOSEA – sea turtle MOU CPs	National	0		
Review and evaluation	IOSEA – sea turtle MOU Secretariat	Supra-LME	2		
Data and information	IOSEA – sea turtle MOU CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 4f: Indonesian Sea LME – Transboundary arrangement for biodiversity - specific (dugong)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CPs	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	CPs	Supra-LME	2		
Planning analysis and advice	CPs	Supra-LME	2		
Planning decision-making	CPs	Supra-LME	2		
Implementation	CPs	Supra-LME National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 5: Indonesian Sea LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Indonesia, Timor-Leste	System name: Indonesian Sea		Region: East Asia
Complete these columns then assess issues using the arrangements tables			After completing the arrangements tables, complete these columns		
Trans-boundary issue ²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – HMS (Tuna and tuna-like)	2		90%		WCPFC
Fisheries – HMS (Tuna and tuna-like)	2		67%		IOTC
Fisheries – EEZ	2		38%		
Pollution - LBS	2		38%		
Pollution – MBS	2		38%		
Biodiversity – Habitat Modification	2		38%		
Biodiversity – Specific (Turtles)	2		52%		
Biodiversity – specific (dugong)	2		52%		CMS MOU
	System architecture completeness index >>		52%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-f)								
Policy cycle stage	Fisheries – HMS	Fisheries – HMS	Fisheries – EEZ	Pollution LBS	Pollution MBS	Biodiversity – Hab Mod	Biodiversity - Specific	Biodiversity - specific (dugongs)
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	IOTC - Scientific Committee Sub-commission	FAO Secretariat	COBSEA Secretariat PEMSEA Technical Committee	COBSEA Secretariat PEMSEA Technical Committee	COBSEA Secretariat PEMSEA Technical Committee	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Policy decision-making	WCPFC Commission.	IOTC - Commission	APFIC Commission	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	IOTC - Scientific Committee Sub-commission	FAO Secretariat	COBSEA Secretariat PEMSEA Technical Committee Countries	COBSEA Secretariat PEMSEA Technical Committee Countries	COBSEA Secretariat PEMSEA Technical Committee Countries	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Planning decision-making	WCPFC Commission.	IOTC - Commission	APFIC Commission	Countries	Countries	Countries	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Implementation	Countries WCPFC Secretariat FFA	Countries	Countries	Countries	Countries	Countries	IOSEA – sea turtle MOU CPs	MOU CPs
Review and evaluation	The Technical and Compliance	Countries IOTC - Scientific	FAO Secretariat Countries	COBSEA PEMSEA	COBSEA PEMSEA	COBSEA PEMSEA	IOSEA – sea turtle MOU	Secretariat

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-f)								
Policy cycle stage	Fisheries – HMS	Fisheries – HMS	Fisheries – EEZ	Pollution LBS	Pollution MBS	Biodiversity – Hab Mod	Biodiversity - Specific	Biodiversity - specific (dugongs)
	Committee (TCC)	committee, sub-commissions, and working parties		Executive Committee	Executive Committee	Executive Committee	Secretariat	
Data and information	SPC OFP	Countries IOTC - Secretariat	FAO Secretariat Countries	Countries	Countries	Countries	IOSEA – sea turtle MOU CPs	MOU CPs

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
4 and 5	1	1	1	0	0	1	0	0.57
4 and 6	1	1	1	0	0	1	0	0.57
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
5 and 6	1	1	1	0	0	1	0	0.57
5 and 7	0	0	0	0	0	0	0	0
5 and 8	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
6 and 8	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
Average	0.10	0.10	0.10	0	0	0.10	0	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the seven issues is extremely low at a score of 0.1 out of a possible 1.

3 Conclusions

In this LME, there are three arrangements for fisheries in the areas, one each cover high sea highly migratory tuna and tuna-like fisheries in the Western Central Pacific (WCPFC) and the Indian Ocean (IOTC) and the remaining arrangement (APFIC, FAO) covers the fisheries within national jurisdiction. There does not appear to be any formal connection between the three arrangements, possibly as they have different areas of competence. However, it is to be expected that at some high level, the two Commissions (WCPFC and IOTC) for the large highly migratory fisheries would connect. In contrast, the arrangement for the regional seas programme cover both for pollution and biodiversity, falling under the Coordinating Body of the Seas of South east Asia (COBSEA), with linkages to the Partnership in Environmental Management for the Seas of East Asia (PEMSEA). However neither of the “within national jurisdiction” arrangements for fisheries or pollution/biodiversity appears to be integrated with each other or with the tuna arrangements.

The specific biodiversity arrangement for turtles (IOSEA) does not appear to be integrated with any of the other arrangements in the LME. Further, no integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in other intergovernmental partnerships or with each other’s meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Indonesia Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Indonesia Sea LME	Completeness	Integration	Engagement
	52%	0.1	56%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1.

Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
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Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Kuroshio Current LME

1 The system to be governed

The system is the Kuroshio Current LME. This includes the marine waters of the countries shown in Table 1 and a small proportion of High Seas.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter X-23), so a review is not provided here. This assessment is also informed by the Northwest Pacific Action Plan (UNEP 1994) and the NOWPAP website.

2 Governance arrangements

2.1 Transboundary issues to be governed

Although this is a transboundary LME (Table 1), the majority of the LME lies within Japan's EEZ. Therefore, there are few significant transboundary issues to be addressed by governance in this LME. Fisheries are important in this area, but their management is for the most part at the national level, by Japan (Makino 2011). The main transboundary stocks are tunas and billfishes. Whereas, the area covered by the West Central Pacific Fisheries Commission (WCPFC), which has the mandate for management of these species in the western Pacific, does cover the Kuroshio Current LME (Table 2), the fisheries that it manages cannot be said to be a significant issue in this LME. Therefore the relevance of the WCPFC to the LME is moderate. However, it can be said that an arrangement for highly migratory species is in place for the tuna and billfish stocks in this LME.

Biodiversity issues identified by Sherman and Hempel (2009) for this LME are primarily Japanese national issues. Pollution issues affecting marine waters are all considered to be transboundary.

The transboundary issues identified as requiring governance arrangements are:

- Fisheries— HMS may be the only significant transboundary issue
- Pollution – LBS and MBS

2.2 Identify transboundary arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

Table 1. Percentage of Kuroshio Current LME area taken up by the EEZ of each country and the High Seas (area = 1,317,095 km²)

Country	Percent of LME area
Japan	92.9
Philippines	0.9
Taiwan	3.6
High Seas	2.6
The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.	

1. UNEP Northwest Pacific Action Plan – NOWPAP
 - a. Special Monitoring and Coastal Environment Assessment Regional Activity Centre- CEARAC, Toyama, Japan;
 - b. Marine Environmental Emergency Preparedness and Response Regional Activity Centre- MERRAC, Taejon, Republic of Korea
 - c. Pollution Monitoring Regional Activity Centre- POMRAC, Vladivostok, Russian Federation.
 - d. Data and Information Network RAC- DINRAC, Beijing, China
2. The North Pacific Marine Science Organization (PICES)
3. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
4. Asia-Pacific Economic Cooperation (APEC), Oceans and Fisheries Working Group (OFWG)¹
5. Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific Region, 1994

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Kuroshio Current LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Kuroshio Current LME			
Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME ²
APFIC	<1	4	D
PICES	3	54	D
WCPFC	1	100	C
NOWPAP		100	C

The extent of country membership in these bodies and instruments for the Kuroshio Current LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Kuroshio Current LME					
Coastal countries in the LME	Agreements				
	APFIC	APEC-OFWG	PICES	WCPFC	NOWPAP
Japan	B	C	B	B	C
Philippines	B	C	N	B	N
Taiwan	N	N	N	N	N

¹ Merger of former Marine Resource Conservation and Fisheries Working Groups

² A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

% engagement	100	100	100	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed					

2.2.1 *Assessment of issues*

The arrangements in place for the issues identified are shown in Tables 4a-b. These are summarized in Table 5.

Table 4a: Kuroshio Current LME ¹ – Transboundary arrangement for fisheries – Highly Migratory Species					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	Supra-LME	3	IUCN	<ul style="list-style-type: none">• Fishing mortality on key non-target oceanic species, including sharks, seabirds and sea turtles is covered under this arrangement.• The FFA oversees the implementation of several treaties and agreements relating to HMS (Nauru Agreement, Niue Treaty, Multilateral NTSA Agreement on Strengthening Implementation of the Niue Treaty, Wellington Convention, Palau Arrangement, U.S Treaty).• Scores are for WCPFC, except D and I which is for SPC.• The role of the SPRFMO in high seas fisheries and biodiversity relative to that of the WCPFC is unclear.
Policy decision-making	WCPFC Commission.	Supra-LME	3		
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	Supra-LME	3		
Planning decision-making	WCPFC Commission.	Supra-LME	3		
Implementation	CPs WCPFC Secretariat FFA	Supra-LME National	2		
Review and evaluation	WCPFC Technical and Compliance Committee (TCC)	Supra-LME	2		
Data and information	SPC OFP	Supra-LME	3		
Overall total and % completeness >>			19/21 = 90%		

Table 4b: Kuroshio Current LME – Transboundary arrangement for pollution – LBS and oil spills

Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		<ul style="list-style-type: none"> • CEARAC's main activities are to monitor and assess harmful algal blooms, to develop new monitoring tools using remote sensing and to assess land-based sources of marine litter. It does not cover the full range of LBS pollution. • MERRAC is to develop effective regional cooperative measures in response to marine pollution incidents including oil and hazardous and noxious substances. It is also working on MBS of marine litter. • POMRAC is responsible for cooperation regarding atmospheric deposition of contaminants and river and direct inputs of contaminants to the marine and coastal environment.
Policy decision-making	NOWPAP-IGM	Supra-LME	1		
Planning analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		
Planning decision-making	NOWPAP-IGM	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	CEARAC, MERRAC	Supra-LME	1		
Data and information	DINRAC, MERRAC, CEARAC	Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 5: Kuroshio Current LME governance architecture - System summary ⁱⁱ											
IW category: LME		Countries: Japan, Philippines, Taiwan		System name: Kuroshio Current LME		Region: North West Pacific					
Complete these columns then assess issues using the arrangements tables				After completing the arrangements tables, complete these columns							
Trans-boundary issue ²		Number of countries involved		Collective importance for countries involved		Completeness of governance arrangement % (category)		Priority for intervention to improve governance		Observations	
Fisheries – Highly Migratory Species		3				90					
Pollution – LBS		3				38					
Pollution –MBS		3				38					
		System architecture completeness index >>				56%				<< System priority for intervention	

2.3 Assessment of transboundary integration of arrangements within the system

The assessment of transboundary integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 5) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4)		
Policy cycle stage	Fisheries - HMS	Pollution - LBS and oil spills
Policy analysis and advice	PICES, APEC-OWWG	NOWPAP-RCU, CEARAC, MERRAC
Policy decision-making	Countries	NOWPAP-IGM
Planning analysis and advice	PICES, APEC-OWWG	NOWPAP-RCU, CEARAC, MERRAC
Planning decision-making	Countries	NOWPAP-IGM
Implementation	Countries	Countries
Review and evaluation	Countries	CEARAC, MERRAC
Data and information	PICES	DINRAC, MERRAC, CEARAC

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
2 and 3	1	1	1	1	0	1	1	0.9
Average	0.3	0.3	0.3	0.3	0.0	0.3	0.3	0.3

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the four issues is 0.3 out of a possible 1.

The high integration among arrangements 2 and 3 arises because they are all under NOWPAP. However, it must be recalled that NOWPAP is purely a coordination mechanism that has no international legal standing. Therefore, the apparent degree of integration that may arise from sharing a common organisation is essentially informal. There does not appear to be any integration between the two arrangements. Nor could any organization be found with a mandate to integrate transboundary marine issues for this LME.

3 Conclusions

In this LME, the fact that there is no regional seas convention covering the area, but only an action plan, seriously weakens capacity for transboundary governance in areas relating to pollution. Further, there is no indication of transboundary integration, other than through cooperation in science. There is the potential for integration of pollution issues under NOWPAP should it proceed to the level of a Convention. There does not appear to be any other transboundary organisation than NOWPAP that could integrate and coordinate across the full range of issues required for EBM.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
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For the Kuroshio Current LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Kuroshio Current LME	Completeness	Integration	Engagement
	56%	0.3	100%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

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<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Makino, M. 2011. Fisheries Management in Japan: Its institutional features and case studies (Fish & Fisheries Series). Springer: New York, 200 p.

Makino, M. 2011. Fisheries Management in Japan: Its institutional features and case studies. Volume 34, Fish & Fisheries Series, Springer: New York. 200 pp.

Schmidt, C-C. 2003. Fisheries and Japan: A case of multiple roles? International Symposium on Multiple Roles and Functions of Fisheries and Fishing Communities, 13 February 2003, Aomori, Japan.

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End notes

ⁱTable notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

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ⁱⁱTable notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Mediterranean Sea LME

1 The system to be governed

The system is the Mediterranean Sea LME. This includes the marine waters of the entire Mediterranean Sea (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter IV-7), so a review is not provided here. This assessment is also informed by the TDA, SAP MED, SAP BIO (UNEP, 1999; UNEP- MAP-RAC/SPA, 2003; UNEP-MAP-MEDPOL, 2005; UNEP-MAP 2011, 2012) and the institutional review by the GEF (GEF 2011).

2 Governance arrangements

2.1 Issues to be governed

The issues to be addressed by governance were initially identified in the TDA for the Mediterranean Sea (UNEP-MAP-MEDPOL 2005) and updated based on more recent policy documents, such as new Protocols of the Barcelona Convention:

- Decline in fisheries
 - Fisheries for shared demersal fishes and invertebrates
 - Fisheries for shared small pelagics
 - Fisheries for tunas and tuna-like species
- Decline in seawater quality
 - Land-based sources of pollution
 - Industrial
 - Agricultural
 - Municipal sewage
 - Marine based sources of pollution
 - Long-range atmospheric sources of pollution

Table 1. Percentage of Mediterranean Sea LME area taken up by the EEZ of each country and the High Seas¹ (area = 2,506,350 km²)

Country	Percent of LME area
Albania	0.4
Algeria	5.1
Croatia	2.2
Cyprus	3.9
Egypt	6.7
France	3.5
Greece	19.5
Israel	1.1
Italy	21.2
Lebanon	0.8
Libya	14.0
Malta	2.2
Monaco	<0.1
Morocco	0.7
Montenegro	0.3
Slovenia	<0.1
Spain	10.3
Syria	0.4
Tunisia	4.0
Turkey	3.3
United Kingdom	<0.1
High Seas	0.2

The figures shown in this table are based on the EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

¹ Assuming each country claims its EEZ to the fullest extent possible given proximity of other countries

- Long-range transport of PTS in seabirds
- Human health risks
 - Microbiological and chemical contamination of food
 - Risks from bathing in contaminated seawater
 - Risks from contaminated beach sand
- Biodiversity and degradation of natural resources
 - Overexploitation of coastal resources;
 - Conversion and degradation of critical habitats;
 - Management of marine and coastal protected areas, biodiversity and ecosystems
 - Protection of endangered species and habitats
 - Introduction of alien species;
 - Pollution in the form of excess nutrients; toxic waste, including oil; solid waste and litter

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) 1975, revised 1995.
 - a. Mediterranean Action Plan, 1975 revised in 1995 with its operational programmes and Regional activity centres addressing
 - i. pollution assessment and control (MEDPOL and REMPEC)
 - ii. environment and development interaction and climate change (Plan Bleu et PAP RACs)
 - iii. marine protected areas and biodiversity (RAC SPA)
 - iv. sustainable consumption and production (SCP RAC)
 - b. Protocol for the Prevention and Elimination of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft or Incineration at Sea (Barcelona Dumping Protocol) 1975, revised 1995
 - c. Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources and Activities (LBS Protocol) 1980, revised 1996
 - i. The Strategic Action Programme to eliminate pollution from land-based sources in the Mediterranean (SAP MeD), the GEF Transboundary Diagnostic Analysis for the Mediterranean Sea and the National Action Plans (NAPs) 1997

- d. Protocols Concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea (Prevention and Emergency Protocol)²
 - e. Protocol for the Protection of the Mediterranean Sea against Pollution Resulting from Exploration and Exploitation of the Continental Shelf and the Seabed and its Subsoil (Offshore Protocol) 1994
 - f. Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal (Hazardous Wastes Protocol) 1996
 - g. Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (1999)(SPA and Biodiversity Protocol) 1995
 - i. The Strategic Action Programme for the Conservation of Biological Diversity in the Mediterranean region (SAP BIO), and related National Action Plans (NAPs), 2003
 - h. Protocol on Integrated Coastal Zone Management in the Mediterranean (ICZM Protocol) 2008
2. The Mediterranean Commission on Sustainable Development (MCSD) established in the framework of UNEP/MAP
3. Agreement on the Conservation of Cetaceans in the Black Sea Mediterranean Sea and Contiguous Atlantic Area (CMS/ACCOBAMS)
4. Agreement for the Establishment of the General Fisheries Commission for the Mediterranean (GFCM)
5. The International Convention for the Conservation of Atlantic Tunas (ICCAT)
6. The Euro-Mediterranean Partnership (EMP) and Barcelona Process, relaunched in 2008 as the Union for the Mediterranean (UfM)³
7. GEF/UNEP-MAP strategic Partnership for the Mediterranean Large Marine Ecosystem
 - a. Mediterranean Environmentally Sustainable Development Programme (Sustainable Med)
8. Mediterranean Action Plan - Strategic Action Programme to Address Pollution from Land-Based Activities, 1998 (SAPMED)
9. Strategic Action Programme for the Conservation Of Biological Diversity (Sap Bio) in the Mediterranean Region, 2003 (SAPBIO)

² There are two separate protocols, the original in 1975 and the new protocol in 2002

³ The EMP includes EU, North African and Middle East States on the Mediterranean and goes far beyond marine EBM to include, for example, trade, transport, education, alternative energy and civil society
http://eeas.europa.eu/euromed/index_en.htm.

10. Action Plan for the Protection of the Marine Environment and the Sustainable Development of the Coastal Areas of the Mediterranean, 1995 (Mediterranean Action Plan or MAP Phase II, replacing the MAP 1975)
11. European Union Common Fisheries Policy (CFP)
12. European Union Integrated Maritime Policy (IMP)

An account of the many regional and subregional arrangements that have bearing on the marine environment and resources is provided by (Scoullos and Ferragina 2010)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Mediterranean Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Mediterranean Sea LME			
Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME ⁴
Barcelona Convention and Protocols	99	100	A
GFCM	84	100	C
ICCAT	3	100	C
ACCOBAMS		100	C
EU CFP	44	63	D
EU IMP	44	63	D

The extent of country membership in these bodies and instruments for the Mediterranean Sea LME is shown in Table 3.

⁴A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Mediterranean Sea LME
(<http://195.97.36.231/dbases/webdocs/BCP/StatusOfSignaturesAndRatifications.doc>)

Coastal countries in the LME	Agreements													
	Barcelona Convention	Barcelona-Dumping Protocol	Barcelona - LBS Protocol	Barcelona- Prevention\ Emergency Protocol 1976	Barcelona- Prevention\ Emergency Protocol 2002	Barcelona-Offshore Protocol	Barcelona-Hazardous Wastes	Barcelona - SPA Protocol	Barcelona –ICZM Protocol	ACCOBAMS	GFCM 2004	ICCAT	EU-CFP	EU-IMP
Albania	B	B	B	B		B	B	B	B	B	B	B	N	N
Algeria	B	B	B	B			B	B	C	B	B	B	N	N
Bosnia Herzegovina	B	B	B	B									N	N
Croatia	B	B	B	B	B	B		B	B	B	B	B	B	B
Cyprus	B	B	B	B	B	B		B		B	B	B	B	B
Egypt	B	B	B	B			B	B		B		B	N	N
France	B	B	B	B	B			B	B	B	B	B	B	B
Greece	B	B	B	B	B	B	B		C	B	B		B	B
Israel	B	B	B	B		B			C				N	N
Italy	B	B	B	B		B	B	B	C	B	B	B	B	B
Lebanon	B	B	B	B				B		B	B		N	N
Libya	B	B	B	B		B	B			B	B	B	N	N
Malta	B	B	B	B	B	B	B	B	C	B	B	B	B	B
Monaco	B	B	B	B	B	B	B	B	C	B	B		N	N
Morocco	B	B	B	B	B	B	B	B	B	B	B	B	N	N
Montenegro	B		B		B		B	B	B	B	B		B	B
Slovenia	B	B	B	B	B	B		B	B	B	B		B	B
Spain	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Syria	B	B	B	B	B	B	B	B	B	B		B	N	N
Tunisia	B	B	B	B		B	B	B	C	B	B	B	N	N
Turkey	B	B	B	B	B		B	B			B	B	B	B
EU	B	B	B	B	B	B	B	B	B					
% engagement	100	95	100	95	59	67	67	90	67	86	81	67	100	100

B = a binding commitment to the agreement by ratification, accession, acceptance or adoption; C = agreement to cooperate by signing; N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed

2.2.1 Assessment of issues

The arrangements in place for the issues identified are shown in Tables 4a-f. These are summarized in Table 5.

Table 4a:Mediterranean Sea LME ⁱ – Transboundary arrangement for fisheries–demersal fishes, invertebrates and small pelagics					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	GFCM Scientific Advisory Committee (SAC) GFCM Compliance Committee (CoC)	Supra-LME	3		<ul style="list-style-type: none">• These issues are all combined as they are subject to the same governance processes carried out by the same organisations• Decisions include measures for conservation of cetaceans and Mediterranean monk seal.
Policy decision-making	GFCM Commission	Supra-LME	3		
Planning analysis and advice	Scientific Advisory Committee (SAC) Compliance Committee (CoC)	Supra-LME	3		
Planning decision-making	GFCM Commission	Supra-LME	3		
Implementation	Contracting Parties, Secretariat	Supra-LME National	2		
Review and evaluation	Compliance Committee (CoC)	Supra-LME	3		
Data and information	CPs, GFCM Secretariat, GFCM Committees	Supra-LME	3		
Overall total and % completeness >>			20/21 = 95%		

Table 4b: Mediterranean Sea LME – Transboundary arrangement for fisheries –Large pelagic fishes (tunas and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		<ul style="list-style-type: none">• The GFCM reviews ICCAT decisions that are relevant to stocks in the Mediterranean and adopt them as appropriate.• The ICCAT/GFCM WG on Large Pelagic Species in the Mediterranean pays particular attention to stocks of small tunas that are not commonly assessed by ICCAT.• Only five non-EU countries are ICCAT members. EU countries are sometimes represented in ICCAT by the EU.
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels ICCAT/GFCM WG on Large Pelagic Species in the Mediterranean	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	SCRS and Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	SCRS and Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4c: Mediterranean Sea LME – Transboundary arrangement for pollution – Land based sources (LBS)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Barcelona Convention LBS Protocol Secretariat MEDPOL Programme Blue Plan Regional Activity Centre (BP/RAC)	LME	2		• The human health risk issue is also considered to be covered by this arrangement
Policy decision-making	Barcelona Convention LBS Protocol COP Barcelona Convention COP	LME	3		
Planning analysis and advice	Barcelona Convention Protocol Secretariat	LME	2		
Planning decision-making	Barcelona Convention LBS Protocol COP	LME	3		
Implementation	CPs LBS Protocol Secretariat	National LME	2		
Review and evaluation	Barcelona Convention Protocol Secretariat	LME	2		
Data and information	Barcelona Convention LBS Protocol Secretariat	LME	2		
Overall total and % completeness >>			16/21 = 76%		

Table 4d:Mediterranean Sea LME – Transboundary arrangement for pollution - Marine-based sources (MBS)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Barcelona Convention Dumping, Offshore, Hazardous Wastes, Prevention and Emergency Protocol Secretariats MEDPOL REMPEC	LME	2	IMO has a worldwide regulatory mandate, any specific regulation regarding pollution from ships in the Med (for instance specially protected area) will have to be agreed at the level of IMO	<ul style="list-style-type: none">• Four Barcelona convention protocols address marine-based sources of pollution: the Dumping Protocol, the Prevention and Emergency Protocol, the Offshore Protocol and the Hazardous Wastes Protocol.• While these are supported by different technical groups and different regional activity centres, and they are combined here under single governance arrangement. However, if the processes relating to these protocols are quite separate they should be separated into different arrangements• For practical purposes dumping and HW may also be considered as land based sources and not sea based sources. The pollution is often not generated at sea but on land. Under MARPOL they are however treated as MBS.
Policy decision-making	Barcelona Convention Dumping, Offshore, Hazardous Wastes, Prevention and Emergency Protocol COPs Barcelona Convention COP	LME	3		
Planning analysis and advice	Barcelona Convention Dumping, Offshore, Hazardous Wastes, Prevention and Emergency Protocol Secretariats Appropriate RACs	LME	2		
Planning decision-making	Barcelona Convention Dumping, Offshore, Hazardous Wastes, Prevention and Emergency Protocol COPs	LME	3		
Implementation	CPs Barcelona Convention Protocol Secretariats	National LME	2		
Review and evaluation	Barcelona Convention Protocol Secretariats	LME	2		
Data and information	Barcelona Convention Protocol Secretariats, Appropriate RACs	LME	2		
Overall total and % completeness >>			16/21 = 76%		

Table 4e: Mediterranean Sea LME – Transboundary arrangement for degradation of natural resources					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score ⁵		
Policy analysis and advice	Barcelona Convention SPA/BIO, ICZM and Offshore Protocol Secretariats, PAP/RAC and SPA/RAC	LME	2	ACCOBAMS Secretariat (Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area)	
Policy decision-making	Barcelona Convention SPA/BIO and ICZM Protocol COP Barcelona Convention COP	LME	2		
Planning analysis and advice	Barcelona Convention SPA/BIO and ICZM Protocol Secretariat PAP/RAC and SPA/RAC	LME	2		
Planning decision-making	Barcelona Convention SPA and ICZM Protocol COPs	LME	2		
Implementation	CPs SPA and ICZM Protocol Secretariats	National LME	1.5		
Review and evaluation	CPs Barcelona Convention PAP/RAC and SPA/RAC	LME	2		
Data and information	CPs Barcelona Convention PAP/RAC and SPA/RAC	LME	2		
Overall total and % completeness >>			13.5/21 = 64%		

⁵ Average scores for SPA and ICZM Protocols

Table 4f: Mediterranean Sea LME – Transboundary Arrangement for Fisheries – EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3		
Policy decision-making	European Commission	Supra-LME	2		
Planning analysis and advice	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3		
Planning decision-making	European Commission	Supra-LME	3		
Implementation	Contracting Parties Scientific, Technical and Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	National Supra-LME	2		
Review and evaluation	Commission STECF	Supra-LME	3		
Data and information	Contracting Parties Commission STECF Advisory Councils	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 5 provides a summary of the assessment of transboundary issues.

Table 5: Mediterranean Sea LME governance architecture - System summary ⁱⁱ					
IW category: LME	Countries: see table 1		System name: Mediterranean Sea		Region: North Atlantic
Complete these columns then assess issues using the arrangements tables			After completing the arrangements tables, complete these columns		
Trans-boundary issue ²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – demersal fishes, invertebrates and small pelagics	20		96		GFCM
Fisheries – large pelagics (tunas and tuna-like species)	20		86		ICCAT
Fisheries - EEZ	20		90		EU - CFP
Pollution – LBS	20		76		UNEP/MAP, Barcelona Convention Protocols
Pollution – MBS LBS (Dumping)	20		76		
Pollution – MBS LBS (Offshore)	20		76		
Pollution – MBS LBS (Hazardous)	20		76		
Pollution – MBS (Emergency)	20		76		
Degradation of natural resources	20		64		
	System architecture completeness index >>		78%		<< System priority for intervention

2.3 Assess transboundary integration of arrangements within systems

The assessment of transboundary integration is based on the extent to which issue specific arrangements in an LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-f) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from Table 5)

Policy cycle stage	Fisheries – demersal fishes, invertebrates and small pelagics	Fisheries – large pelagics	Fisheries - EEZ	Pollution -- LBS	Pollution – MBS	Degradation of natural resources
Policy analysis and advice	GFCM Scientific Advisory Committee (SAC)	ICCAT Standing Committee on Research and Statistics (SCRS)	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Barcelona Convention LBS Protocol Secretariat Blue Plan Regional Activity Centre (BP/RAC)	Barcelona Convention Dumping, Offshore, Hazardous Wastes, Prevention and Emergency Protocol Secretariats Appropriate RACs	Barcelona Convention SPA and ICZM Protocol Secretariats, PAP/RAC and SPA/RAC
Policy decision-making	GFCM Compliance Committee (CoC)	ICCAT Commission	European Commission	Barcelona Convention LBS Protocol COP Barcelona Convention COP	Barcelona Convention Dumping, Offshore, Hazardous Wastes, Prevention and Emergency Protocol COPs Barcelona Convention COP	Barcelona Convention SPA and ICZM Protocol COP Barcelona Convention COP
Planning analysis and advice	GFCM Commission	ICCAT SCRS and Species Panels	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Barcelona Convention Protocol Secretariat	Barcelona Convention Dumping, Offshore, Hazardous Wastes, Prevention and Emergency Protocol Secretariats Appropriate RACs	Barcelona Convention SPA and ICZM Protocol Secretariat PAP/RAC and SPA/RAC
Planning decision-making	Scientific Advisory Committee (SAC)	ICCAT/GFCM WG on Large Pelagic Species in the Mediterranean	European Commission	Barcelona Convention LBS Protocol COP	Barcelona Convention Dumping, Offshore, Hazardous Wastes, Prevention and Emergency Protocol COPs	Barcelona Convention SPA and ICZM Protocol COPs
Implementation	Compliance Committee (CoC)	ICCAT Commission	Contracting Parties Scientific, Technical and Economic	CPs LBS Protocol	CPs Barcelona Convention	CPs SPA and ICZM Protocol

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from Table 5)						
Policy cycle stage	Fisheries – demersal fishes, invertebrates and small pelagics	Fisheries – large pelagics	Fisheries - EEZ	Pollution -- LBS	Pollution – MBS	Degradation of natural resources
			Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	Secretariat	Protocol Secretariats	Secretariats
Review and evaluation	GFCM Commission	Countries	Commission STECF	Barcelona Convention Protocol Secretariat	Barcelona Convention Protocol Secretariats	CPs Barcelona Convention PAP/RAC and SPA/RAC
Data and information		SCRS and Conservation and Management Measures Compliance Committee (CMMCC)	Contracting Parties Commission STECF Advisory Councils	Barcelona Convention LBS Protocol Secretariat	Barcelona Convention Protocol Secretariats, Appropriate RACs	CPs Barcelona Convention PAP/RAC and SPA/RAC

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	1	1	0	0	0	0.3
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
3 and 4	1	1	1	1	1	1	1	1
3 and 5	1	1	1	1	1	1	1	1
3 and 6	1	1	1	1	1	1	1	1
3 and 7	1	1	1	1	1	1	1	1
3 and 8	1	1	1	1	1	1	1	1
3 and 9	0	0	0	0	0	0	0	0
4 and 5	1	1	1	1	1	1	1	1
4 and 6	1	1	1	1	1	1	1	1
4 and 7	1	1	1	1	1	1	1	1
4 and 8	1	1	1	1	1	1	1	1
4 and 9	0	0	0	0	0	0	0	0
5 and 6	1	1	1	1	1	1	1	1
5 and 7	1	1	1	1	1	1	1	1
5 and 8	1	1	1	1	1	1	1	1
5 and 9	0	0	0	0	0	0	0	0
6 and 7	1	1	1	1	1	1	1	1
6 and 8	1	1	1	1	1	1	1	1
6 and 9	0	0	0	0	0	0	0	0
7 and 8	1	1	1	1	1	1	1	1
7 and 9	0	0	0	0	0	0	0	0
8 and 9	0	0	0	0	0	0	0	0
Average	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the six issues is (0.4 out of a possible 1). The two arrangements for fisheries are connected through a joint technical committee. The arrangements for pollution and biodiversity all fall under the Barcelona Convention. These two sets of arrangements (Fisheries and Barcelona Convention) are integrated through an MOU.

A formal integrating mechanism is considered to be important if EAF or EBM are to be achieved. The Mediterranean Commission on Sustainable Development (MCSDD) is the only separate integrating mechanism that could be identified for the entire Mediterranean Sea. The EU Integrated Maritime Policy does seek to integrate marine matters within the waters of the EU countries but only covers 63% of the Mediterranean. However, the pursuit of the Ecosystem Approach within the UNEP-MAP, that includes fisheries, is an indication of intent and progress with integration (UNEP/MAP, 2012).

3 Conclusions

Given the semi-enclosed nature of this LME, the fit of arrangements to the LME is very close, with two extending also to the Black Sea, and one (ICCAT) extending an Atlantic ocean-wide. The fact that decisions taken in ICCAT are not binding, seriously weakens this arrangement. However, the uptake of recommendations by the GFCM strengthens them in the Mediterranean. The Barcelona Convention and its protocols provide a strong framework for addressing land and marine-based sources of pollution as well as biodiversity issues. A strength of the Specially Protected Areas and Biodiversity Protocol is that it applies to areas beyond national jurisdiction. The need for an integrating mechanism is recognized by the countries in the establishment of the Mediterranean Commission on Sustainable Development. However, it appears to be a consultative body that is largely advisory in nature rather than having any formal coordination mandate.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Mediterranean Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Mediterranean Sea LME	Completeness	Integration	Engagement
	78%	1.0	85%

This LME has been assigned an overall integration score of 1.0 due to the presence of the Mediterranean Commission on Sustainable Development (MCSD) with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

4 Acknowledgements

We are grateful for review and comments provided by Virginie Hart, Souha El Asmi and Frederic Hebert. These reviewers provided a wealth of additional information that could take the scope of this assessment beyond governance architecture and into governance performance and effectiveness. For reference this material is provide below.

- The 2009 SAP BIO updating on Climate Change issues (3 sub-regional reports and a regional synthesis: Arab countries: http://www.rac-spa.org/sites/default/files/doc_climate_change/ccc_med_arab.pdf ; Adriatic countries: http://www.rac-spa.org/sites/default/files/doc_climate_change/cca_med_adriatic.pdf; European non-Adriatic countries and Israel : http://www.rac-spa.org/sites/default/files/doc_climate_change/ccb_north_med_non_adriatic_and_israel.pdf; and Regional synthesis report: http://www.rac-spa.org/sites/default/files/doc_climate_change/ccd_synthesis.pdf).
- Technical reports compiled in the framework of the RAC/SPA Project on SPAMIs in the open seas 'MedOpenSeas': <http://www.rac-spa.org/node/1031> : Report presenting a georeferenced compilation on bird important areas in the Mediterranean open seas: http://medabnj.rac-spa.org/images/stories/Publications/bird_important_areas.pdf
- Fisheries conservation and vulnerable ecosystems in the Mediterranean open seas, including the deep seas: <http://www.rac-spa.org/publications/#en1.1>
- Overview of scientific findings and criteria relevant to identifying SPAMIs in the Mediterranean open seas, including the deep seas: http://medabnj.rac-spa.org/images/stories/Publications/overview_report.pdf
- International legal instruments applied to the conservation of marine biodiversity in the Mediterranean region and actors responsible for their implementation and enforcement: http://medabnj.rac-spa.org/images/stories/Publications/international_legal_instrument.pdf
- Technical report on the Geographical Information System developed for the Mediterranean open seas: http://medabnj.rac-spa.org/images/stories/Publications/gis_report.pdf

- The 2003 SAP BIO adopted document could be found in the four Barcelona convention official languages at the following links: ENG: <http://sapbio.rac-spa.org/sapbioeng.pdf>, FRA: <http://sapbio.rac-spa.org/sapbiofr.pdf>, ARA: <http://sapbio.rac-spa.org/sapbioara.pdf>, ESP: <http://sapbio.rac-spa.org/sapbioesp.pdf>.
- Others in the publication section of RAC/SPA (www.rac-spa.org) website: <http://www.rac-spa.org/publications#en14>.

5 References

- GEF. 2011. International Waters: Review of legal and institutional frameworks. UNDP, NY, 309 p.
- Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.
- Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.
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- Scoullou, M. and E. Ferragina. 2010. Environmental and Sustainable Development Components of a European Strategy for the Mediterranean. In: Environmental and Sustainable Development in the Mediterranean, Scoullou, M. and E. Ferragina [eds]. European Institute of the Mediterranean (IEMed) and the European Union Institute for Security Studies (EUISS).
- Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.
- UNEP. 1999. Strategic Action Programme to Address Pollution from Land-based Activities. UNEP, Athens. 80 p.
- UNEP-MAP-MEDPOL. 2005. Transboundary diagnostic analysis TDA for the Mediterranean Sea.
- UNEP. 1999. Strategic Action Programme to Address Pollution from Land-based Activities. UNEP, Athens, 1999.
- UNEP-MAP. 2011. Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean and its Protocols. United Nations Environment Programme, Mediterranean Action Plan, Athens, 148 pp.
- UNEP-MAP. 2012a. Support to the Barcelona Convention for the Implementation of the Ecosystem Approach, including the establishment of MPAs in open sea areas, including deep sea. UNEP, Athens, 50. p.

UNEP/MAP. 2012b. Note on the ecosystems approach process in 2012-2013 biennium. United Nations Environment Programme, Mediterranean Action Plan, Athens, Greece, 11 p.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

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- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
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Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
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- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
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Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱTable notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

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Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

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ⁱⁱTable notes:

This table provides an overview of all the arrangements in the system and their status.

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Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 4 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national

level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Newfoundland-Labrador Shelf LME

1 The system to be governed

The system is the Newfoundland-Labrador Shelf LME. It has an area of about 899,000 km² and extends some distance off the eastern coast of Canada, encompassing the areas of the Labrador Current and the Grand Banks. Only the northern portion of this LME, the Labrador shelf, lies within the Arctic area of Canada. Canada and France (the islands of St. Pierre and Miquelon) share jurisdiction of this LME (Table 1)

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter XIX - 59), so a review is not provided here.

Table 1. Percentage of Newfoundland-Labrador Shelf LME area taken up by the EEZ of each country and the High Seas (area = 899,000 km²)

Country	Percent of LME area
Canada	86.4
France	0.9
High Seas	12.6

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 59 (Sherman and Hempel, 2009) as follows:

- Fisheries
 - commercially exploited fish species (cod, haddock, salmon etc)
- Pollution
 - (MBS) oil and gas industry's exploitation

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
2. Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)
3. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
4. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Newfoundland-Labrador Shelf LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with the Newfoundland-Labrador Shelf LME (area = 899,482 km ²)			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of Agreement to LME ¹
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	100	C
Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)	14	100	C
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	4	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	4	100	C

The extent of country membership in these bodies and instruments for the Newfoundland-Labrador Shelf LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Newfoundland-Labrador Shelf LME				
Coastal countries in the LME	Agreements			
	ICCAT	NAFO	NAMMCO	NASCO
Canada	B	B		B
France (Saint Pierre and Miquelon)	B	B		
% engagement	100	100		50
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed				

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-d. They are summarised in Table 5

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 4a. Newfoundland-Labrador Shelf LME ¹ – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4b: Newfoundland – Labrador Shelf LME – Transboundary Arrangement for fisheries – EEZ and ABNJ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NAFO Scientific Council	Supra-LME	3		
Policy decision-making	NAFO General Council Fisheries Commission	Supra-LME	3		
Planning analysis and advice	NAFO Scientific Council	Supra-LME	3		
Planning decision-making	NAFO General Council Fisheries Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NAFO Standing Committee on International Control (STACTIC)	Supra-LME	3		
Data and information	Countries NAFO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4c: Newfoundland – Labrador Shelf LME – Transboundary Arrangement for Fisheries – Specific (Marine Mammals)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3		Neither country is eligible to be full members without the expressed agreement of the 4 original signatory countries
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	NAMMCO Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	NAMMCO Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4d: Newfoundland – Labrador Shelf LME – Transboundary arrangement for fisheries – specific (salmon)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICES NASCO Secretariat and its Commissions	Supra-LME	3		Both countries are members of NASCO (France through the EU) ICES named in NASCO to provide scientific advice
Policy decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Planning analysis and advice	NASCO Three Commissions NASCO Secretariat ICES	Supra-LME	3		
Planning decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 5: Newfoundland – Labrador Shelf LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Canada, France	System name: Newfoundland – Labrador Shelf LME		Region: NW Atlantic
Complete these columns then assess issues using the arrangements tables			After completing the arrangements tables, complete these columns		
Trans-boundary issue ²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – EEZ/ABNJ	2		86%		NAFO
Fisheries – large pelagics (tunas and tuna-like)	2		86%		ICCAT
Fisheries - specific (marine mammals)	2		71%		NAMMCO
Fisheries – specific (salmon)	2		57%		NASCO
Pollution – MBS (None)	2		0%		
Pollution – LBS (None)	2		0%		
	System architecture completeness index >>		50%		<< System priority for intervention

2.2.2 Issues mentioned but not addressed above:

Marine pollution from offshore oil and gas exploitation is not addressed specifically in the form of a transboundary agreement between the two countries. This is likely due to the fact that the majority of the LME is within Canada's maritime domain and as such, pollution for the industry is addressed nationally.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-d) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-d)				
Policy cycle stage	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries - Specific	Fisheries - Specific - Marine Mammals
Policy analysis and advice	NAFO Scientific Council	ICCAT Standing Committee on Research and Statistics (SCRS)	ICES NASCO Secretariat and its Commissions	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods
Policy decision-making	NAFO General Council Fisheries Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council
Planning analysis and advice	NAFO Scientific Council	ICCAT SCRS and Species Panels	NASCO Three Commissions NASCO Secretariat ICES	NAMMCO Management Committee and Scientific Committee
Planning decision-making	NAFO General Council Fisheries Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council
Implementation	Countries	Countries	Countries	NAMMCO Secretariat – Joint NAMMCO Control Scheme for Hunting
Review and evaluation	NAFO Standing Committee on International Control (STACTIC)	Conservation and Management Measures Compliance Committee (CMMCC)	NASCO Council	NAMMCO Council Committee on Inspection and Observation
Data and information	Countries NAFO Secretariat	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	NAMMCO and ACPB Countries NAMMCO Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.								
Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
Average	0	0	0	0	0	0	0	0

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the four issues is 0 out of a possible 1.

3 Conclusions

None of the four fisheries agreements (NAFO, ICCAT, NAMMCO and NASCO) have formal linkages identified across the different stages of the policy cycle.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

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High	20-40%	0.2-0.4	20-40%
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For the Newfoundland-Labrador Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Newfoundland-Labrador Shelf LME	Completeness	Integration	Engagement
	50%	0	63%

4 References

- Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.
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Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the North Australian Shelf LME and Arafura-Timor Seas Project (ATSEA) Area

1 The system to be governed

The system is nominally the North Australian Shelf LME (NASLME). However, the GEF Arafura-Timor Seas (ATSEA) Project covers an area that includes this LME and extends northward the full extent of Arafura and Timor Seas to the coasts of Indonesia, Papua New Guinea, and Timor-Leste. This assessment is therefore done for both the LME and the larger ATSEA project area in parallel. The marine waters included in these areas are shown in Table 1.

An overview of the NAS LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter VIII-13), so a review is not provided here. This assessment is also informed by the ATSEA TDA, PRODOC and SAP (ATSEA 2012a, 2012b).

Table 1. Percentage of North Australian Shelf LME area (area =774,718 km²) and Arafura-Timor Seas Project (ATSEA) area (area =1,594,471 km²), taken up by the EEZ of each country and the High Seas

Country	Percent of area	
	NASLME	ATSEA
Australia	99.2	59.9
Indonesia	<0.1	31.2
Papua New Guinea	<0.1	1.5
Timor-Leste		2.3
Joint management		
Australia-Timor Leste,		2.2
Australia-PNG		<0.1
Australia-Indonesia		2.9
High Seas	0.8	0.0

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

The emphasis in this assessment is mainly the ATSEA Project area as this is the marine ecosystem the countries in the region have selected to work with.

2 Governance arrangements

2.1 Issues to be governed

The issues to be addressed by governance were identified in the TDA (ATSEA 2012):

- Unsustainable fisheries and decline and loss of living coastal and marine resources
 - Demersal finfish and invertebrates
 - Shrimps and prawns
 - Pelagic fishes
- Marine and land-based pollution (e.g. marine debris, sediments, oil spills)
- Modification, degradation and loss of coastal and marine habitats (coral reef and associated habitats)
- Decline and loss of biodiversity and key marine species (especially turtles, dugongs, seabirds/shorebirds, sea snakes, sharks and rays via targeted harvesting or bycatch)

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified as overlapping this area and that may be expected to comprise the arrangements are:

1. Asia Pacific Fisheries Commission (APFIC)
 - a. Regional Plan of Action (RPOA) to Promote Responsible Fishing Practices (including Combating IUU Fishing) in the Region (South East Asia)
2. Convention for the Conservation of the Southern Bluefin Tuna (CCSBT)
3. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
4. Indian Ocean Tuna Commission (IOTC)
5. Asia-Pacific Economic Cooperation (APEC)
 - a. Ocean and Fisheries Working Group (OFWG)
6. Pacific Islands Forum Fisheries Agency/South Pacific Forum Fisheries Agency Convention (FFA)
7. UNEP Coordinating Body for the Seas of East Asia (COBSEA)
8. South East Asian Fisheries Development Center (SEAFDEC)
9. Secretariat of the Pacific Community (SPC)
10. South Pacific Regional Environmental Program (Noumea Convention) (SPREP)
11. Partnerships for the Environmental Management of the Seas of East Asia (PEMSEA)
12. Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI)
13. Indian Ocean- South East Asian Marine Turtle Memorandum of Understanding (IOSEA-MOU)
14. Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)
15. Agreement between the Government of Australia and the Government of the Republic of Indonesia Relating to Cooperation in Fisheries (1992 Fisheries Cooperation Agreement)
 - a. Working Group on Marine Affairs and Fisheries (WGMAF)
 - i. Australia-Indonesia Fisheries Surveillance Forum
16. Australian-Papua New Guinea Torres Strait Treaty
17. Strategic Action Programme for the Arafura and Timor Seas Region, 2012
18. Action Plan for the Protection and Development of the Marine and Coastal Areas of the East Asian Region, 1981
19. Coral Triangle Initiative – Coral Reefs, Fisheries and Food Security (CTI-CFF) – Regional Plan of Action and Agreement to Establish a CTI-CFF Regional Secretariat

The extent to which the geographical area of coverage of these bodies and instruments overlaps the North Australian Shelf LME is shown in Table 2.

Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME ¹	Percent of agreement in ATSEA	Percent of ATSEA in agreement	Fit of agreement to ATSEA
APFIC	5	89	D	10	83	D
CCSBT	<1	21	D	1	26	D
WCPFC	1	86	D	1	73	D
FFA	1	86	D	2	73	D
IOSEA MOU		100	C		100	C
Dugong MOU						
IOTC	<1	14	D	<1	27	D
COBSEA			D	12	99	D
SEAFDEC	<1	<1	D	3	35	D

This LME is at the boundary between Pacific and Indian Ocean agreements. The extent of country membership in these bodies and instruments for the ATSEA/North Australian Shelf LME is shown in Table 3.

Coastal countries in the LME	Agreements									
	APFIC	FFA	WCPFC	IOTC	SEAF-DEC	PEMSEA	COBSEA	SE Asia RPOA	IOSEA MOU	Dugong MOU
Australia	B	B	B	B	N	N	C	C	C	C
Indonesia	B	N	C	B	C	C	C	C	C	
Papua New Guinea		B	B	N	N	N	N	C	C	C
Timor-Leste	B		N	N	N	C	N	C		
% engagement	75	50	67	100	100	100	100	100	75	50
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed										

2.2.1 Assessment of issues

The arrangements for the issues identified above are summarized in Table 4a-e. An overall summary is presented in Table 5.

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 4a: North Australian Shelf LME /ATSEA ¹ – Transboundary arrangement for fisheries – demersal finfish and invertebrates, shrimps/prawns					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	APFIC, SEAFDEC, World Fish Centre	Supra-LME	2	Arafura and Timor Seas Experts Forum (ATSEF)	<ul style="list-style-type: none">• Decline and loss of biodiversity and key marine species via targeted fisheries and bycatch is largely addressed under this arrangement.• East Asia RPOA has a regional/sub-regional MCS networks that include the Arafura and Timor Seas• Scores for advice are average of APFIC and SE Asia RPOA• Australian-PNG Torres Strait Treaty covers access in a limited area• Australia-Indonesia MOU Box agreement covers access in a limited area.• Scores are for APFIC, noting that RPOA may be stronger than APFIC, especially for implementation therefore that score is based on the RPOA
Policy decision-making	SE Asia RPOA Coordination Committee APFIC Commission	Supra-LME	1		
Planning analysis and advice	APFIC, SEAFDEC, World Fish Centre	Supra-LME	1		
Planning decision-making	SE Asia RPOA Coordination Committee	Supra-LME	1		
Implementation	CPs RPOA MCS networks	National Supra-LME	1		
Review and evaluation	SE Asia RPOA Coordination Committee	Supra-LME	2		
Data and information	CPs	National	2		
Overall total and % completeness >>			10/21 = 48%		

Table 4b North Australian Shelf LME /ATSEA – Transboundary arrangement for fisheries – Highly Migratory Species (tuna and tuna-like)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	Supra-LME	3	IUCN PIF/FFA	<ul style="list-style-type: none">For HMS three agreements overlap the area. There is significant overlap with the CCSBT area but fisheries for southern bluefin tuna do not appear to be of significance here². The IOTC area also overlaps but the fisheries for the resources covered by this agreement do not appear to be significant in this region. The WCPFC appears to be the agreement most relevant to the resources but does not cover the entire area.Only 1 country has ratified the WCPF Agreement.The PIF/SPC/FFA oversee the several treaties and agreements relating to HMS but their overlap with this area is minor (Torres Strait area)What are the implications of this for HMS fisheries in this LME?Are there small tunas in the area that these RFMOs should be managing but are not?Fishing mortality on key non-target oceanic species, including sharks, seabirds and sea turtles is covered under this arrangement.
Policy decision-making	WCPFC Commission.	Supra-LME	3		
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	Supra-LME	3		
Planning decision-making	WCPFC Commission.	Supra-LME	3		
Implementation	CPs WCPFC Secretariat FFA	Supra-LME	2		
Review and evaluation	The Technical and Compliance Committee (TCC)	Supra-LME	2		
Data and information	SPC OFP	Supra-LME	3		
Overall total and % completeness >>			19/21 = 90%		

² CCSBT 2010. Report of the Fifteenth Meeting of the Scientific Committee.

Table 4c: North Australian Shelf LME /ATSEA – Transboundary arrangement for (a) Pollution - LBS and MBS and (b) biodiversity – general..					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	COBSEA Secretariat PEMSEA Technical Committee	Supra-LME	1	• APEC, ASEAN, PEMSEA and the SCS Project. Both COBSEA and ASEAN are inter-governmental groupings that share several member countries. The geographical focus (seas of Southeast Asia and southern part of the People’s Republic of China) for the activities is similar. APEC is another inter-governmental grouping with a more extensive geographical coverage, which includes the East Asian Seas region.	• Among the Regional Seas Programmes, East Asia has steered a unique course. There is no regional convention; instead the programme promotes compliance with existing environmental treaties and is based on member country goodwill. • PEMSEA is the regional coordinating mechanism for the implementation of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA)
Policy decision-making	COBSEA PEMSEA Executive Committee	Supra-LME	1		
Planning analysis and advice	COBSEA Secretariat PEMSEA Technical Committee Countries	Supra-LME National	1		
Planning decision-making	Countries	National	1		
Implementation	Countries	National	2		
Review and evaluation	COBSEA PEMSEA Executive Committee	Supra-LME	0		
Data and information	Countries	National	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4d: North Australian Shelf LME /ATSEA – Transboundary arrangement for biodiversity - specific (sea turtles)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Planning analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		
Planning decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Implementation	IOSEA – sea turtle MOU CPs	National	0		
Review and evaluation	IOSEA – sea turtle MOU Secretariat	Supra-LME	2		
Data and information	IOSEA – sea turtle MOU CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 4e: North Australian Shelf LME /ATSEA – Transboundary arrangement for biodiversity - specific (dugong)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CPs	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	CPs	Supra-LME	2		
Planning analysis and advice	CPs	Supra-LME	2		
Planning decision-making	CPs	Supra-LME	2		
Implementation	CPs	Supra-LME National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

2.2.2 Issues mentioned in the TDA but not addressed above:

Table 5: North Australian Shelf LME /ATSEA governance architecture - System summary ⁱⁱ					
IW category: LME		Countries: Australia, Indonesia, Papua New Guinea, East Timor	System name: North Australian Shelf/ATSEA LME		Region: SE Asia
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – demersal finfish and invertebrates, shrimps/prawns	4		48		
Fisheries – HMS (tuna and tuna-like)	4		90		
Pollution -LBS	4		38		
Pollution - MBS	4		38		
Biodiversity - general	4		38		
Biodiversity – specific (sea turtles)	4		52		
Biodiversity – specific (dugong)	4		52		CMS MOU
	System architecture completeness index >>		51%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 5)					
Policy cycle stage	Fisheries – demersal finfish and invertebrates, shrimps/prawns	Fisheries – HMS	Pollution – LBS/MBS and Biodiversity =General	Biodiversity - specific (sea turtles)	Biodiversity - specific (dugongs)
Policy analysis and advice	APFIC, SEAFDEC, World Fish Centre	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	COBSEA Secretariat PEMSEA Technical Committee	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Policy decision-making	SE Asia RPOA Coordination Committee APFIC Commission	WCPFC Commission.	COBSEA PEMSEA Executive Committee	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Planning analysis and advice	APFIC, SEAFDEC, World Fish Centre	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	COBSEA Secretariat PEMSEA Technical Committee Countries	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Planning decision-making	SE Asia RPOA Coordination Committee	WCPFC Commission.	Countries	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Implementation	CPs RPOA MCS networks	CPs WCPFC Secretariat FFA	Countries	IOSEA – sea turtle MOU CPs	MOU CPs
Review and evaluation	SE Asia RPOA Coordination Committee	The Technical and Compliance Committee (TCC)	COBSEA PEMSEA Executive Committee	IOSEA – sea turtle MOU Secretariat	Secretariat
Data and information	CPs	SPC OFP	Countries	IOSEA – sea turtle MOU CPs	MOU CPs

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.								
Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
3 and 4	1	1	1	0	0	1	0	0.6
3 and 5	1	1	1	0	0	1	0	0.6
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
4 and 5	1	1	1	0	0	1	0	0.6
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
5 and 7	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
Average	0.14	0.14	0.14	0	0	0.14	0	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the seven issues is 0.1 out of a possible 1.

3 Conclusions

In this LME, the only integration is seen across issues is among the pollution and biodiversity under COBSEA. No body or agency with a mandate to provide policy integration across these issues could be found. The ATSEA project may be fulfilling this role to some extent. But has a limited life-span.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the North Australian Shelf LME/ATSEA Area, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

North Australian Shelf LME / ATSEA Area	Completeness	Integration	Engagement
	51%	0.1	80%

4 References

ATSEA. 2011. Governance of the Arafura and Timor Seas: Technical Paper for the Transboundary Diagnostic Analysis component of the Arafura and Timor Seas Ecosystem Action Program. Arafura and Timor Seas Ecosystem Action Program, Jakarta. 28 pp.

ATSEA. 2012b. Strategic Action Programme for the Arafura and Timor Seas Region. Report prepared for the Arafura Timor Seas Ecosystem Action (ATSEA) Program, Jakarta Indonesia. 32 p.

ATSEA. 2012a. Transboundary Diagnostic Analysis for the Arafura and Timor Seas Region. Report prepared for the Arafura Timor Seas Ecosystem Action (ATSEA) Program, Jakarta Indonesia. 101 p.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱTable notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱTable notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 4 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the North Brazil Shelf LME

1 The system to be governed

The system is the North Brazil Shelf LME. This includes the marine waters of the countries listed in Table 1 and a small area of High Seas. Although Barbados has a portion of its EEZ in the LME, it is not usually included in this LME as it is not a coastal country.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter XVI-52), so a review is not provided here. This assessment is also informed by the CLME Project TDAs and SAP (Phillips 2011).

2 Governance arrangements

2.1 Issues to be governed

The issues to be addressed by governance were identified in the TDA and Mahon and Phillips (2013):

- Fisheries
- Biodiversity
- Habitat modification
- Pollution

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention).
 - a. Protocol Concerning Co-operation in Combating Oil Spills in the Wider Caribbean Region which was also adopted in 1983 and entered into force on 11 October 1986;
 - b. Protocol Concerning Specially Protected Areas and Wildlife (SPAW) in the Wider Caribbean Region which was adopted on 18 January 1990. The Protocol entered into force on 18 June 2000;

Table 1. Percentage of North Brazil Shelf LME area taken up by the EEZ of each country and the High Seas

Country	Percent of LME area
Barbados	2.3
Brazil	49.3
France	11.5
Guyana	12.8
Suriname	12.1
Trinidad and Tobago	4.6
Venezuela	2.4
High Seas	4.9

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

- c. Protocol Concerning Pollution from Land-Based Sources and Activities which was adopted on 6 October 1999. The Protocol entered into force on 13 August 2010.
2. Caribbean Regional Fisheries Mechanism (CRFM)
3. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
4. Latin American Organization for Fisheries Development (OLDEPESCA)
5. Organization for Central American Fisheries and Aquaculture Sector (OSPECA)
6. Western Central Atlantic Fisheries Commission (WECAFC)
7. Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)
8. The Strategic Action Programme for The Sustainable Management of The Shared Living Marine Resources of the Caribbean And North Brazil Shelf Large Marine Ecosystems (CLME⁺ SAP)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the North Brazil Shelf LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the North Brazil Shelf LME (area = 1,044,333 km ²)			
Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME ¹
Cartagena Convention and Protocols	7	46	D
CRFM	17	32	D
ICCAT	1	100	B
OLDEPESCA	3	21	D
WECAFC	6	100	B
CLME ⁺ SAP			

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

The extent of country membership in these bodies and instruments for the North Brazil Shelf LME is shown in Table 3

Table 3. Country membership in regional marine agreements relevant to the North Brazil Shelf LME								
Coastal countries in the LME	Agreements							
	Cartagena Convention	Cartagena-LBS	Cartagena SPAW	Cartagena Oil spills	CRFM	ICCAT	OLDE PESCA	WECAFC
Barbados	B		B	B	B	B		C
Brazil	N	N	N	N	N	B		C
France	B	B	B	B	N	B	N	C
Guyana	B	B	B	B	B		B	C
Suriname					B			C
Trinidad and Tobago	B	B	B	B	B	B		C
Venezuela	B		B	B	N	B	B	C
% engagement	83	50	83	83	83	71	33	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed								

2.2.1 Assessment of issues

The arrangements in place for the issues identified are shown in Tables 4a-h. These are summarized in Table 5.

Table 4a: North Brazil Shelf LME ¹ – Transboundary arrangements for fisheries - EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CRFM Secretariat CRFM Forum	Sub-LME	3	WECAFC OLDEPESCA	The CRFM is responsible for fisheries in the waters of CARICOM countries, and for representing these countries with external for fishing interests
Policy decision-making	CRFM Ministerial Council	Sub-LME	1		
Planning analysis and advice	CRFM Secretariat CRFM Forum CRFM Scientific WGs	Sub-LME	2		
Planning decision-making	CRFM Ministerial Council	Sub-LME	1		
Implementation	CRFM Secretariat CPs	Sub-LME National	1		
Review and evaluation	CRFM Secretariat CRFM Forum	Sub-LME	2		
Data and information	CRFM Secretariat	Sub-LME	2		
Overall total and % completeness >>			12/21 = 57%%		

Table 4b: North Brazil Shelf LME – Transboundary arrangements for fisheries - EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	WECAFC Scientific Advisory group, and WGs. Commission	Supra-LME	2	CRFM OSPESCA OLDEPESCA OECS	
Policy decision-making	WECAFC Commission	Supra-LME	0		
Planning analysis and advice	Working Groups and Partners	Supra-LME	2		
Planning decision-making	WECAFC Commission	Supra-LME	0		
Implementation	Countries Partner Organizations	National LME	0		
Review and evaluation	Working Groups and Commission	Sub-LME	1		
Data and information	Countries, FAO HQ and Working Groups	National Supra-LME	1		
Overall total and % completeness >>			6/21 = 29%%		

Table 4c: North Brazil Shelf LME – Transboundary arrangements for fisheries - general					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	OLDEPESCA - Board and Technical Committee Expert Groups	Supra-LME	2	WECAFC	US is not a member of OLDEPESCA How significant is OLDEPESCA to the members of this LME?
Policy decision-making	OLDEPESCA - Council of Ministers	Supra-LME	1		
Planning analysis and advice	OLDEPESCA - Board and Technical Committee Expert Groups	Supra-LME	2		
Planning decision-making	Countries	National	1		
Implementation	Countries	National	1		
Review and evaluation	OLDEPESCA - Council of Ministers	Supra-LME	1		
Data and information	Countries OLDEPESCA – Secretariat	National Supra-LME	1		
Overall total and % completeness >>			9/21 = 43%		

Table 4d. North Brazil Shelf LME – Transboundary arrangement for fisheries – HMS (tuna and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3	The Billfish Foundation (TBF), International Game Fish Association (IGFA) GCFI	Mexico and US are members but not Cuba
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			17/21 = 80%		

Table 4e. North Brazil Shelf LME – Transboundary arrangement for Pollution – LBS					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	LBS Scientific and Technical Advisory Committee (STAC)	Supra-LME	3		To what extent is the Cartagena Convention and its protocols significant agreements in the arrangement for Pollution and Biodiversity in the LME?
Policy decision-making	IGM LBS CoP	Supra-LME	1		
Planning analysis and advice	LBS Scientific and Technical Advisory Committee (STAC) CIMAB-RAC- Cuba IMA-RAC-Trinidad	Supra-LME	2		
Planning decision-making	LBS CoP	Supra-LME	1		
Implementation	Countries RCUs RACs	National Supra-LME	2		
Review and evaluation	LBS STAC	Supra-LME	2		
Data and information	Countries RCUs RACs	National Supra-LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4f. North Brazil Shelf LME – Transboundary arrangement for Pollution – MBS					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Cartagena Conv - OSP Scientific and Technical Advisory Committee (STAC), OSP COP	Supra-LME	3	MEXUS -Gulf	The bilateral agreement between Mexico and the US to prevent pollution from oil spills and other hazardous substances has a joint action plan that is the responsibility of the US Coast Guard and the Secretaria de Marina-Armada de Mexico.
Policy decision-making	Cartagena Conv. – IGM, Oil Spill CoP	Supra-LME	1		
Planning analysis and advice	Cartagena Conv. - Scientific and Technical Advisory Committee (STAC),RAC/REMPEITC-Carib	Supra-LME	2		
Planning decision-making	Cartagena Conv. - Oil Spill CoP	Supra-LME	1		
Implementation	Cartagena Conv. – Countries, RCUs, RACs	National Supra-LME	2		
Review and evaluation	Cartagena Conv. - Oil Spill STAC	Supra-LME	2		
Data and information	Cartagena Conv. – Countries, RCUs, RACs	National Supra-LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4g. North Brazil Shelf LME – Transboundary arrangement for Biodiversity – General (PAs, Habitat alteration and depleted non-commercial species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Cartagena Convention SPAW Protocol Scientific and Technical Advisory Committee (STAC) SPAW COP	Supra-LME	3	TNC, CoML	Cuba and U.S. are parties to the SPAW Protocol but not Mexico.
Policy decision-making	SPAW IGM and CoP	Supra-LME	2		
Planning analysis and advice	SPAW Scientific and Technical Advisory Committee (STAC) RAC-SPAW Guadeloupe	Supra-LME	2		
Planning decision-making	SPAW CoP	Supra-LME	2		
Implementation	SPAW Countries RCUs RACs	National Supra-LME	2		
Review and evaluation	SPAW STAC	Supra-LME	2		
Data and information	SPAW Countries RCUs RACs	Supra-LME	2		
Overall total and % completeness >>			15/21 = 71%		

Table 4h: North Brazil Shelf LME – Transboundary Arrangements for Biodiversity – Turtles					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		Both USA and Mexico are parties to the IAC, but not Cuba
Policy decision-making	IAC Consultative Committee and CoP	Supra-LME	3		
Planning analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Planning decision-making	IAC CoP	Supra-LME	3		
Implementation	IAC Countries	National	0		
Review and evaluation	IAC Countries	National	1		
Data and information	IAC Countries	National	1		
Overall total and % completeness >>			12/21 = 57%		

2.2.2 Issues mentioned in the TDA but not addressed above:

Table 5: North Brazil Shelf LME governance architecture - System summary ⁱⁱ					
IW Category: LME		Countries: Barbados Brazil, France, Guyana Suriname, Trinidad and Tobago, Venezuela	System name: North Brazil Shelf LME		Region: Western Atlantic
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue ²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – EEZ	7		57		CRFM
Fisheries – EEZ	7		29		WECAFC
Fisheries – EEZ	7		43		OLDESPECA
Fisheries - HMS	7		80		
Pollution - LBS	7		62		
Pollution - MBS	7		62		
Biodiversity – General	7		71		
Biodiversity - Specific (sea turtles)	7		57		
	System architecture completeness index >>		58%		<< System priority for intervention

2.3 Assess transboundary integration of arrangements

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Table 4 a - h) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table5)								
Policy cycle stage	Fisheries – EEZ (CRFM)	Fisheries – EEZ (WECAFC)	Fisheries – EEZ (OLDEPESCA)	Fisheries - HMS	Pollution - LBS	Pollution - MBS	Biodiversity – General	Biodiversity - Specific (sea turtles)
Policy analysis and advice	CRFM Secretariat CRFM Forum	WECAFC SAG, and WGs. Commission	OLDEPESCA - Board and Technical Committee Expert Groups	ICCAT SCRS	LBS STAC	Cartagena - OSP STAC, OSP COP	Cartagena SPAW Protocol STAC SPAW COP	IAC Consultative and Scientific Committees
Policy decision-making	CRFM Ministerial Council	WECAFC Commission	OLDEPESCA - Council of Ministers	ICCAT Commission	IGM LBS CoP	Cartagena – IGM, OSP CoP	SPAW IGM and CoP	IAC Consultative Committee and CoP
Planning analysis and advice	CRFM Secretariat CRFM Forum CRFM Scientific WGs	Working Groups and Partners	OLDEPESCA - Board and Technical Committee Expert Groups	ICCAT SCRS and Species Panels	LBS STAC CIMAB-RAC- Cuba IMA-RAC- Trinidad	Cartagena Conv. – OSP STAC,RAC/REMP EITC-Carib	SPAW STAC RAC-SPAW Guadeloupe	IAC Consultative and Scientific Committees
Planning decision-making	CRFM Ministerial Council	WECAFC Commission	Countries	ICCAT Commission	LBS CoP	Cartagena Conv. - Oil Spill CoP	SPAW CoP	IAC CoP
Implementation	CRFM Secretariat CPs	Countries Partner Organizations	Countries	Countries	Countries RCUs RACs	Cartagena Conv. – Countries, RCUs,RACs	SPAW Countries RCUs RACs	IAC Countries
Review and evaluation	CRFM Secretariat CRFM Forum	Working Groups and Commission	OLDEPESCA - Council of Ministers	CMMCC)	LBS STAC	Cartagena Conv. - Oil Spill STAC	SPAW STAC	IAC Countries
Data and information	CRFM Secretariat	Countries, FAO HQ and Working Groups	Countries OLDEPESCA – Secretariat	PWG	Countries RCUs RACs	Cartagena Conv. – Countries, RCUs, RACs	SPAW Countries RCUs RACs	IAC Countries

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	1	1	1	0	0	0	0	0.4
1 and 3	0	0	0	0	0	0	0	-
1 and 4	0	0	0	0	0	0	0	-
1 and 5	0	0	0	0	0	0	0	-
1 and 6	0	0	0	0	0	0	0	-
1 and 7	0	0	0	0	0	0	0	-
1 and 8	0	0	0	0	0	0	0	-
2 and 3	0	0	0	0	0	0	0	-
2 and 4	0	0	0	0	0	0	0	-
2 and 5	0	0	0	0	0	0	0	-
2 and 6	0	0	0	0	0	0	0	-
2 and 7	0	0	0	0	0	0	0	-
2 and 8	0	0	0	0	0	0	0	-
3 and 4	0	0	0	0	0	0	0	-
3 and 5	0	0	0	0	0	0	0	-
3 and 6	0	0	0	0	0	0	0	-
3 and 7	0	0	0	0	0	0	0	-
3 and 8	0	0	0	0	0	0	0	-
5 and 6	0	0	0	0	0	0	0	-
5 and 7	0	0	0	0	0	0	0	-
5 and 8	0	0	0	0	0	0	0	-
5 and 9	1	1	1	1	1	1	1	1.0
6 and 7	1	1	1	1	1	1	1	1.0
6 and 8	1	1	1	1	1	1	1	1.0
6 and 9	0	0	0	0	0	0	0	-
7 and 8	1	1	1	1	1	1	1	1.0
7 and 9	0	0	0	0	0	0	0	-
8 and 9	0	0	0	0	0	0	0	-
Average	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the six issues is 0.2 out of a possible 1.

3 Conclusions

The two arrangements for fisheries (CRFM and WECAFC) in the areas within national jurisdiction are closely connected. So are the two arrangements for pollution and biodiversity that fall under the Cartagena Convention. However neither of these pairs appears to be integrated with each other or with the tuna arrangement (ICCAT)

No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the North Brazil Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

North Brazil Shelf LME	Completeness	Integration	Engagement
	58%	0.2	74%

4 References

- Heileman, S. 2011. CLME Project reef and pelagic ecosystems Transboundary Diagnostic Analysis (TDA). Prepared for The Caribbean Large Marine Ecosystem and Adjacent Areas (CLME) Project, Cartagena, Colombia, 243 pp.
- Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.
- Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.
<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.
- Mahon, R., L. Fanning and P. McConney. 2011a. CLME TDA Update for fisheries ecosystems: governance issues. The Caribbean Large Marine Ecosystem and Adjacent Areas (CLME) Project, Cartagena, Colombia, 113 pp.
- Mahon, R. and T. Phillips. 2012. Governance assessment for the Guianas-Brazil shelf continental shelf fisheries ecosystem. Centre for Resource Management and Environmental Studies (CERMES), University of the West Indies, Cave Hill Campus, Barbados, Technical Report No 59: 29pp.
- Phillips, T. 2011. CLME Project Continental Shelf Ecosystem Transboundary Diagnostic Analysis (TDA). Prepared for The Caribbean Large Marine Ecosystem and Adjacent Areas (CLME) Project, Cartagena, Colombia, 64 pp.
- Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 4 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the North Sea LME

1 The system to be governed

The system is the North Sea LME. It is situated on the continental shelf of northwestern Europe. It covers an area of about 690,000km². The countries bordering this LME includes Belgium, Denmark, Denmark (Faroe Islands), France, Germany, Netherlands, Norway, Sweden and the United Kingdom (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter 42), so a review is not provided here.

Table 1. Percentage of North Sea LME area taken up by the EEZ of each country and the High Seas (area = 689,073 km ²)	
Country (N to S)	Percent of LME area
Belgium	0.5
Denmark (Greenland)	11.6
Denmark (Faroe Islands)	1.5
France	0.3
Germany	5.9
Netherlands	8.9
Norway	22.7
Sweden	2.0
United Kingdom	46.5
High Seas	0.2

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 42 (Sherman and Hempel, 2009) as follows:

- Fisheries
 - increasing commercially overexploited stocks;
 - invasive species from ballast water and shipping
- Pollution
 - (LBS) Eutrophication (sewage effluents, leaching from agricultural land, contributions from rural populations and atmospheric nitrogen deposition)
- Pollution
 - (MBS) Hazardous substances, oily wastes and slicks

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)
2. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
3. International Council for the Exploration of the Sea (ICES)

4. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
5. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)
6. North-East Atlantic Fisheries Commission (NEAFC)
7. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)
8. Agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances (Bonn Agreement)
9. Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)
10. European Union Common Fisheries Policy (CFP)
11. European Union Maritime Policy

The extent to which the geographical area of coverage of these bodies and instruments overlaps the North Sea LME is shown in Table 2.

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
Arctic Council (AC)	1	18	D
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	100	C
International Council for the Exploration of the Sea (ICES)	5	100	C
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	3	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	3	100	C
North-East Atlantic Fisheries Commission (NEAFC)	5	99	D
Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)	5	100	C
Agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances (Bonn Agreement)	50	94	D
Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)	32	97	C
European Union Common Fisheries Policy (CFP)	14	76	D
European Union Maritime Policy	14	76	D

The extent of country membership in these bodies and instruments for the North Sea LME is shown in Table 3.

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the North Sea LME									
Coastal countries in the LME	Agreements								
	ICCAT	ICES	NAMMCO	NASCO	NEAFC	OSPAR	Bonn	ASCOBANS	CFP
Belgium	N	B				B	B	B	B
Denmark (Greenland)			B	B	B	B			
Denmark (Faroe Islands)			B	B	B	B			
France	B	B				B	B	B	B
Germany	N	B				B	B	B	B
Netherlands		B				B	B	B	B
Norway	B	B	B	B	B	B	B	C	
Sweden	N	B		B		B	B	B	B
United Kingdom	B	B				B	B	B	B
% engagement	50	78	33	44	33	100	78	78	67
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed									

2.2.1 Assessment of issues

The governance arrangements for the issues identified above are presented in Tables 4a- 4i. They are summarised in table 5.

Table 4a: North Sea LMEⁱ – Transboundary Arrangement for Fisheries – Specific (salmon)

Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	Supra-LME	3	ICES	Only Denmark is a member Dependent on ICES for scientific advice
Policy decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	Supra-LME	3		
Planning decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat and International Atlantic Salmon Research Board	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4b: North Sea LME – Transboundary Arrangement for fisheries - Marine Mammals					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3		
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4c: North Sea LME – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		Only Denmark is a member of NEAFC ICES named in NEAFC to provide scientific advice
Policy decision-making	NEAFC - Commission	Supra-LME	3		
Planning analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		
Planning decision-making	NEAFC - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Supra-LME	3		
Data and information	Countries ICES	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4d. North Sea LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4e: North Sea LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS) and Biodiversity (General)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	OSPAR – 5 main Committees and their Working Groups a) Biodiversity and Ecosystem b) Eutrophication Strategy c) Hazardous Substances d) Offshore Industry Strategy e) Radioactive Substances	Supra-LME	3	Arctic Council ICES (as observer)	
Policy decision-making	OSPAR Commission	Supra-LME	3		
Planning analysis and advice	OSPAR – 5 main Committees and their Working Groups	Supra-LME	3		
Planning decision-making	OSPAR Commission	Supra-LME	3		
Implementation	Countries OSPAR Commission Special Studies OSPAR Secretariat	National Supra-LME	1		
Review and evaluation	OSPAR Commission, Main Committees and Working Groups	Supra-LME	3		
Data and information	Countries OSPAR Secretariat	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4f: North Sea LME – Transboundary Arrangement General – Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC)	
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 4g: North Sea LME – Transboundary Arrangement for Biodiversity – Specific (Small cetaceans)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ASCOBANS Advisory Committee	Supra-LME	3	CMS	
Policy decision-making	Meeting of the Parties	Supra-LME	2		
Planning analysis and advice	ASCOBANS Advisory Committee	Supra-LME	3		
Planning decision-making	Meeting of the Parties	Supra-LME	1		
Implementation	Contracting Parties	National	0		
Review and evaluation	Meeting of the Parties	Supra-LME	2		
Data and information	Contracting Parties, Secretariat, Advisory Committee, Coordinating Authorities	National Supra-LME	2		
Overall total and % completeness >>			13 /21 = 62%		

Table 4h: North Sea LME – Transboundary Arrangement for Fisheries – EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3		
Policy decision-making	European Commission	Supra-LME	2		
Planning analysis and advice	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	Supra-LME	3		
Planning decision-making	European Commission	Supra-LME	3		
Implementation	Contracting Parties Scientific, Technical and Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	National Supra-LME	2		
Review and evaluation	Commission STECF	Supra-LME	3		
Data and information	Contracting Parties Commission STECF Advisory Councils	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4i: North Sea LME – Transboundary Arrangement for Pollution – MBS					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Bonn Agreement – Contracting Parties	National	2		
Policy decision-making	Meeting of the Parties	Supra-LME	1		
Planning analysis and advice	Contracting Parties	National	2		
Planning decision-making	Meeting of the Parties	Supra-LME	1		
Implementation	Contracting Parties	National	0		
Review and evaluation	Meeting of the Parties	Supra-LME	1		
Data and information	Contracting Parties	National	1		
Overall total and % completeness >>			8 /21 = 38%		

Table 5: North Sea LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Belgium, Denmark, Denmark (Faeroe Islands), France, Germany, Netherlands, Norway, Sweden and the United Kingdom	System name: North Sea		Region: North East Atlantic
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – EEZ/ABNJ	8		86%		NEAFC
Fisheries – large pelagics (tunas and tuna-like)	8		86%		ICCAT
Fisheries – specific (salmon)	8		57%		NASCO
Fisheries - Marine Mammals	8		71%		NAMMCO
Fisheries - EEZ	8		90%		CFP
Pollution - LBS	8		90%		OSPAR
Pollution - MBS	8		90%		OSPAR
Pollution - LBS	8		67%		Arctic Council
Pollution - MBS	8		67%		Arctic Council
Pollution - MBS	8		38%		Bonn
Biodiversity – Small Cetaceans	8		62%		ASCOBANS
	System architecture completeness index >>		73%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-i) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table5)											
Policy cycle stage	Fisheries - Salmon	Fisheries – marine mammals	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries - EEZ	Pollution – LBS	Pollution – MBS	Pollution – LBS	Pollution – MBS	Pollution - MBS	Biodiversity - Specific
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	NEAFC - PEMAS ICES	ICCAT Standing Committee on Research and Statistics (SCRS)	EU-CFP Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	OSPAR – 5 main Committees and their Working Groups	OSPAR – 5 main Committees and their Working Groups	Arctic Council – ACAP, AMAP, CAFF, EPPR, PAME, SAO	Arctic Council – ACAP, AMAP, CAFF, EPPR, PAME, SAO	Bonn Agreement – Contracting Parties	ASCOBANS Advisory Committee
Policy decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	NEAFC - Commission	ICCAT Commission	European Commission	OSPAR Commission	OSPAR Commission	Arctic Council	Arctic Council	Meeting of the Parties	Meeting of the Parties
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	NAMMCO Man. Comm and Sci. Comm	NEAFC - PEMAS ICES	ICCAT SCRS and Species Panels	Advisory Councils Scientific, Technical and Economic Committee for Fisheries (STECF)	OSPAR – 5 main Committees and their Working Groups	OSPAR – 5 main Committees and their Working Groups	Arctic Council - ACAP, AMAP, CAFF, EPPR, PAME, SAO	Arctic Council - ACAP, AMAP, CAFF, EPPR, PAME, SAO	Contracting Parties	ASCOBANS Advisory Committee
Planning decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	NEAFC - Commission	ICCAT Commission	European Commission	OSPAR Commission	OSPAR Commission	Arctic Council	Arctic Council	Meeting of the Parties	Meeting of the Parties
Implementation	Countries	Countries Secretariat – Joint NAMMCO	Countries	Countries	Contracting Parties Scientific, Technical	Countries OSPAR Commission Special	Countries OSPAR Commission Special	Countries	Countries	Contracting Parties	Contracting Parties

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table5)											
Policy cycle stage	Fisheries - Salmon	Fisheries – marine mammals	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries - EEZ	Pollution – LBS	Pollution – MBS	Pollution – LBS	Pollution – MBS	Pollution - MBS	Biodiversity - Specific
		Control Scheme for Hunting			and Economic Committee for Fisheries (STECF) and its Expert Working Groups (EWGs)	Studies OSPAR Secretariat	Studies OSPAR Secretariat				
Review and evaluation	NASCO Council	NAMMMCO Council Committee on Inspection and Observation	NEAFC - PECCOE	ICCAT CMMCC	Commission on STECF	OSPAR Commission Main Committees and Working Groups	OSPAR Commission Main Committees and Working Groups	Arctic Council	Arctic Council	Meeting of the Parties	Meeting of the Parties
Data and information	Countries NASCO Secretariat and IASRB	Countries NAMMCO Secretariat	Countries ICES	ICCAT PWG	Contracting Parties Commission on STECF Advisory Councils	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Countries Secretariat	Countries Secretariat	Contracting Parties	Contracting Parties, Secretariat, Advisory Committee, Coordinating Authorities

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.								
Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
1 and 10	0	0	0	0	0	0	0	0
1 and 11	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
2 and 10	0	0	0	0	0	0	0	0
2 and 11	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
3 and 9	0	0	0	0	0	0	0	0
3 and 10	0	0	0	0	0	0	0	0
3 and 11	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
4 and 9	0	0	0	0	0	0	0	0
4 and 10	0	0	0	0	0	0	0	0
4 and 11	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
5 and 7	0	0	0	0	0	0	0	0
5 and 8	0	0	0	0	0	0	0	0
5 and 9	0	0	0	0	0	0	0	0
5 and 10	0	0	0	0	0	0	0	0
5 and 11	0	0	0	0	0	0	0	0
6 and 7	1	1	1	1	1	1	1	1
6 and 8	0	0	0	0	0	0	0	0
6 and 9	0	0	0	0	0	0	0	0
6 and 10	0	0	0	0	0	0	0	0

6 and 11	0	0	0	0	0	0	0	0
7 and 8	0	0	0	0	0	0	0	0
7 and 9	0	0	0	0	0	0	0	0
7 and 10	0	0	0	0	0	0	0	0
7 and 11	0	0	0	0	0	0	0	0
8 and 9	1	1	1	1	1	1	1	1
8 and 10	0	0	0	0	0	0	0	0
8 and 11	0	0	0	0	0	0	0	0
9 and 10	0	0	0	0	0	0	0	0
9 and 11	0	0	0	0	0	0	0	0
10 and 11	0	0	0	0	0	0	0	0
Average	0.4	0.04	0.04	0.04	0.04	0.04	0.04	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the issues is 0.04 out of a possible 1.

3 Conclusions

The policy cycles relating to the key issues of fisheries and pollution are associated with well-established arrangements that are among the strongest globally. However, there does not appear to be much integration among these processes.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6-0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the North Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

North Sea LME	Completeness	Integration	Engagement
	73%	0.1	62%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 5 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Northeast US Continental Shelf LME

1 The system to be governed

The system is the Northeast U.S. Continental Shelf LME. This LME has an area of 310,000 km² and extends from the Gulf of Maine to Cape Hatteras in the Atlantic Ocean. It spans four major sub-areas: Gulf of Maine, Georges Bank, Southern New England, and the Mid-Atlantic Bight along the marine waters of the countries as indicated in Table 1.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter 61), so a review is not provided here.

Table 1. Percentage of Northeast U.S. Continental Shelf LME area taken up by the EEZ of each country and the High Seas (area = 310,000 km ²)	
Country	Percent of LME area
Canada	16.9
United States	82.1
High Seas	1.1

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 61 (Sherman and Hempel, 2009) as follows:

- Fisheries
 - decline in biomass of fish stocks; excessive fishing mortality; collapse of commercially exploited stocks; overfishing of several demersal stocks
- Biodiversity
 - benthic community degradation
- Pollution
 - (LB) fish tissue contamination and increasing eutrophication
 - (LBS) high levels of sediment contamination (near urban centres)

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

Governance in this LME is shared among several stewardship agencies and there is a complex layering of management agencies. The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. The International Commission for the Conservation of Atlantic Tunas (ICCAT)

2. Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)
3. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
4. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Northeast U.S. Continental Shelf LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with the Northeast U.S. Continental Shelf LME (area = 315,654 km ²)			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of Agreement to LME ¹
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	<1	100	C
Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)	5	100	C
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	2	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	1	90	D

The extent of country membership in these bodies and instruments for the Northeast U.S. Continental Shelf LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Northeast U.S. Continental Shelf LME				
Coastal countries in the LME	Agreements			
	ICCAT	NAFO	NAMMCO	NASCO
Canada	B	B		B
United States	B	B		B
% engagement	100	100		100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed				

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-d. They are summarised in Table 5

Table 4a. Northeast U.S. Continental Shelf LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			17/21 = 81%		

Table 4b: Northeast U.S. Continental Shelf LME – Transboundary Arrangement for fisheries – EEZ and ABNJ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NAFO Scientific Council	Supra-LME	3		
Policy decision-making	NAFO General Council Fisheries Commission	Supra-LME	3		
Planning analysis and advice	NAFO Scientific Council	Supra-LME	3		
Planning decision-making	NAFO General Council Fisheries Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NAFO Standing Committee on International Control (STACTIC)	Supra-LME	3		
Data and information	Countries NAFO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4c: Northeast U.S. Continental Shelf LME – Transboundary Arrangement for Fisheries – Specific (Marine Mammals)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3		Neither country is eligible to be full members without the expressed agreement of the 4 original signatory countries
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	NAMMCO Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	NAMMCO Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4d: Northeast U.S. Continental Shelf LME – Transboundary arrangement for fisheries – specific (salmon)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICES NASCO Secretariat and its Commissions	Supra-LME	3		Both countries are members of NASCO (France through the EU) ICES named in NASCO to provide scientific advice
Policy decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Planning analysis and advice	NASCO Three Commissions NASCO Secretariat ICES	Supra-LME	3		
Planning decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 5: Northeast U.S. Continental Shelf LME governance architecture - System summary ¹					
IW category: LME		Countries: Canada, USA	System name: Northeast U.S. Continental Shelf LME		Region: NW Atlantic
Complete these columns then assess issues using the arrangements tables			After completing the arrangements tables, complete these columns		
Trans-boundary issue ²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – EEZ/ABNJ	2		86%		
Fisheries – large pelagics (tunas and tuna-like)	2		81%		
Fisheries - specific (marine mammals)	2		71%		
Fisheries – specific (salmon)	2		57%		
Pollution – MBS	2		0%		
Pollution - LBS	2		0%		
	System architecture completeness index >>		49%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

Issues relating to invasive species and marine pollution are not addressed specifically as transboundary issues between the countries in the LME. This is likely due to the LME being primarily within Canada's maritime domain and as such, dealt with nationally and at levels higher than the LME such as the case for ballast water discharges from international shipping.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-d) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-d)				
Policy cycle stage	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries - Specific	Fisheries - Specific - Marine Mammals
Policy analysis and advice	NAFO Scientific Council	ICCAT Standing Committee on Research and Statistics (SCRS)	ICES NASCO Secretariat and its Commissions	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods
Policy decision-making	NAFO General Council Fisheries Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council
Planning analysis and advice	NAFO Scientific Council	ICCAT SCRS and Species Panels	NASCO Three Commissions NASCO Secretariat ICES	NAMMCO Management Committee and Scientific Committee
Planning decision-making	NAFO General Council Fisheries Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council
Implementation	Countries	Countries	Countries	NAMMCO Secretariat – Joint NAMMCO Control Scheme for Hunting
Review and evaluation	NAFO Standing Committee on International Control (STACTIC)	Conservation and Management Measures Compliance Committee (CMMCC)	NASCO Council	NAMMMCO Council Committee on Inspection and Observation
Data and information	Countries NAFO Secretariat	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	NAMMCO and ACPB Countries NAMMCO Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.								
Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
Average	0	0	0	0	0	0	0	0

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the four issues is 0 out of a possible 1.

3 Conclusions

None of the four fisheries agreements (NAFO, ICCAT, NASCO and NAMMCO) have formal linkages identified across the different stages of the policy cycle.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Northeast U.S. Continental Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Northeast U.S. Continental Shelf LME	Completeness	Integration	Engagement
	49%	0	75%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advisesⁱⁱⁱ
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^{iv}

Decision-making (policy and management):

- 0 = No decision-making mechanism^v
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vi}
- 3 = Implemented through a coordinated regional/global mechanism^{vii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{viii}
- 3 = DI centrally managed and shared^{ix}

End notes

ⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0 for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱ The individual integration scores to be entered in Table 5 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

ⁱⁱⁱ Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^{iv} This can be internal or external

^v This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vi} This means support from regional programmes or partner organizations arranged via secretariat

^{vii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{viii} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^{ix} Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Northern Bering - Chukchi Seas LME

1 The system to be governed

The system is the Northern Bering - Chukchi Seas LME. It is located off Russia's East Siberian coast and the northwestern coast of Alaska (Table 1). It is fed by both Pacific and Arctic waters. Pacific waters enter the LME via the Bering Strait.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter XI-31), so a review is not provided here.

Table 1. Percentage of Northern Bering - Chukchi Seas LME area taken up by the EEZ of each country and the High Seas (area = 1,323,717 km²)

Country	Percent of LME area
Russia	42.9
United States	35.2
High Seas	21.9

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by Sherman and Hempel (2009) as follows:

- Fisheries
 - dramatic oscillations on the scale of two-to-three years (due to the impact of varying ice and weather regimes; or the internal dynamics of this ecosystem)
- Pollution (LBS)
 - increasing distribution of organic pollutants; high HCHs content (exceeding PCBs and DDTs); a broad spectrum of trace metals including heavy metals, aromatic and chlorinated hydrocarbons
 - MBS are generally slight and attributed mainly to chemicals and oil spills
- Biodiversity/Habitat Modification
 - localised degradation of some habitats (mainly attributable to pollution)
- Climate Change
 - warming rapidly; thinning polar ice pack; profound ecological impact expected

2.2 Identify arrangements for each transboundary issue

The Northern Bering - Chukchi Seas LME is bordered by Russia and the U.S. The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)

2. International Pacific Halibut Commission (IPHC)/Convention for the Preservation of the Halibut Fishery(IPHC)
3. The North Pacific Marine Science Organization (PICES)
4. Agreement on the Conservation of Polar Bears (ACPB)
 - a. Agreement between the Government of the United States of America and the Government of the Russian Federation on the conservation and management of the Alaska-Chukotka polar bear population

The extent to which the geographical area of coverage of these bodies and instruments overlap the Northern Bering - Chukchi Seas LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with Northern Bering - Chukchi Seas LME			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
Arctic Council (AC)	7.2	100	C
International Pacific Halibut Commission (IPHC)/Convention for the Preservation of the Halibut Fishery(IPHC)	3	17	D
The North Pacific Marine Science Organization (PICES)	1	27	D

The extent of country membership in these bodies and instruments for the Northern Bering - Chukchi Seas LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Northern Bering - Chukchi Seas LME					
LME coastal countries	Agreement				
	AC	IPHC	PICES	ACPB	ACPB Alaska-Chukotka
Russia	C	N	B	B	B
United States	C	B	B	B	B
% engagement	100	100	100	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed					

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

2.2.1 Assessment of issues

The governance arrangements for the issues identified above are presented in Tables 4 a-c. They are summarised in table 5

Table 4a: Northern Bering - Chukchi Seas LME ¹ – Transboundary Arrangements for Fisheries – Halibut					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board.	LME	3	PICES?	Russia is not a member
Policy decision-making	IPHC - Commission	LME	3		
Planning analysis and advice	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board.	LME	3		
Planning decision-making	IPHC - Commission	LME	3		
Implementation	Countries	National	2		
Review and evaluation	IPHC – Conference Board	LME	3		
Data and information	IPHC – Conference Board	LME	3		
Overall total and % completeness >>			20/21 = 95%		

Table 4b: Northern Bering - Chukchi Seas LME – Transboundary Arrangement for Pollution – LBS and MBS, Biodiversity, Fisheries and Climate Change					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; Conservation of Arctic Flora and Fauna; Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC) IMO	Both countries are members of the Arctic Council
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; Conservation of Arctic Flora and Fauna; Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 4c: Northern Bering - Chukchi Seas LME – Transboundary Arrangement for Biodiversity - Protection of Polar Bears					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ACPB – IUCN Polar Bear Specialist Group and Country experts US-Russia National Sections, Scientific Working Groups	Supra-LME National Sub-LME	2	Arctic Council	Both coastal states are members of ACPB although Russia has only signed, not ratified Both countries have signed the agreement under ACPB regarding the Alaska-Chukotka polar bears The arrangement includes both the ACPB and the subsequent US-Russia Polar Bear Agreement so the scores are the average of the two agreements (ACPB 8/21; US-Rus 12/21)
Policy decision-making	US-Russia Polar Bear Commission ACPB- Countries	Sub-LME Supra-LME National	1		
Planning analysis and advice	ACPB – IUCN Polar Bear Specialist Group and Country experts	Supra-LME National	2		
Planning decision-making	ACPB Countries	Supra-LME National	1		
Implementation	ACPB Countries US –Russia agreement countries	National	0.5		
Review and evaluation	ACPB - IUCN Polar Bear Specialist Group US-Russia Polar Bear Commission	Supra-LME Sub-LME	1.5		
Data and information	ACPB Countries ACPB – IUCN Polar Bear Specialist Group and Country experts US-Russia agreement countries	National Supra-LME Sub-LME	2		
Overall total and % completeness >>			10/21 = 48%		

Table 5: Northern Bering - Chukchi Seas LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Russia, United States	System name: Chukchi Sea		Region: North Polar
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries - Halibut	2		95%		
Pollution (LBS)	2		67%		
Pollution (MBS)	2		67%		
Biodiversity - General	2		67%		
Biodiversity - Protection of Polar Bears	2		48%		
	System architecture completeness index >>		69%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-c) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-c)

Policy cycle stage	Fisheries - Halibut	Pollution - LBS	Pollution - MBS	Biodiversity - General	Biodiversity - Polar Bear
Policy analysis and advice	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board.	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	ACPB – IUCN Polar Bear Specialist Group and Country experts US-Russia National Sections, Scientific Working Groups
Policy decision-making	IPHC - Commission	Arctic Council			US-Russia Polar Bear Commission ACPB- Countries
Planning analysis and advice	IPHC - Conference Board, the Processor Advisory Group, the Research Advisory Board, the Management Strategy Advisory Board, and the Scientific Review Board.	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	ACPB – IUCN Polar Bear Specialist Group and Country experts
Planning decision-making	IPHC - Commission	Arctic Council	Arctic Council	Arctic Council	ACPB Countries
Implementation	Countries	Countries	Countries	Countries	ACPB Countries US –Russia agreement countries
Review and evaluation	IPHC – Conference Board	Arctic Council	Arctic Council	Arctic Council	ACPB - IUCN Polar Bear Specialist Group US-Russia Polar Bear Commission
Data and information	IPHC – Conference Board	Countries Secretariat	Countries Secretariat	Countries Secretariat	ACPB Countries ACPB – IUCN Polar Bear Specialist Group and Country experts US-Russia agreement countries

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
2 and 3	0	1	0	1	0	1	1	0.57
2 and 4	0	1	0	1	0	1	1	0.57
2 and 5	0	0	0	0	0	0	0	0
3 and 4	0	1	0	1	0	1	1	0.17
3 and 5	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
Average	0	0.3	0	0.3	0	0.3	0.3	0.2

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the five issues is 0.2 out of a possible 1.

3 Conclusions

While the halibut (IPHC) and polar bear (ACPB) arrangements do not appear to be connected, the arrangement for land-based and marine-based pollution, biodiversity in general and fisheries under the Arctic Council is well-integrated. However, since the Arctic Council is not constituted under a Convention, it is limited in terms of its ability to create any binding agreements and is dependent on countries to implement its recommendations. The Council is currently working with the IMO to develop a polar code for marine activities in the Arctic and Antarctic. This LME has been assigned an overall integration score of 1.0 due to the presence of the Arctic Council with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Northern Bering – Chukchi Seas LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Northern Bering – Chukchi Seas LME	Completeness	Integration	Engagement
	69%	1.0	100%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp. <http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared

or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Norwegian Sea LME

1 The system to be governed

The system is the Norwegian Sea LME. It is a western boundary ecosystem situated off the West Coast of Norway and consists of two deep basins and the Norwegian shelf along the eastern rim. It covers about 1.12 million km² along the coasts of Denmark, Iceland, Norway, Norway (Jan Mayen) and the United Kingdom (Table 1)

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter 43), so a review is not provided here.

Table 1. Percentage of Norwegian Sea LME area taken up by the EEZ of each country and the High Seas (area = 1,120,000 km ²)	
Country	Percent of LME area
Denmark	9.6
Iceland	5.3
Norway	12.8
Norway (Jan Mayen)	49.6
United Kingdom	2.1
High Seas	20.6

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 43 (Sherman and Hempel, 2009) as follows:

- Fisheries
 - increasing number of collapsed stocks and commercially exploited stocks
- Pollution
 - (MBS) offshore oil industry (spills); substandard ships

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

More than 20 treaties and agreements cover the entire Arctic area. However, the key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)
2. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
3. International Council for the Exploration of the Sea (ICES)
4. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)

5. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
6. North-East Atlantic Fisheries Commission (NEAFC)
7. Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Norwegian Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with Norwegian Sea LME (area = 1,070,359 km ²)			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of Agreement to LME ¹
Arctic Council (AC)	4	65	D
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	100	C
International Council for the Exploration of the Sea (ICES)	7	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	5	100	C
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	5	100	C
North-East Atlantic Fisheries Commission (NEAFC)	8	100	C
Convention for the Protection of the Marine Environment of the North-East Atlantic [OSPAR Convention](OSPAR)	8	100	C

The extent of country membership in these bodies and instruments for the Norwegian Sea LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Norwegian Sea LME							
Coastal countries in the LME	Agreements						
	AC	ICCAT	ICES	NASCO	NAMMCO	NEAFC	OSPAR
Denmark	C		B			B	B
Iceland	C	B	B	B	B	B	B
Norway	C	B	B	B	B	B	B
Norway (Jan Mayen)	C	B	B	B	B	B	B
United Kingdom	N	B	B				B
% engagement	100	80	100	60	67	80	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed							

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-f. They are summarised in Table 5.

Table 4a: Norwegian Sea LME ⁱ – Transboundary Arrangement for Fisheries – Specific (salmon)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	Supra-LME	3	ICES	Dependent on ICES for scientific advice
Policy decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	Supra-LME	3		
Planning decision-making	NASCO-Council and NE Atlantic Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat and International Atlantic Salmon Research Board	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 4b: Norwegian Sea LME – Transboundary Arrangement for fisheries - Marine Mammals					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3		
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4c: Norwegian Sea LME – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		Only Denmark is a member of NEAFC ICES named in NEAFC to provide scientific advice
Policy decision-making	NEAFC - Commission	Supra-LME	3		
Planning analysis and advice	NEAFC -Permanent Committee on Management and Science (PEMAS) ICES	Supra-LME	3		
Planning decision-making	NEAFC - Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NEAFC - Permanent Committee on Control and Enforcement (PECCOE)	Supra-LME	3		
Data and information	Countries ICES	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4d. Norwegian Sea LME – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			17/21 = 81%		

Table 4e: Norwegian Sea LME – Transboundary Arrangement for Pollution – Pollution (LBS and MBS) and Biodiversity (General)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	OSPAR – 5 main Committees and their Working Groups a) Biodiversity and Ecosystem b) Eutrophication Strategy c) Hazardous Substances d) Offshore Industry Strategy e) Radioactive Substances	Supra-LME	3	Arctic Council ICES (as observer)	
Policy decision-making	OSPAR Commission	Supra-LME	3		
Planning analysis and advice	OSPAR – 5 main Committees and their Working Groups	Supra-LME	3		
Planning decision-making	OSPAR Commission	Supra-LME	3		
Implementation	Countries OSPAR Commission Special Studies OSPAR Secretariat	National Supra-LME	1		
Review and evaluation	OSPAR Commission, Main Committees and Working Groups	Supra-LME	3		
Data and information	Countries OSPAR Secretariat	National Supra-LME	3		
Overall total and % completeness >>			19 /21 = 90%		

Table 4f: Norwegian Sea LME – Transboundary Arrangement General – Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC)	
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency preparedness, Prevention and response (EPPR); Protection of Arctic Marine Environment (PAME); SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 5: Norwegian Sea LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Denmark Iceland, Norway, Norway, United Kingdom	System name: Norwegian Sea		Region: North East Atlantic
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – EEZ/ABNJ	3		86%		NEAFC
Fisheries – large pelagics (tunas and tuna-like)	3		81%		ICCAT
Fisheries – specific (salmon)	3		57%		NASCO
Fisheries - Marine Mammals	3		71%		NAMMCO
Pollution - LBS	3		90%		OSPAR
Pollution - MBS	3		90%		OSPAR
Pollution - LBS	3		67%		Arctic Council
Pollution - MBS	3		67%		Arctic Council
	System architecture completeness index >>		76%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-f) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage for the Norwegian Sea LME (from table5)								
Policy cycle stage	Fisheries - Salmon	Fisheries – marine mammals	Fisheries – EEZ/ABNJ	Fisheries - HMS	Pollution – LBS	Pollution – MBS	Pollution – LBS	Pollution – MBS
Policy analysis and advice	NASCO – Secretariat and its NE Atlantic Commission as well as ICES	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	NEAFC - Permanent Committee on Management and Science (PEMAS) ICES	ICCAT Standing Committee on Research and Statistics (SCRS)	OSPAR – 5 main Committees and their Working Groups	OSPAR – 5 main Committees and their Working Groups	Arctic Council – ACAP, AMAP, CAFF, EPPR, PAME, SAO	Arctic Council – ACAP, AMAP, CAFF, EPPR, PAME, SAO
Policy decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	NEAFC - Commission	ICCAT Commission	OSPAR Commission	OSPAR Commission	Arctic Council	Arctic Council
Planning analysis and advice	NASCO – Secretariat and NE Atlantic Commission	NAMMCO Man. Comm and Sci. Comm	NEAFC - PEMAS ICES	ICCAT SCRS and Species Panels	OSPAR – 5 main Committees and their Working Groups	OSPAR – 5 main Committees and their Working Groups	Arctic Council - ACAP, AMAP, CAFF, EPPR, PAME, SAO	Arctic Council - ACAP, AMAP, CAFF, EPPR, PAME, SAO
Planning decision-making	NASCO-Council and NE Atlantic Commission	NAMMCO Council	NEAFC - Commission	ICCAT Commission	OSPAR Commission	OSPAR Commission	Arctic Council	Arctic Council
Implementation	Countries	Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	Countries	Countries	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries OSPAR Commission Special Studies OSPAR Secretariat	Countries	Countries
Review and evaluation	NASCO Council	NAMMMCO Council Committee on Inspection and Observation	NEAFC - PECCOE	ICCAT CMMCC	OSPAR Commission, Main Committees and Working Groups	OSPAR Commission, Main Committees and Working Groups	Arctic Council	Arctic Council
Data and information	Countries NASCO Secretariat and IASRB	Countries NAMMCO Secretariat	Countries ICES	ICCAT PWG	Countries OSPAR Secretariat	Countries OSPAR Secretariat	Countries Secretariat	Countries Secretariat

Table 7. Assessment of integration among arrangements for the Norwegian Sea LME. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
5 and 6	1	1	1	1	1	1	1	1
5 and 7	0	0	0	0	0	0	0	0
5 and 8	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
6 and 8	0	0	0	0	0	0	0	0
7 and 8	1	1	1	1	1	1	1	1
Average	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the issues is 0.1 out of a possible 1.

3 Conclusions

The policy cycles relating to the key issues of fisheries and pollution are associated with well-established arrangements that are among the strongest globally. However, there does not appear to be much integration among these processes. Since the LME is largely a single country one and Denmark has a focus on EBM, the integration may be taking place at the national level.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Norwegian Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Norwegian Sea LME	Completeness	Integration	Engagement
	76%	0.1	83%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

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<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

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- 3 = Agreed compliance mechanism with repercussions

Data and information:

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- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

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Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

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ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 5 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Oyashio Current LME

1 The system to be governed

The system is the Oyashio Current LME. This includes marine waters of Japan and Russia, including a large disputed area (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter X 24), so a review is not provided here. This assessment is also informed by the Northwest Pacific Action Plan (UNEP 1994), the NOWPAP website and the GIWA assessment for the Oyashio Current (Alekseev, et al. 2006)

Table 1. Percentage of Oyashio Current LME area taken up by the EEZ of each country and the High Seas (area = 532,818 km²)

Country	Percent of LME area
Disputed (Southern Kurile Islands)	25.6
Japan	12.4
Russia	60.1
High Seas	2.0
The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.	

2 Governance arrangements

2.1 Issues to be governed

The main fishery resources identified as transboundary are tunas and billfishes. Whereas, the area covered by the West Central Pacific Fisheries Commission, which has the mandate for management of these species in the western Pacific, does cover the Oyashio Current LME (Table 2), the fisheries that it manages cannot be said to be a significant issue in this LME. Therefore the relevance of the WCPFC to the LME is minor. However, it can be said that an arrangement for highly migratory species is in place for the tuna and billfish stocks in this LME.

Whereas, FAO (1994) indicates that there are probably several substantial straddling stocks in this region, it does not give details specific to the Oyashio Current and Sherman and Hempel (2009) do not make specific reference to shared or straddling stocks. However, it is assumed here that there are transboundary fishery resources that would require a transboundary arrangement.

Given that the Kuril Islands are disputed, it is not clear whether biodiversity in this area should be considered a transboundary issue. If most biodiversity threats are coastal in nature, or due to habitat damage from fishing within EEZs then the issue cannot be considered to be transboundary. Pollution issues affecting marine waters are all considered to be transboundary.

The transboundary issues to be addressed by governance were identified as:

- Fisheries
 - Small pelagics and demersal finfish and invertebrates
- Pollution
 - LBS

- MBS oils spills

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. The North Pacific Marine Science Organization (PICES)
2. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
3. Asia-Pacific Economic Cooperation (APEC), Oceans and Fisheries Working Group (OFWG)¹
4. Convention for the Conservation of Anadromous Stocks in The North Pacific Ocean (NPAFC)
5. UNEP Northwest Pacific Action Plan 1994– NOWPAP
 - a. Special Monitoring and Coastal Environment Assessment Regional Activity Centre- CEARAC, Toyama, Japan;
 - b. Marine Environmental Emergency Preparedness and Response Regional Activity Centre- MERRAC, Taejon, Republic of Korea
 - c. Pollution Monitoring Regional Activity Centre- POMRAC, Vladivostok, Russian Federation.
 - d. Data and Information Network RAC- DINRAC, Beijing, China

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Oyashio Current LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Oyashio Current LME			
Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME ²
NPAFC	<1	2	D
PICES	2	100	C
WCPFC	1	100	C

¹ Merger of former Marine Resource Conservation and Fisheries Working Groups

² A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

The extent of country membership in these bodies and instruments for the Oyashio Current LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Oyashio Current LME				
Coastal countries in the LME	Agreements			
	NPAFC	PICES	WCPFC	APEC OFWG
Japan	B	B	B	C
Russia	B	B		C
% engagement	100	100	50	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed				

2.2.1 Assessment of issues

The governance arrangements for the issues identified above are presented in Tables 4 a-b. They are summarised in table 5

Table 4a: Oyashio Current LME ⁱ – Transboundary arrangement for fisheries – Shared small pelagics and demersal finfish and invertebrates					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	PICES, APEC-OFWG	Supra-LME	1	PICES, APEC-OFWG?	<ul style="list-style-type: none">• There is no structured transboundary arrangement for fisheries other than tuna under the WCPFC, and tuna fisheries are not prominent in the Oyashio Current LME.• There is some collaboration in fisheries science and assessment through PICES and countries may engage in some level of policy discussion through the APEC-OFWG.
Policy decision-making	Countries	National	0		
Planning analysis and advice	PICES, APEC-OFWG	Supra-LME	1		
Planning decision-making	Countries	National	0		
Implementation	Countries	National	0		
Review and evaluation	Countries	National	0		
Data and information	PICES	Supra-LME	1		
Overall total and % completeness >>			3/21 = 14%		

Table 4b: Oyashio Current LME – Transboundary arrangement for pollution – LBS and oil spills					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		<p>CEARAC's main activities are to monitor and assess harmful algal blooms, to develop new monitoring tools using remote sensing and to assess land-based sources of marine litter. It does not cover the full range of LBS pollution.</p> <p>MERRAC is to develop effective regional cooperative measures in response to marine pollution incidents including oil and hazardous and noxious substances. It is also working on MBS of marine litter.</p> <p>POMRAC is responsible for cooperation regarding atmospheric deposition of contaminants and river and direct inputs of contaminants to the marine and coastal environment.</p>
Policy decision-making	NOWPAP-IGM	Supra-LME	1		
Planning analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		
Planning decision-making	NOWPAP-IGM	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	CEARAC, MERRAC	Supra-LME	1		
Data and information	DINRAC, MERRAC, CEARAC	Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 5: Oyashio Current LME governance architecture - System summary ⁱⁱ					
IW category: LME		Countries: Japan, Russia	System name: Oyashio Current LME		Region: North Pacific
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – Shared small pelagics and demersal finfish and invertebrates	2		14		ICES only
Pollution – LBS and oil spills	2		38		NOWPAP
Pollution – LBS and oil spills	2		38		
	System architecture completeness index >>		30		<< System priority for intervention

2.3 Assess transboundary integration of arrangements within systems

The assessment of transboundary integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-b) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 5)

Policy cycle stage	Fisheries - Shared small pelagics and demersal finfish and invertebrates	Pollution – LBS and oil spills
Policy analysis and advice	None	NOWPAP-RCU, CEARAC, MERRAC
Policy decision-making	None	NOWPAP-IGM
Planning analysis and advice	PICES, APEC-OFWG	NOWPAP-RCU, CEARAC, MERRAC
Planning decision-making	None	NOWPAP-IGM
Implementation	None	Countries
Review and evaluation	None	CEARAC, MERRAC
Data and information	PICES	DINRAC, MERRAC, CEARAC

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
2 and 3	1	1	1	1	1	1	1	1
Average	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the two issues is 0.3 out of a possible 1.

The appearance of high integration among arrangements 2, 3, 4 and 5 arises because they are all under NOWPAP. However, it must be recalled that NOWPAP is purely a coordination mechanism that has no international legal standing. Therefore, the apparent degree of integration that may arise from sharing a common organisation is essentially informal. No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

3 Conclusions

In this LME, there is essentially no transboundary fisheries arrangement. However, PICES does provide opportunity for transboundary cooperation in assessment and science. Also, the fact that there is no regional seas convention covering the area, but only an action plan, seriously weakens capacity for transboundary governance in areas relating to pollution. Further, there is no indication of transboundary integration between the fisheries and pollution issues, other than through cooperation in science. There is the potential for integration of pollution and biodiversity issues under NOWPAP should it proceed to the level of a Convention. There does not appear to be any other organisation than NOWPAP that could integrate and coordinate across the full range of issues required for EBM.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Oyashio Current LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Oyashio Current LME	Completeness	Integration	Engagement
	100%	0.3	30%

4 References

Alekseev, A.V., Khrapchenkov, F.F., Baklanov, P.J., Blinov, Y.G., Kachur, A.N., Medvedeva, I.A., Minakir, P.A. and G.D. Titova. 2006. Oyashio Current, GIWA Regional assessment 31. University of Kalmar, Kalmar, Sweden.

FAO. 1995. World review of highly migratory species and straddling stocks, FAO Fisheries Technical Paper No. 337, 69 p.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Yatsu, A. 2008. Fisheries management and regime shifts: lessons learned from the Kuroshio/Oyashio Current System

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱTable notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱTable notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national

level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Pacific Central American Coastal LME

1 The system to be governed

The system is the Pacific Central American Coastal (PCAC) LME. This includes the marine waters of the Pacific Ocean extending from 22°N to 4°S under the jurisdiction of Mexico, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Peru, Colombia and Ecuador. The LME covers a surface area of nearly 2 million km² and is shared among the member countries as indicated in Table 1.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter 48), so a review is not provided here. This assessment is also informed by the Eastern Equatorial Pacific GIWA Regional Assessment (UNEP, 2006), the Northeast Pacific Regional Seas Profile (UNEP, n.d.) and the Asia Pacific Economic Cooperation Workshop IV on Large Marine Ecosystems (2013). While efforts have been made to seek support from GEF for an International Waters LME project, no funding for the LME-scaled project has been received to date (APEC, 2013).

Table 1. Percentage of Pacific Central American Coastal LME area taken up by the EEZ of each country and the High Seas (area = 1,974,291 km²)

Country	Percent of LME area
Colombia	14.2
Costa Rica	9.8
Ecuador	7.0
El Salvador	4.4
Guatemala	5.3
Honduras	0.0
Mexico	45.1
Nicaragua	3.1
Panama	9.4
Peru	0.5
High Seas	1.1
The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.	

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified in the preliminary TDA (2006):

- Fisheries
 - over-exploitation of wild shrimp species
 - declining small coastal pelagic
 - maintaining the largest tuna catches in the eastern Pacific
- Pollution
 - LBS (nutrients, sediments and pesticides)
 - MBS (oil and ballast water)
- Biodiversity
 - by-catch of demersal species from wild shrimp harvesting
 - decline of marine turtles and sharks

- habitat modification leading to disappearance and destruction of mangroves and wetlands

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements. However, the extent to which this can be done (from a governance process perspective) will depend on the degree to which the issues share a responsible agency. For example, while the decline and vulnerability of elasmobranchs or sea turtles may be primarily a biodiversity issue, they may be caused largely by fishing and can therefore be addressed within the fisheries arrangement. Indeed, in many countries protection of these species is under fisheries legislation.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Antigua Convention – Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific – not yet in force as only Panama has ratified the Convention.
2. Permanent Commission for the South Pacific (CPPS)
3. The Convention for the Protection of the Marine Environment and Coastal Areas of the South-East Pacific (Lima Convention, 1986) - The South-East Pacific Regional Seas Programme
 - a. Plan of Action for the Protection of the Marine Environment and Coastal Areas of the South-East Pacific
 - b. 3 Pollution Protocols – Hydrocarbon spills (1987), LBS (1986), radioactive (1995)
 - c. Biodiversity Protocol – Management of marine and coastal protected areas (1994)
4. MEX-US 1980 Agreement of Cooperation between the US and Mexico regarding Pollution of the Marine Environment by Discharges of Hydrocarbons and other Hazardous Substances and its Action Plan (MEXUS-PAC)
5. International Convention for the Strengthening of the Inter-American Tropical Tuna Commission (IATTC)
6. Organization for Central American Fisheries and Aquaculture Sector (OSPESCA)
7. Latin American Organization for Fisheries Development (OLDEPESCA)
8. Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Pacific Central American Coastal LME is shown in Table 2.

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific (Antigua)	44	61	D
Permanent Commission for the South Pacific (CPPS)	6	30	D
Convention for the Protection of the Marine Environment and Coastal Areas of the South-East Pacific - The Lima Convention (Lima)	11	38	D
Convention for the Strengthening of the Inter-American Tropical Tuna Commission (IATTC)	3	100	C
Latin American Organization for Fisheries Development (OLDEPESCA)	21	72	D
Organization for Central American Fisheries and Aquaculture Sector (OSPESCA)	35	38	D
Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)		100	C

The extent of country membership in these bodies and instruments for the Pacific Central American Coastal LME is shown in Table 3.

LME coastal countries	Agreements										
	Antigua	IATTC	OLDEPESCA	OSPESCA	CPPS	IAC	Lima Convention	Lima LBS	Lima Hydrocarbon	Lima Radioactive	Lima CMPAS
Mexico		B	B	N	N	B	N	N	N	N	N
Guatemala	C	B		B	N	B	N	N	N	N	N
El Salvador	C	B	B	B	N		N	N	N	N	N
Honduras	C	N	B	B	N	B	N	N	N	N	N
Nicaragua	C	B	B	B	N	C	N	N	N	N	N
Costa Rica	C	B	B	B	N	B	N	N	N	N	N
Panama	B	B		B	N	B	B	B	B	B	B
Peru	N	B	B	N	B	B	B	B	B	B	B
Colombia		B		N	B		B	B	B	B	B

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Pacific Central American Coast LME											
LME coastal countries	Agreements										
	Antigua	IATTC	OLDEPESCA	OSPECA	CPPS	IAC	Lima Convention	Lima LBS	Lima Hydrocarbon	Lima Radioactive	Lima CMPAS
Ecuador	N	B	B	N	B	B	B	B	B	B	B
% engagement	0	100	70	100	100	70	100	100	100	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed											

2.2.1 Assessment of transboundary issue

The governance arrangements for the issues identified above are presented in Tables 4 a-g. They are summarised in table 5

Table 4a: Pacific Central American Coastal LME ⁱ – Transboundary arrangements for fisheries - EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CPPS - Executive Committee comprised of National Presidents, Working Groups for Scientific Affairs and Fisheries, International Maritime Law and the LIMA Plan of Action	Supra-LME	3	OLDEPESCA OSPESCA	CPPS only covers the 3 countries in the LME from South America and as such, does not include the 70% majority of the countries in this LME. How do the countries in the LME reconcile overlaps with CPPS and OLDEPESCA and with OLDEPESCA and OSPESCA as they technically address the same fisheries but cover different parts of the LME? For countries who are members of more than one agreement, what is the current relationship between their interactions with each organization?
Policy decision-making	CPPS – Assembly	Supra-LME	2		
Planning analysis and advice	CPPS - Executive Committee comprised of National Presidents, Working Groups for Scientific Affairs and Fisheries, International Maritime Law and the LIMA Plan of Action	Supra-LME	3		
Planning decision-making	CPPS – Executive Committee	Supra-LME	2		
Implementation	CPPS Member Countries	National	2		
Review and evaluation	CPPS – Executive Committee	LME	2		
Data and information	CPPS Member Countries CPPS Secretariats	National Supra-LME	2		
Overall total and % completeness >>			16/21 = 76%		

Table 4b: Pacific Central American Coastal LME – Transboundary arrangements for fisheries - EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	OLDEPESCA - Board and Technical Committee Expert Groups	Supra-LME	2	CPPS OSPECA	OLDEPESCA members includes 6 of the 10 countries in the LME but score much weaker than CPPS in terms of completeness
Policy decision-making	OLDEPESCA - Council of Ministers	Supra-LME	1		How do the countries in the LME reconcile overlaps with CPPS and OLDEPESCA and with OLDEPESCA and OSPECA as they technically form one arrangement but cover different parts of the LME?
Planning analysis and advice	OLDEPESCA - Board and Technical Committee Expert Groups	Supra-LME	2		For countries who are members of more than one agreement, what is the relationship between their interactions with each organization?
Planning decision-making	Countries	National	1		
Implementation	Countries	National	1		
Review and evaluation	OLDEPESCA - Council of Ministers	Supra-LME	1		
Data and information	Countries OLDEPESCA – Secretariat	National Supra-LME	1		
Overall total and % completeness >>			9/21 = 43%		

Table 4c: Pacific Central American Coastal LME – Transboundary arrangements for fisheries - EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	OSPESCA – Directors of Fisheries and Aquaculture Commission	Supra-LME	3	OLDEPESCA CPPS	<p>OSPESCA members includes 6 of the 10 countries in the LME that are part of the Central American isthmus and as such, does not include Mexico nor the three South American countries of Colombia, Peru and Ecuador. Furthermore, none of the Central American countries are members of CPPS due to its area of competence</p> <p>How do the countries in the LME reconcile overlaps this apparent division of the LME by arrangements when they technically address the same fisheries but cover different parts of the LME?</p> <p>For countries who are members of more than one agreement, what is the current relationship between their interactions with each organization?</p>
Policy decision-making	OSPESCA - Council of Ministers	Supra-LME	2		
Planning analysis and advice	OSPESCA – Directors of Fisheries and Aquaculture Commission	Supra-LME	3		
Planning decision-making	OSPESCA Member countries	Supra-LME National	2		
Implementation	OSPESCA Member Countries	National	2		
Review and evaluation	OSPESCA - Council of Ministers	LME	2		
Data and information	OSPESCA Member Countries OSPESCA Secretariat	National Supra-LME	2		
Overall total and % completeness >>			16/21 = 76%		

Table 4d: Pacific Central American Coastal LME – Transboundary arrangements for fisheries – HMS (tuna and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IATTC - Scientific Advisory Committee	LME	3		All countries are members of IATTC which bodes well given the importance of the large pelagic fishery to the region.
Policy decision-making	IATTC - Commission	LME	3		
Planning analysis and advice	IATTC - Scientific Advisory Committee	LME	3		
Planning decision-making	IATTC - Commission	LME	3		
Implementation	Countries	National	0		
Review and evaluation	Committee for the Review of Implementation of Measures Adopted by the Commission	LME	3		
Data and information	Secretariat Countries	LME National	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4e. Pacific Central American Coastal LME – Transboundary Arrangements for Pollution – LBS (Lima LBS Protocol) and MBS (Lima Oil Spill and Radioactive Protocols)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CPPS Scientific Affairs Office and Economic Affairs Office	Supra-LME	3	IOC (SPINCAM Project) MEXUS-PAC	Ecuador, Colombia and Panama are members of all of the Lima Convention Protocols. Curiously Panama is not a party to the Convention but is a member of its Action Plan and all of its protocol. MEXUS PAC only relates to the US and Mexico in the case of oil spill emergencies.
Policy decision-making	High Contracting Parties	LME	1		
Planning analysis and advice	CPPS Scientific Affairs Office and Economic Affairs Office	Supra-LME	3		
Planning decision-making	Executive Secretariat at CPPS	LME	1		
Implementation	Countries Executive Secretariat	National LME	1		
Review and evaluation	Executive Secretariat (at CPPS)	LME	2		
Data and information	Countries Executive Secretariat (at CPPS)	National LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4f: Pacific Central American Coastal LME – Transboundary Arrangements for Biodiversity - CMPAs and habitat deterioration (Lima Protocol on Management of coastal and marine protected areas)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CPPS Scientific Affairs Office and Economic Affairs Office	Supra-LME	3	IOC (SPINCAM Project)	Ecuador, Colombia and Panama are members of this agreement in this LME.
Policy decision-making	High Contracting Parties	LME	1		
Planning analysis and advice	CPPS Scientific Affairs Office and Economic Affairs Office	Supra-LME	3		
Planning decision-making	Executive Secretariat at CPPS	LME	1		
Implementation	Countries Executive Secretariat	National LME	1		
Review and evaluation	Executive Secretariat (at CPPS)	LME	2		
Data and information	Countries Executive Secretariat (at CPPS)	National LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4g: Pacific Central American Coastal LME – Transboundary Arrangements for Biodiversity - Turtles					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Policy decision-making	IAC Consultative Committee and CoP	Supra-LME	3		
Planning analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Planning decision-making	IAC CoP	Supra-LME	3		
Implementation	IAC Countries	National	0		
Review and evaluation	IAC Countries	National	1		
Data and information	IAC Countries	National	1		
Overall total and % completeness >>			12/21 = 57%		

Table 5: Pacific Central American Coastal LME governance architecture - System summary ⁱⁱ					
IW category: LME		Countries: Mexico, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Peru, Colombia and Ecuador	System name: PCAC		Region: Eastern Central Pacific
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries - species within EEZ	10		76%		
Fisheries - species within EEZ	10		43%		
Fisheries - species within EEZ	10		76%		
Fisheries – HMS (tunas and tuna-like species)	10		86%		
Pollution – LBS	10		62%		
Pollution - MBS	10		62%		
Pollution - MBS	10		62%		
Biodiversity - CMPAs and habitat deterioration	10		62%		
Biodiversity – Specific (Turtles)	10		57%		
	System architecture completeness index >>		65%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-g) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-g)									
Policy cycle stage	Fisheries – EEZ	Fisheries – EEZ	Fisheries – EEZ	Fisheries - HMS	Pollution – LBS	Pollution - MBS	Pollution - MBS	Biodiversity – PA and Hab Mod	Biodiversity - turtles
Policy analysis and advice	CPPS - Executive Committee comprised of National Presidents, Working Groups for Scientific Affairs and Fisheries, International Maritime Law and the LIMA Plan of Action	OLDEPESCA - Board and Technical Committee Expert Groups	OSPESCA – Directors of Fisheries and Aquaculture Commission	IATTC - Scientific Advisory Committee	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	IAC Consultative and Scientific Committees
Policy decision-making	CPPS – Assembly	OLDEPESCA - Council of Ministers	OSPESCA - Council of Ministers	IATTC - Commission	High Contracting Parties	High Contracting Parties	High Contracting Parties	High Contracting Parties	IAC Consultative Committee and CoP
Planning analysis and advice	CPPS - Executive Committee comprised of National Presidents, Working Groups for Scientific Affairs and Fisheries, International Maritime Law and the LIMA Plan of Action	OLDEPESCA - Board and Technical Committee Expert Groups	OSPESCA – Directors of Fisheries and Aquaculture Commission	IATTC - Scientific Advisory Committee	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	CPPS Scientific Affairs Office and Economic Affairs Office	IAC Consultative and Scientific Committees
Planning decision-making	CPPS – Executive Committee	Countries	OSPESCA Member countries	IATTC - Commission	Executive Secretariat at CPPS	Executive Secretariat at CPPS	Executive Secretariat at CPPS	Executive Secretariat at CPPS	IAC CoP
Implementation	CPPS Member Countries	Countries	OSPESCA Member Countries	Countries	Countries Executive Secretariat	Countries Executive Secretariat	Countries Executive Secretariat	Countries Executive Secretariat	IAC Countries
Review and evaluation	CPPS – Executive Committee	OLDEPESCA - Council of Ministers	OSPESCA - Council of Ministers	Committee for the Review of Implementation of Measures Adopted by the Commission	Executive Secretariat (at CPPS)	Executive Secretariat (at CPPS)	Executive Secretariat (at CPPS)	Executive Secretariat (at CPPS)	IAC Countries
Data and information	CPPS Member Countries CPPS Secretariats	Countries OLDEPESCA – Secretariat	OSPESCA Countries OSPESCA Secretariat	Secretariat Countries	Countries Executive Secretariat (at CPPS)	Countries Executive Secretariat (at CPPS)	Countries Executive Secretariat (at CPPS)	Countries Executive Secretariat (at CPPS)	IAC Countries

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
1 and 8	0	0	0	0	0	0	0	0
1 and 9	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
2 and 8	0	0	0	0	0	0	0	0
2 and 9	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
3 and 8	0	0	0	0	0	0	0	0
3 and 9	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
4 and 8	0	0	0	0	0	0	0	0
4 and 9	0	0	0	0	0	0	0	0
5 and 6	0	1	0	1	1	1	1	0.71
5 and 7	0	1	0	1	1	1	1	0.71
5 and 8	0	1	0	1	1	1	1	0.71
5 and 9	0	0	0	0	0	0	0	0
6 and 7	0	1	0	1	1	1	1	0.71
6 and 8	0	1	0	1	1	1	1	0.71
6 and 9	0	0	0	0	0	0	0	0
7 and 8	0	1	0	1	1	1	1	0.71
7 and 9	0	0	0	0	0	0	0	0
8 and 9	0	0	0	0	0	0	0	0
Average	0	0.17	0	0.17	0.17	0.17	0.17	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this LME, integration across the arrangements for the nine issues is 0.1 out of a possible 1.

3 Conclusions

There are three separate arrangements for fish species within the EEZ (CPPS, OLDESPECA and OSPESCA) as well as the arrangement for tuna and tuna-like species (IATTC). However, somewhat unique among LMEs, is the Secretariat for the Regional Seas Convention being housed at the Permanent Commission for the South Pacific (CPPS). While specific formal integration is mentioned in the two Conventions, it is likely that the two Commissions have considerable informal linkages since the secretariats for both CPPS and the Lima Convention are within the same organization. No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. Governance arrangements for this LME appear to be split along geographic lines with arrangements for the southern part of the LME being distinct from those for the northern part. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Pacific Central American Coastal LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Pacific Central American Coastal LME	Completeness	Integration	Engagement
	65%	0.1	85%

4 References

APEC. 2013. Asia Pacific Economic Cooperation Workshop IV Report on Large Marine Ecosystems. Ansan, Korea, August 12-13, 2013.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp. <http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

UNEP (2006). Permanent Commission for the South Pacific (CPPS). Eastern Equatorial Pacific, GIWA Regional Assessment 65. University of Kalmar, Kalmar, Sweden.

UNEP (n.d.) Northeast Pacific Region Profile. Available online at www.unep.ch/regionalseas/pubs/profiles/nep.doc

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Western Pacific Warm Pool

1 The system to be governed

The system is the Western Pacific Warm Pool (WPWP). This includes the marine waters of the countries listed in Table 1 as well as a significant area of high seas. The WPWP is generally defined as defined as the area of ocean in the Western Tropical Pacific within the isotherm of annual-average sea surface temperature of 28°C. As such, the boundaries of the WPWP are dynamic, changing seasonally and from year to year. For the purposes of TWAP the WPWP is defined as the WARM ocean province of Longhurst (1998) (Honey and Sherman 2013). Whereas, Honey and Sherman (2013) argue that the WPWP is not in LME, GEF documents refer to it as one.

The assessment also looks at the area comprising the Pacific Ocean EEZs of Pacific Island Forum members. This may be a more appropriate representation of the Pacific Islands Region.

This assessment is informed by the project documents (TDA, PRODOC, SAP, etc.) of the two phases (2005-2011 and 2011-2015) of the GEF Pacific Islands Oceanic Fisheries Management Project (OFMP) (UNDP 2004). It is also informed by the Framework of the Pacific Oceanscape (FPO) (Pratt and Govan, 2011, Govan 2013) and by reports of the Secretariat of the Pacific Community (SPC 2012, 2013).

Table 1. Percentage of WPWP area taken up by the EEZ of each country and the High Seas for both the TWAP defined WPWP area (area = 12 787 700 km²) and the Pacific Islands Forum area (area = 26 123 138 km²).

Country	Percent of area	
	WPWP	PIF
Australia		11.2
Cook Islands		7.5
Fiji	2.8	4.9
France - Wallis and Futuna	1.6	
Indonesia	1.8	
Kiribati	9.2	13.2
Marshall Islands	11.2	7.6
Micronesia	22.9	11.5
Nauru	2.4	1.2
New Zealand		15.7
Niue		1.2
Palau	4.3	2.3
Papua New Guinea	7.5	9.2
Samoa		0.5
Philippines	1.2	
Solomon Islands	6.4	6.1
Tokelau	0.1	
Tonga	0.1	2.5
Tuvalu	5.9	2.9
USA - Northern Mariana Islands and Guam	0.7	
USA - Howland Island and Baker Island	2.5	
Vanuatu	0.6	2.4
High Seas	18.8	0.0
The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.		

2 Governance arrangements

2.1 Transboundary issues to be governed

The transboundary issues to be addressed by governance were identified in the above documents. The documents of the two phases of the Oceanic Fisheries Management Project focus on fisheries and associated biodiversity in high seas areas. As with other marine GEF IW systems marine pollution is treated as a transboundary issue.

- Fisheries
 - Highly Migratory Tunas
 - Coastal - small tunas and demersal species
- Biodiversity
 - Protected areas and migratory endangered species (cetaceans, seabirds, sea turtles) including benthic straddling and ABNJ
 - Habitat modification and destruction
- Pollution
 - Land Based Sources (LBS) of pollution
 - Marine Based Sources (MBS) of pollution, dumping, hazardous materials, exploration and waste from ships, including oil.

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Noumea Convention - Convention for the Protection of the Natural Resources and Environment of the South Pacific – Secretariat of the Pacific Region Environmental Programme (SPREP)
 - a. Protocol for the Prevention of Pollution of the South Pacific Region by Dumping
 - b. Protocol Concerning Co-operation in Combating Pollution Emergencies in the South Pacific Region
2. Apia Convention on Conservation of Nature in the South Pacific (1990)
3. Convention on the Conservation and Management of High Seas Fishery Resources in the South Pacific Ocean - South Pacific Regional Fisheries Management Organisation (SPRFMO)
4. WCPFC - Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean
 - a. Technical and Compliance Committee (TCC)
 - b. The Northern Committee (NC)
 - c. Scientific Committee
5. South Pacific Forum Fisheries Agency Convention - Pacific Islands Forum Fisheries Agency (FFA) and subsidiary agreements

- a. Nauru Agreement Concerning Cooperation in the Management of Fisheries of Common Interest
- b. Niue Treaty on Cooperation in Fisheries Surveillance and Law Enforcement in the South Pacific Region and Multilateral NTSA Agreement on Strengthening Implementation of the Niue Treaty
- c. Wellington Convention - Convention for the Prohibition of Fishing with Long Drift Nets in the South Pacific
- d. Palau Arrangement for the Management of the Purse Seine Fishery in the Western and Central Pacific
- e. US Treaty - Multilateral Treaty on Fisheries Between Certain Governments of the Pacific Island States and the Government of the United States of America
6. Secretariat of the Pacific Community (initially South Pacific Commission)
 - a. Pacific Islands Regional Oceans Policy (PIROP), 2002
 - b. Ocean Fisheries Programme (OFP)
 - c. Coastal Fisheries Programme (CFP)
7. Pacific Islands Forum (PIF), its Council or Regional Organisations of the Pacific (CROP) and the CROP Marine Sector Working Group (MSWG)
 - a. Framework for a Pacific Oceanscape (FPO), 2010

The extent to which the geographical area of coverage of these bodies and instruments overlaps the WPWP is shown in Table 2.

Table 2: Spatial overlap of transboundary arrangements with the Western Pacific Warm Pool area						
Arrangement	Percent of arrangement in WPWP	Percentage of WPWP in arrangement	Fit of agreement to WPWP ¹	Percent of arrangement in PIF	Percentage of PIF in arrangement	Fit of agreement to PIF
Noumea Convention and Protocols	88	27	D	99	63	B
SPC	90	37	D	69	58	D
FFA	100	21	B	80	34	D
SPRFMO	17	4	D	<1	<1	NA
WCPFC	100	12	C	25	100	C
PIF	73	36	NA	NA	NA	NA
WPWP	NA	NA	NA	36	72	NA

The extent of country membership in these bodies and instruments for the WPWP is shown in Table 3.

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Western Pacific Warm Pool and Pacific Islands Forum areas.								
Coastal Country	Noumea Convention	Noumea Dumping Protocol	Noumea Emergency Protocol	SPC	FFA	SPRFMO	WCPFC	PIF
Australia	B	B	B	C	B	B	B	C
Cook Islands	B	B	B	C	B	B	B	C
Federated States of Micronesia	B	B	B	C	B		B	C
Fiji	B	B	B	C	B		B	C
France ²	B	B	B	C	N	N	B	N
Kiribati				C	B		B	C
Marshall Islands	B	B	B	C	B		B	C
Nauru	B	B	B	C	B		B	C
New Zealand ³	B	B	B	C	B	B	B	C
Niue				C	B		B	C
Palau	C	C	C	C	B		B	C
Papua New Guinea	B	B	B	C	B		B	C
Samoa	B	B	B	C	B		B	C
Solomon Islands	B	B	B	C	B		B	C
Tonga				C	B		B	C
Tuvalu	C	C	C	C	B		B	C
United Kingdom	C	C	C	N	N		N	N
United States of America ⁴	B	B	B	C	N	C	B	N
Vanuatu				C	B	B	B	C
% engagement	46	46	46	96	65	15	100	100
<p>B = a binding commitment to the agreement by ratification, accession, acceptance or adoption</p> <p>C = agreement to cooperate by signing</p> <p>N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed</p>								

² France: extends to French Polynesia, New Caledonia and Wallis and Futuna

³ New Zealand extends to Tokelau

⁴ United States of America extends to American Samoa, Guam and the Commonwealth of the Northern Mariana Islands

2.2.1 Assessment of issues

The individual assessments of the issues identified above are shown in Tables 4a-e. These assessments are summarized in Table 5.

Table 4a: Western Pacific Warm Pool ⁱ – Transboundary arrangement for fisheries – Highly Migratory Species					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	LME	3	IUCN	<ul style="list-style-type: none">• Fishing mortality on key non-target oceanic species, including sharks, seabirds and sea turtles is covered under this arrangement.• The FFA oversees the implementation of several treaties and agreements relating to HMS (Nauru Agreement, Niue Treaty, and Multilateral NTSA Agreement on Strengthening Implementation of the Niue Treaty, Wellington Convention, Palau Arrangement, and U.S. Treaty).• Scores are for WCPFC, except D and I which is for SPC.• The role of the SPRFMO in high seas fisheries and biodiversity relative to that of the WCPFC is unclear
Policy decision-making	WCPFC Commission.	LME	3		
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	LME	3		
Planning decision-making	WCPFC Commission.	LME	3		
Implementation	CPs WCPFC Secretariat FFA	LME National	1		
Review and evaluation	The Technical and Compliance Committee (TCC)	LME	2		
Data and information	SPC OFP	LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4b: Western Pacific Warm Pool – Transboundary arrangement for fisheries – coastal - small tunas and demersal species					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	PIF-FPO, SPC-CFP	LME	2		<ul style="list-style-type: none">• Insofar as can be discerned there is no structured policy process for coastal fisheries. Various organisations are de facto filling roles that if linked could comprise a policy process, although a planning decision-making mechanism is absent.• The potential role of the FFA in this mechanism is unclear. Although its mandate applies to all waters, its focus is exclusively HMS
Policy decision-making	PIF	LME	1		
Planning analysis and advice	SPC-CFP	LME	1		
Planning decision-making	CPs	National	0		
Implementation	CPs	National	0		
Review and evaluation	CPs	National	0		
Data and information	SPC-CFP	LME	3		
Overall total and % completeness >>			7/21 = 33%		

Table 4c: Western Pacific Warm Pool – Transboundary arrangement for pollution – LBS					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	SPREP Secretariat IMO	LME	2		• There is no Noumea Convention protocol for LBS. Therefore, measures can only be addressed under the convention itself
Policy decision-making	Noumea Convention COP	LME	1		
Planning analysis and advice	SPREP Secretariat IMO	LME	1		
Planning decision-making	Noumea Convention COP	LME	2		
Implementation	CPs SPREP Secretariat	LME National	1		
Review and evaluation	SPREP Secretariat	LME	1		
Data and information	CPs SPREP Secretariat	LME National	2		
Overall total and % completeness >>			10/21 = 48%		

Table 4d: Western Pacific Warm Pool – Transboundary arrangement for pollution – MBS					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	SPREP Secretariat IMO	LME	1		• While there is a dumping protocol, other MBS pollution - hazardous materials, exploration and waste from ships, including oil - are addressed only by the convention itself.
Policy decision-making	Noumea Convention COP Dumping Protocol COP	LME	1		
Planning analysis and advice	SPREP Secretariat IMO	LME	1		
Planning decision-making	Dumping Protocol COP	LME	2		
Implementation	CPs SPREP Secretariat	LME National	1		
Review and evaluation	SPREP Secretariat	LME	1		
Data and information	CPs SPREP Secretariat	LME National	2		
Overall total and % completeness >>			9/21 = 43%		

Table 4e: Western Pacific Warm Pool – Transboundary arrangement for Biodiversity – general (protected areas and migratory endangered species (including benthic straddling and ABNJ))					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	SPREP Secretariat	LME	2	<ul style="list-style-type: none">• The FPO provides a policy context for this aspect of biodiversity conservation, but can it be considered as a policy adviser to SPREP• There are many NGOs active in promoting these aspects of biodiversity conservation (IUCN).• The Coral Triangle Initiative provides significant activity at a sub-regional level	<ul style="list-style-type: none">• The Noumea convention covers specially protected areas and protection of wild flora and fauna, but there is no protocol to give effect to this aspect.• Whereas there is the Convention on Conservation of Nature in the South Pacific for which the SPC is Secretariat, it does not have very broad membership or appear to be very active.• The OFMP includes aspects of fishing impacts on seamounts, and bycatch of sharks, seabirds and sea turtles
Policy decision-making	Noumea Convention COP	LME	1		
Planning analysis and advice	SPREP Secretariat	LME	1		
Planning decision-making	SPREP Secretariat	LME	2		
Implementation	CPs SPREP Secretariat	LME National	1		
Review and evaluation	SPREP Secretariat	LME	1		
Data and information	CPs SPREP Secretariat	LME National	2		
Overall total and % completeness >>			10/21 = 48%		

Table 5: Pacific Warm Pool governance architecture - System summaryⁱⁱ

IW category: Marine region		Countries: see table 1	System name: Western Pacific Warm Pool		Region: Western Pacific
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries - HMS	all		86		WCPFC
Fisheries - coastal	all		25		SPC
Pollution - LBS	all		48		Noumea Convention
Pollution - MBS	all		43		
Biodiversity - general	all		48		Noumea Convention
	System architecture completeness index >>		51		<< System priority for intervention

2.3 Assess transboundary integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 10 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-e)

Policy cycle stage	Fisheries - HMS	Fisheries - coastal	Biodiversity	Pollution - LBS	Pollution - MBS
Policy analysis and advice	PIF-FPO, SPC-CFP	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	SPREP Secretariat	SPREP Secretariat IMO	SPREP Secretariat IMO
Policy decision-making	PIF	WCPFC Commission.	Noumea Convention COP	Noumea Convention COP	Noumea Convention COP Dumping Protocol COP
Planning analysis and advice	SPC-CFP	The Technical and Compliance Committee (TCC) The Northern Committee (NC)	SPREP Secretariat	SPREP Secretariat IMO	SPREP Secretariat IMO

		Scientific Committee FFA			
Planning decision-making	CPs	WCPFC Commission.	SPREP Secretariat	Noumea Convention COP	Dumping Protocol COP
Implementation	CPs	CPs WCPFC Secretariat FFA	CPs SPREP Secretariat	CPs SPREP Secretariat	CPs SPREP Secretariat
Review and evaluation	SPC-CFP	The Technical and Compliance Committee (TCC)	SPREP Secretariat	SPREP Secretariat	SPREP Secretariat
Data and information	SPC-CFP	SPC OFP	CPs SPREP Secretariat	CPs SPREP Secretariat	CPs SPREP Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	1	0.1
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
3 and 4	1	1	1	1	1	1	1	1
3 and 5	1	1	1	1	1	1	1	1
4 and 5	1	1	1	1	1	1	1	1
Average	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the six issues is 0.3 out of a possible 1.

3 Conclusions

The two arrangements for pollution and biodiversity that fall under the Noumea Convention are integrated under SPREP although there is a deficiency of protocols to give effect to the intent of the convention. The Pacific Islands Region has a well-structured mechanism for policy coordination and integration across all issues in the form of the Pacific Islands Forum. It is not clear that integration at the technical level is as well-structured, although there are many linkages and interaction among the relevant processes in this region, several of the supported by MOUs between agencies. This LME has been assigned an overall integration score of 1.0 due to the presence of the Pacific Islands Forum (PIF) with its ability to function as an overall policy coordinating organization for the key transboundary issues within the LME.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Pacific Warm Pool LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Pacific Warm Pool LME	Completeness	Integration	Engagement
	51%	1.0	64%

4 References

- Carleton, C. and V. Vuki. 2011. The GEF/UNDP Oceanic Fisheries Management Project Terminal Evaluation. UNDP,
- GEF. 2005. Pacific Islands Oceanic Fisheries Management Project: Project Document - Synthesis. The GEF, Washington, DC.
- Govan, H. 2013. Our Sea of Islands – Our Livelihoods – Our Oceania - Framework for a Pacific Oceanscape, Part I: Assessment of Framework for a Pacific Oceanscape Implementation and justification of the Concept Notes for Implementation of Ocean Policy. Pacific Islands Forum, 16 p.
- Hanich, Q. A. 2010. Regional fisheries management in ocean areas surrounding Pacific Islands States. In H. Terashima (Eds.), Proceedings of the International Seminar on Islands and Oceans (pp. 195-212). Tokyo, Japan: Ocean Policy Research Foundation
- Hanich, Q. A., F. Teo and B. M. Tsamenyi. 2008. Closing the Gaps: Building Capacity in Pacific Fisheries Governance and Institutions.
- Honey, K. T. and K. Sherman. 2013. The Western Pacific Warm Pool Assessment Approach for the Transboundary Waters Assessment. Background Brief. NOAA Large Marine Ecosystem Program, Narragansett, RI, USA.
- Longhurst, A. (1998). Ecological geography of the sea, Academic Press, San Diego, California. 560 pp.
- Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.
<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.
- Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.
- PIFS. 2007. The Pacific plan for strengthening regional cooperation and integration. Pacific Islands Forum Secretariat, Suva, Fiji, 52 p.
- Pratt, K. 2010. Our Sea of Islands – Our Livelihoods – Our Oceania. Part 1 - Toward a framework for a Pacific oceanscape: a policy analysis.
- South, G.R., P. Skelton, J. Veitayaki, A. Resture, C. Carpenter, C. Pratt and A. Lawedrau. 2004. Pacific Islands, GIWA Regional assessment 62. University of Kalmar, Kalmar, Sweden.
- SPC. 2005. Pacific Islands Regional Ocean Policy and Framework for Integrated Strategic Action (PIROP). The Secretariat of the Pacific Community, New Caledonia, 24 p.

SPC. 2012. Division of Fisheries, Aquaculture and Marine Ecosystems (FAME) - Strategic Plan 2013–2016. Secretariat of the Pacific Community, New Caledonia, 32 p.

SPC. 2013. Status report: Pacific Islands reef and nearshore fisheries and aquaculture. Secretariat of the Pacific Community, New Caledonia,

UNDP. 2008. Pacific Adaptation to Climate Change Project (PACC) - Project Document. The Global Environment Facility, Washington DC, 136 pp.

Wright, A., Stacey, N., & Holland, P. (2006). The cooperative framework for ocean and coastal management in the Pacific Islands: Effectiveness, constraints and future direction. *Ocean & Coastal Management* 49, 739. You

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

i Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ii Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

iii The individual integration scores to be entered in Table 4 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national

level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Patagonian Shelf LME

1 The system to be governed

The system is the Patagonian Shelf LME, extending from 34°S at the northern end of the Rio De la Plata to 55°S at Tierra del Fuego in Argentina. This LME covers the entire coastline of Uruguay and Argentina and is approximately 1.2 million km². The marine jurisdiction of the LME is shared between the two countries according to Table 1.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter XVI–55), so a review is not provided here. This assessment is also informed by 1999 GEF PRODOC for the project entitled “Environmental Protection of the Rio de la Plata and its Maritime Front: Pollution Prevention and Control and Habitat Restoration (FREPLATA)”, its 2006 TDA for Policy Makers and SAP (2007).

Table 1. Percentage of Patagonia Shelf LME area taken up by the EEZ of each country and the High Seas (area = 1,164,280 km²)

Country	Percent of LME area
Argentina	71.1
Uruguay	6.9
United Kingdom	20.2
High Seas	1.8

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified in the reviewed documents as follow:

- Fisheries
 - over-exploitation and collapse of Argentine hake
 - high percentage of bycatch and discards in both coastal and high seas fleets
- Pollution
 - chemical and petrochemical pollution;
 - direct and indirect industrial effluents and sewage discharges, either with an inadequate treatment or with no treatment at all
 - non-point sources (agricultural waste, etc);
- Biodiversity
 - appearance of invasive species
 - habitat modification from coastal erosion and alteration, dredging activities and sediment disposition

From a transboundary governance perspective, it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. 1973 Treaty of the Rio de la Plata and its Maritime Front
 - a. CARP – Administrative Commission for the Rio de la Plata (1976)
 - b. CTMFM – Binational Technical Commission for the Argentine-Uruguayan Maritime Front (1976)
 - c. Joint CARP-CTMFM Consortium (1998) – Implementation Unit for FREPLATA
2. Convention for the Conservation of the Southern Bluefin Tuna (CCSBT)
3. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
4. Permanent Commission for the South Pacific (CPPS)
5. Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Patagonia Shelf LME is shown in Table 2.

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
Convention for the Conservation of the Southern Bluefin Tuna (CCSBT)	1	98	D
Permanent Commission for the South Pacific (CPPS)	1	5	D
Treaty of the Rio de la Plata and its Maritime Fronts	76	16	D
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	100	C
Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)		100	C

The extent of country membership in these bodies and instruments for the Patagonia Shelf LME is shown in Table 3.

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Patagonian Shelf LME					
Coastal countries in the LME	Agreements				
	CCSBT	CPPS	IAC	Rio de la Plata Treaty	ICCAT
Argentina	N	N	B	B	
Uruguay	N	N	B	B	B
United Kingdom	N	N		N	B
% engagement	0	0	67	100	67
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed					

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-f. They are summarised in Table 5

Table 4a: Patagonian Shelf LME ¹ – Transboundary arrangement for fisheries – HMS (Southern Bluefin Tuna)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CCSBT - Extended Scientific Committee (ESC), WG - Ecologically-Related Species (ERS), Standing Committee for Finance and Administration	Supra-LME	3		None of the countries with marine jurisdiction in the LME are members of the CCSBT.
Policy decision-making	CCSBT - Commission	Supra-LME	3		
Planning analysis and advice	CCSBT - Extended Scientific Committee, WG - Ecologically-Related Species, Standing Committee for Finance and Administration	Supra-LME	3		
Planning decision-making	CCSBT - The Extended Commission	Supra-LME	3		
Implementation	Countries that are members and cooperating non-members Secretariat	National Supra-LME	2		
Review and evaluation	CCSBT- Compliance Committee Countries	Supra-LME National	2		
Data and information	The Extended Commission, ESC and WG-ERS Secretariat Compliance Committee, Countries	Supra-LME National	3		
Overall total and % completeness >>			19/21 = 90%		

Table 4b. Patagonian Shelf LME – Transboundary arrangement for fisheries – HMS (Tuna and tuna-like species other than Southern Blue Fin)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		Argentina is not a member of ICCAT
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			17/21 = 80%		

Table 4c. Patagonian Shelf LME – Transboundary arrangement for fisheries –EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Sub-LME	3		Relative complete policy cycle. While structure is present, funds for CARP and CTMFM limiting so scientific data collection not being done to the level expected.
Policy decision-making	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	Sub-LME	3		
Planning analysis and advice	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Sub-LME	3		
Planning decision-making	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	Sub-LME	3		
Implementation	Countries	National	2		
Review and evaluation	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	Sub-LME	2		
Data and information	Countries CARP and CTMFM	National Sub-LME	2		
Overall total and % completeness >>			18/21 = 86%		

Table 4d. Patagonian Shelf LME – Transboundary arrangement for pollution – LBS and MBS					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Sub-LME	3		Relative complete policy cycle. While structure is present, funds for CARP and CTMFM limiting so scientific data collection not being done to the level expected.
Policy decision-making	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	Sub-LME	3		
Planning analysis and advice	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Sub-LME	3		
Planning decision-making	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	Sub-LME	3		
Implementation	Countries	National	2		
Review and evaluation	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	Sub-LME	2		
Data and information	Countries CARP and CTMFM	National Sub-LME	2		
Overall total and % completeness >>			18/21 = 86%		

Table 4e. Patagonian Shelf LME – Transboundary arrangement for biodiversity – Habitat Modification from dredging and deposition					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Sub-LME	3		Relative complete policy cycle. While structure is present, funds for CARP and CTMFM limiting so scientific data collection not being done to the level expected.
Policy decision-making	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	Sub-LME	3		
Planning analysis and advice	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Sub-LME	3		
Planning decision-making	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	Sub-LME	3		
Implementation	Countries	National	2		
Review and evaluation	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	Sub-LME	2		
Data and information	Countries CARP and CTMFM	National Sub-LME	2		
Overall total and % completeness >>			18/21 = 86%		

Table 4f: Patagonian Shelf LME – Transboundary Arrangements for Biodiversity – Turtles					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Policy decision-making	IAC Consultative Committee and CoP	Supra-LME	3		
Planning analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Planning decision-making	IAC CoP	Supra-LME	3		
Implementation	IAC Countries	National	0		
Review and evaluation	IAC Countries	National	1		
Data and information	IAC Countries	National	1		
Overall total and % completeness >>			12/21 = 57%		

Table 5: Patagonian Shelf LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Argentina, Uruguay, United Kingdom	System name: Patagonian Shelf		Region: South Atlantic
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – HMS (Southern Bluefin Tuna)	3		90%		
Fisheries – HMS (Tuna and tuna-like species other than Southern Blue Fin)	3		86%		
Fisheries –EEZ	3		86%		
Pollution – LBS	3		86%		
Pollution - MBS	3		86%		
Biodiversity – habitat modification from dredging and deposition	3		86%		
Biodiversity – Specific (Turtles)	3		57%		
	System architecture completeness index >>		82%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-f) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)

Policy cycle stage	Fisheries – HMS (Southern Bluefin Tuna)	Fisheries - HMS	Fisheries - EEZ	Pollution – LBS	Pollution - MBS	Biodiversity – Hab Mod	Biodiversity - Turtles
Policy analysis and advice	CCSBT - Extended Scientific Committee (ESC), WG - Ecologically-Related Species (ERS), Standing Committee for Finance and Administration	ICCAT Standing Committee on Research and Statistics (SCRS)	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	IAC Consultative and Scientific Committees
Policy decision- making	CCSBT - Commission	ICCAT Commission	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	IAC Consultative Committee and CoP
Planning analysis and advice	CCSBT - Extended Scientific Committee, WG - Ecologically- Related Species, Standing Committee for Finance and Administration	ICCAT SCRS and Species Panels	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	Administrative Commission of the Rio de la Plata (CARP), Joint Technical Commission of the Maritime Front (CTMFM)	IAC Consultative and Scientific Committees
Planning decision- making	CCSBT - The Extended Commission	ICCAT Commission	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	IAC CoP
Implementation	Countries that are members and cooperating non- members Secretariat	Countries	Countries	Countries	Countries	Countries	IAC Countries

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-f)

Policy cycle stage	Fisheries – HMS (Southern Bluefin Tuna)	Fisheries - HMS	Fisheries - EEZ	Pollution – LBS	Pollution - MBS	Biodiversity – Hab Mod	Biodiversity - Turtles
Review and evaluation	CCSBT- Compliance Committee Countries	Conservation and Management Measures Compliance Committee (CMMCC)	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	CARP (for Rio de la Plata) and CTMFM (for Maritime Fronts area)	IAC Countries
Data and information	The Extended Commission, ESC and WG-ERS Secretariat Compliance Committee, Countries	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries CARP and CTMFM	Countries CARP and CTMFM	Countries CARP and CTMFM	Countries CARP and CTMFM	IAC Countries

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
3 and 4	1	1	1	1	0	1	1	0.86
3 and 5	1	1	1	1	0	1	1	0.86
3 and 6	1	1	1	1	0	1	1	0.86
3 and 7	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	1	1	1	1	0	1	1	0.86
4 and 7	0	0	0	0	0	0	0	0
5 and 6	1	1	1	1	0	1	1	0.86
5 and 7	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
Average	0.24	0.24	0.24	0.24	0	0.24	0.24	0.2

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the five issues is 0.2 out of a possible 1.

3 Conclusions

The two arrangements for high seas Southern Bluefin Tuna and the large pelagics in the Atlantic (CCBST and ICCAT) are separate arrangements, as is the arrangement for turtles (IAC). However, the fisheries, pollution and biodiversity arrangements in the areas within the EEZ of Uruguay and Argentina appear to be well integrated as a result of the Treaty of the Rio de la Plata.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Patagonian Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Patagonian Shelf LME	Completeness	Integration	Engagement
	82%	0.2	58%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Red Sea LME

1 The system to be governed

The system is the Red Sea LME is bordered by Djibouti, Egypt, Eritrea, Israel, Jordan, Saudi Arabia, Sudan and Yemen (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter III-6), so a review is not provided here. This assessment is also informed by the PRODOC.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified Sherman and Hempel (2009) as follows:

- Fisheries
 - widespread illegal fishing and overexploitation
- Pollution
 - LBS – nutrients, chemicals, hydrocarbons
 - MBS - coastal and marine contamination from oil spills, marine transportation
- Biodiversity
 - decline in coral reefs
 - widespread coastal habitat destruction
 - degradation and decline of mangrove

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. The Regional Convention for the Conservation of the Environment of the Red Sea and Gulf of Aden (The Jeddah Convention)
 - a. Protocol concerning Regional Cooperation in Combating Pollution by Oil and Other Harmful Substances in cases of Emergency
 - b. Protocol Concerning the Protection of the Marine Environment from Land-Based Activities in the Red Sea and Gulf of Aden – Not yet in force

Table 1. Percentage of Red Sea LME area taken up by the EEZ of each country and the High Seas (area = 456,127 km²)

Country	Percent of LME area
Djibouti	0.1
Egypt	19.6
Eritrea	17.1
Israel	<0.1
Jordan	<0.1
Saudi Arabia	40.1
Sudan	14.4
Yemen	7.9
High Seas	0.8

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2. Agreement for the establishment of the Indian Ocean Tuna Commission (IOTC)
3. Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)
4. Action Plan for the Conservation of the Marine Environment and Coastal Areas of the Red Sea and the Gulf of Aden, 1976
5. East African Action Plan, 1981

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Red Sea LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Red Sea LME

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
IOTC	1	100	C
Jeddah Convention and Protocols	43	100	C
Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)			

The extent of country membership in these bodies and instruments for the Red Sea LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Red Sea LME

LME coastal countries	Agreement			
	IOTC	Jeddah Convention	Jeddah Oil Spill Protocol	Dugong MOU
Djibouti		B	B	
Egypt		B	B	C
Eritrea	B			C
Israel	N			
Jordan	N	B	B	
Palestine	N	B	B	
Saudi Arabia		B	B	C
Sudan	B	B	B	C
Yemen	B	B	B	C
% engagement	50	100	100	56
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed				

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-e. They are summarised in Table 5

Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IOTC - Scientific Committee Sub-commission	Supra-LME	3		3 of the 9 states have signed but none have ratified IOTC. Given the low percent of high seas, is this likely not an issue? What about coastal pelagic?
Policy decision-making	IOTC - Commission	Supra-LME	1		
Planning analysis and advice	IOTC - Scientific Committee Sub-commission	Supra-LME	3		
Planning decision-making	IOTC - Commission	Supra-LME	2		
Implementation	Countries	National	1		
Review and evaluation	Countries IOTC - Scientific committee, sub-commissions, and working parties	National Supra-LME	2		
Data and information	Countries IOTC - Secretariat	National Supra-LME	2		
Overall total and % completeness >>			14/21 = 67%		

Table 4b: Red Sea LME – Transboundary Arrangement for Pollution - Land-Based Sources and Biodiversity - General					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Jeddah Convention - PERSGA Secretariat Partner IGOs	Supra-LME	1		While the Jeddah Convention has been ratified by 5 of the 9 countries and signed by an additional 2 countries, the LBS Protocol is not in force and the Biodiversity protocol has not been adopted. As such, the score used in the table is that assigned for the entire Convention What role does SACEP and the SASAP play in regional governance of pollution and biodiversity in this LME, if any?
Policy decision-making	Council	Supra-LME	1		
Planning analysis and advice	Jeddah Convention and LBS Protocol - PERSGA Secretariat Partner IGOs	Supra-LME	1		
Planning decision-making	Council	Supra-LME	1		
Implementation	Countries PERSGA Secretariat	National	1		
Review and evaluation	Council Committee for the Settlement of Disputes	Supra-LME	2		
Data and information	Countries PERSGA Secretariat	National Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 4c: Red Sea LME – Transboundary Arrangement for Pollution - Marine-Based Sources					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Jeddah Convention and Oil Pollution Protocol – Marine Emergency Mutual Aid Centre	Supra-LME	3		Signed at the time of the Convention, along with the Action Plan
Policy decision-making	PERGSA Council	Supra-LME	1		
Planning analysis and advice	Jeddah Convention and Oil Pollution Protocol – Marine Emergency Mutual Aid Centre	Supra-LME	3		
Planning decision-making	PERGSA Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	PERGSA Council	Supra-LME	2		
Data and information	Countries Marine Emergency Mutual Aid Centre	National Supra-LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4d: Red Sea LME – Transboundary Arrangement for Biodiversity – Specific (Marine Turtles)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Countries Secretariat Advisory Committee	National Supra-LME	2		
Policy decision-making	Meeting of Parties	Supra-LME	2		
Planning analysis and advice	Countries Secretariat Advisory Committee	National Supra-LME	2		
Planning decision-making	Meeting of Parties	Supra-LME	2		
Implementation	Countries	National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	Countries	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 4e: Red Sea LME – Transboundary arrangement for biodiversity - specific (dugong)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CPs	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	CPs	Supra-LME	2		
Planning analysis and advice	CPs	Supra-LME	2		
Planning decision-making	CPs	Supra-LME	2		
Implementation	CPs	Supra-LME National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 5: Red Sea LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Djibouti, Egypt, Eritrea, Israel, Jordan, Saudi Arabia, Sudan, Yemen	System name: Red Sea		Region: Western Indian Ocean
Complete these columns then assess issues using the arrangements tables			After completing the arrangements tables, complete these columns		
Trans-boundary issue ²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – large highly migratory species (tuna and tuna like)	8		67%		
Pollution - Land-Based Sources	8		38%		
Pollution - Marine-Based Sources	8		62%		
Biodiversity – General	8		38%		
Biodiversity – Specific (Turtles)	8		52%		
Biodiversity – specific (dugong)	8		52%		CMS MOU
	System architecture completeness index >>		52%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

Both the over-fishing and the habitat modification issue relating to biodiversity do not appear to have specific formal arrangements at the regional level for addressing these issues. However, it can be assumed that the Jeddah Convention addresses biodiversity at the general level.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-e)						
Policy cycle stage	Fisheries - HMS	Pollution - MBS	Pollution - LBS	Biodiversity - General	Biodiversity - Specific	Biodiversity - specific (dugongs)
Policy analysis and advice	IOTC - Scientific Committee Sub-commission	Jeddah Oil Pollution Protocol – Marine Emergency Mutual Aid Centre	Jeddah Convention - PERSGA Secretariat Partner IGOs	Jeddah Convention - PERSGA Secretariat Partner IGOs	Countries Secretariat Advisory Committee	MOU CPs
Policy decision-making	IOTC - Commission	Jeddah Council	Jeddah Council	Jeddah Council	Meeting of Parties	MOU CPs
Planning analysis and advice	IOTC - Scientific Committee Sub-commission	Jeddah Convention and Oil Pollution Protocol – Marine Emergency Mutual Aid Centre	Jeddah Convention and LBS Protocol - PERSGA Secretariat Partner IGOs	Jeddah Convention and LBS Protocol - PERSGA Secretariat Partner IGOs	Countries Secretariat Advisory Committee	MOU CPs
Planning decision-making	IOTC - Commission	Jeddah Council	Jeddah Council	Jeddah Council	Meeting of Parties	MOU CPs
Implementation	Countries	Countries PERSGA Secretariat	Countries PERSGA Secretariat	Countries PERSGA Secretariat	Countries	MOU CPs
Review and evaluation	Countries IOTC - Scientific committee, sub-commissions, and working parties	Jeddah Council	Jeddah Council Committee for the Settlement of Disputes	Council Committee for the Settlement of Disputes	Secretariat	Secretariat
Data and information	Countries IOTC - Secretariat	Countries PERSGA Secretariat Marine Emergency Mutual Aid Centre	Countries PERSGA Secretariat	Countries PERSGA Secretariat	Countries	MOU CPs

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
2 and 3	0	1	0	1	1	1	1	0.71
2 and 4	0	1	0	1	1	1	1	0.71
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
3 and 4	1	1	1	1	1	1	1	1
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
Average	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.2

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the three issues is 0.2 out of a possible 1.

3 Conclusions

The two arrangements for pollution and for biodiversity (general) fall under the Jeddah Convention. However, there does not appear to be any specific regional arrangements for overfishing in general nor habitat degradation and its effect on biodiversity within the Red Sea and Gulf of Aden. The transboundary arrangement for turtles and their habitat in the Indian Ocean does not appear to be integrated formally with the other arrangements. No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.

- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Red Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Red Sea LME	Completeness	Integration	Engagement
	52%	0.2	65%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

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Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
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- 1 = Decisions are recommendations to countries
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- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
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Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

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^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Scotian Shelf LME

1 The system to be governed

The system is the Scotian Shelf LME. It is bordered by the Canadian province of Nova Scotia and extends offshore to the shelf break, more than 200 nautical miles from the coast. The area of this LME is 283,000 km² fall primarily under the jurisdiction of Canada as indicated in Table 1.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter XIX - 60), so a review is not provided here.

Table 1. Percentage of Scotian Shelf LME area taken up by the EEZ of each country and the High Seas (area = 283,000 km²)

Country	Percent of LME area
Canada	98.7
France (Saint Pierre and Miquelon)	0.4
High Seas	0.9

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by reviewing Chapter 60 (Sherman and Hempel, 2009) as follows:

- Fisheries
 - overexploitation or collapse of commercially stocks; declines in abundance and sizes for many commercially exploited fish species
- Biodiversity
 - introduction of invasive species and pathogens through ballast water
- Pollution
 - (MBS) illegal spills and discharges (chronic introduction of oil from vessel traffic, marine debris, chemical contaminants from vessels and offshore hydrocarbon development activities)

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. The International Commission for the Conservation of Atlantic Tunas (ICCAT)
2. Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)

3. Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)
4. Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Scotian Shelf LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreements with the Scotian Shelf LME (area = 282, 150 km ²)			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of Agreement to LME ¹
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	<1	100	C
Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)	4	100	C
Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North (NAMMCO)	1	100	C
Convention for the Conservation of Salmon in the North Atlantic Ocean (NASCO)	1	100	C

The extent of country membership in these bodies and instruments for the Scotian Shelf LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Scotian Shelf LME					
Coastal countries in the LME	Agreements				
	ICCAT	NAFO	NAMMCO	NASCO	ICES
Canada	B	B		B	B
France (Saint Pierre and Miquelon)	B	B			B
% engagement	100	100		50	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed					

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-d. They are summarised in Table 5

Table 4a. Scotian Shelf LME ¹ – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4b: Scotian Shelf LME – Transboundary Arrangement for fisheries – EEZ and ABNJ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NAFO Scientific Council	Supra-LME	3		
Policy decision-making	NAFO General Council Fisheries Commission	Supra-LME	3		
Planning analysis and advice	NAFO Scientific Council	Supra-LME	3		
Planning decision-making	NAFO General Council Fisheries Commission	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	NAFO Standing Committee on International Control (STACTIC)	Supra-LME	3		
Data and information	Countries NAFO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4c: Scotian Shelf LME – Transboundary Arrangement for Fisheries – Specific (Marine Mammals)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods	Supra-LME	3		Neither country is eligible to be full members without the expressed agreement of the 4 original signatory countries
Policy decision-making	NAMMCO Council	Supra-LME	1		
Planning analysis and advice	NAMMCO Management Committee and Scientific Committee	Supra-LME	3		
Planning decision-making	NAMMCO Council	Supra-LME	1		
Implementation	NAMMCO Countries Secretariat – Joint NAMMCO Control Scheme for Hunting	National Supra-LME	2		
Review and evaluation	NAMMMCO Council Committee on Inspection and Observation	Supra-LME	2		
Data and information	NAMMCO Countries NAMMCO Secretariat	National Supra-LME	3		
Overall total and % completeness >>			15 /21 = 71%		

Table 4d: Scotian Shelf LME – Transboundary arrangement for fisheries – specific (salmon)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICES NASCO Secretariat and its Commissions	Supra-LME	3		Both countries are members of NASCO (France through the EU) ICES named in NASCO to provide scientific advice
Policy decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Planning analysis and advice	NASCO Three Commissions NASCO Secretariat ICES	Supra-LME	3		
Planning decision-making	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NASCO Council	Supra-LME	2		
Data and information	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	National Supra-LME	2		
Overall total and % completeness >>			12/21 = 57%		

Table 5: Scotian Shelf LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Canada, France	System name: Scotian Shelf LME		Region: NW Atlantic
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – EEZ/ABNJ	2		86%		NAFO
Fisheries – large pelagics (tunas and tuna-like)	2		86%		ICCAT
Fisheries - specific (marine mammals)	2		71%		NAMMCO
Fisheries – specific (salmon)	2		57%		NASCO
Pollution – MBS (None)	2		0%		
Pollution – LBS (None)	2		0%		
	System architecture completeness index >>		50%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

Issues relating to invasive species and marine pollution are not addressed specifically as transboundary issues between the countries in the LME. This is likely due to the LME being primarily within Canada's maritime domain and as such, dealt with nationally and at levels higher than the LME such as the case for ballast water discharges from international shipping.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-4d) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-d)				
Policy cycle stage	Fisheries – EEZ/ABNJ	Fisheries - HMS	Fisheries - Specific	Fisheries - Specific - Marine Mammals
Policy analysis and advice	NAFO Scientific Council	ICCAT Standing Committee on Research and Statistics (SCRS)	ICES NASCO Secretariat and its Commissions	NAMMCO Scientific Committee, Management Committee and the Committee on Hunting Methods
Policy decision-making	NAFO General Council Fisheries Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council
Planning analysis and advice	NAFO Scientific Council	ICCAT SCRS and Species Panels	NASCO Three Commissions NASCO Secretariat ICES	NAMMCO Management Committee and Scientific Committee
Planning decision-making	NAFO General Council Fisheries Commission	ICCAT Commission	NASCO Council NASCO Three Commissions - North American; West Greenland and NE Atlantic	NAMMCO Council
Implementation	Countries	Countries	Countries	NAMMCO Secretariat – Joint NAMMCO Control Scheme for Hunting
Review and evaluation	NAFO Standing Committee on International Control (STACTIC)	Conservation and Management Measures Compliance Committee (CMMCC)	NASCO Council	NAMMMCO Council Committee on Inspection and Observation
Data and information	Countries NAFO Secretariat	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Countries NASCO Secretariat NASCO International Atlantic Salmon Research Board (IASRB)	NAMMCO and ACPB Countries NAMMCO Secretariat

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.								
Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
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3 and 4	0	0	0	0	0	0	0	0
3 and 5	0	0	0	0	0	0	0	0
3 and 6	0	0	0	0	0	0	0	0
4 and 5	0	0	0	0	0	0	0	0
4 and 6	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
Average	0	0	0	0	0	0	0	0

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the four issues is 0 out of a possible 1.

3 Conclusions

None of the four fisheries agreements (NAFO, ICCAT, NAMMCO and NASCO) have formal linkages identified across the different stages of the policy cycle.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
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Low	60-80%	0.6 -0.8	60-80%
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Very High	0-20%	0.0-0.2	0-20%

For the Scotia Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Scotian Shelf LME	Completeness	Integration	Engagement
	50%	0	63%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

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- 1 = Decisions are recommendations to countries
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- 0 = Countries alone
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- 0 = No DI mechanism
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End notes

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Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

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Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

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Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

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System architecture completeness: Average for issues.

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^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Sea of Japan LME

1 The system to be governed

The system is the Sea of Japan LME. This includes the marine waters of four countries and a disputed area (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter X-25), so a review is not provided here. This assessment is also informed by Northwest Pacific Action Plan (UNEP 1994) and the NOWPAP website.

2 Governance arrangements

2.1 Issues to be governed

2.1.1 Priority issues

The priority transboundary issues to be addressed by governance were identified in Sherman and Hempel (2009) and in the Northwest Pacific Action Plan (UNEP 1994):

- Fisheries
 - Shared small pelagics and demersal finfish and invertebrates
- Biodiversity
 - Marine invasive species
 - Marine protected areas
 - Habitat and community modification
- Pollution
 - LBS - marine litter, nutrients
 - Oil spills

In addition to the above transboundary issues there are relatively small fisheries for highly migratory species. Whereas, the area mandated for the West Central Pacific Fisheries Commission does cover the Sea of Japan LME (Table 2), few of the fisheries that it manages

Table 1. Percentage of Sea of Japan LME area taken up by the EEZ of each country and the High Seas (area = 982,146 km ²)	
Country ¹	Percent of LME area
Japan	43.5
North Korea ²	9.2
Russia	31.1
South Korea ³	9.4
Japan - South Korea disputed zone	6.7
High Seas	<0.1
The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.	

¹Sherman and Hempel (2009, Chapter X-25) indicate that China is a coastal country in this LME, but this does not appear to be the case.

²Democratic People's Republic of Korea

³Republic of Korea

actually extend into this LME. Therefore the relevance of this arrangement to the LME is low. However, it can be said that an arrangement for highly migratory species is in place for the LME.

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. UNEP Northwest Pacific Action Plan – NOWPAP
 - a. Special Monitoring and Coastal Environment Assessment Regional Activity Centre- CEARAC, Toyama, Japan;
 - b. Marine Environmental Emergency Preparedness and Response Regional Activity Centre- MERRAC, Taejon, Republic of Korea
 - c. Pollution Monitoring Regional Activity Centre- POMRAC, Vladivostok, Russian Federation.
 - d. Data and Information Network RAC- DINRAC, Beijing, China
2. The North Pacific Marine Science Organization (PICES)
3. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
4. Asia-Pacific Economic Cooperation (APEC), Oceans and Fisheries Working Group (OFWG)⁴

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Sea of Japan LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Sea of Japan LME			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ⁵
PICES	4	100	C
WCPFC	1	100	C
NOWPAP		100	C

The extent of country membership in these bodies and instruments for the Sea of Japan LME is shown in Table 3.

⁴ Merger of former Marine Resource Conservation and Fisheries Working Groups

⁵ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Sea of Japan LME				
Coastal countries in the LME	Agreements			
	PICES	WCPFC	NOWPAP	APEC OFWG
Japan	B	B	C	C
North Korea		N	C	N
Russia	B		C	C
South Korea	B	B	C	C
% engagement	75	67	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed				

2.2.1 Assessment of issues

The transboundary arrangements covering the key issues outlined in tables 4 a – d. These are summarised in Table 5.

Table 4a: Sea of Japan LME ⁱ – Transboundary arrangement for fisheries – Shared small pelagics and demersal finfish and invertebrates					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	PICES, APEC-OFWG	Supra-LME	1		<ul style="list-style-type: none">• There is no structured transboundary arrangement for fisheries other than tuna under the WCPFC, and as already noted the majority of tuna fisheries do not extend into the Sea of Japan.• There is some collaboration in fisheries science and assessment through PICES and countries may engage in some level of policy discussion through the APEC-OFWG.
Policy decision-making	Countries	National	0		
Planning analysis and advice	PICES, APEC-OFWG	Supra-LME	1		
Planning decision-making	Countries	National	0		
Implementation	Countries	National	0		
Review and evaluation	Countries	National	0		
Data and information	PICES	Supra-LME	1		
Overall total and % completeness >>			3/21 = 14%		

Table 4b: Sea of Japan LME – Transboundary arrangement for biodiversity - Marine Protected Areas and marine invasive species,					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NOWPAP-RCU	Supra-LME	2		• DINRAC’s objectives are to develop a region-wide data and information exchange network, to promote regional cooperation and exchange of information on the marine and coastal environment in the NOWPAP region.
Policy decision-making	NOWPAP-IGM	Supra-LME	1		
Planning analysis and advice	NOWPAP	Supra-LME	2		
Planning decision-making	NOWPAP-IGM	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NOWPAP	Supra-LME	1		
Data and information	NOWPAP- DINRAC	Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 4c: Sea of Japan LME – Transboundary arrangement for biodiversity – Habitat and community modification					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NOWPAP-RCU	Supra-LME	1		<ul style="list-style-type: none">• There does not appear to be any specialised part of NOWPAP focused on habitat and community modification.• For DINRAC’s objectives see Table 4b.
Policy decision-making	NOWPAP-IGM	Supra-LME	1		
Planning analysis and advice	NOWPAP	Supra-LME	1		
Planning decision-making	NOWPAP-IGM	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NOWPAP	Supra-LME	0		
Data and information	NOWPAP- DINRAC	Supra-LME	1		
Overall total and % completeness >>			5/21 = 23%		

Table 4d: Sea of Japan LME – Transboundary arrangement for pollution – LBS and MBS (oil spills)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		<ul style="list-style-type: none">• CEARAC’s main activities are to monitor and assess harmful algal blooms, to develop new monitoring tools using remote sensing and to assess land-based sources of marine litter. It does not cover the full range of LBS pollution.• MERRAC is to develop effective regional cooperative measures in response to marine pollution incidents including oil and hazardous and noxious substances. It is also working on MBS of marine litter.• POMRAC is responsible for cooperation regarding atmospheric deposition of contaminants and river and direct inputs of contaminants to the marine and coastal environment.• For DINRAC’s objectives see Table 4b.
Policy decision-making	NOWPAP-IGM	Supra-LME	1		
Planning analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		
Planning decision-making	NOWPAP-IGM	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	CEARAC, MERRAC	Supra-LME	1		
Data and information	DINRAC, MERRAC, CEARAC	Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 5: Sea of Japan LME governance architecture - System summary ⁱⁱ					
IW category: LME	Countries: Japan, North Korea, Russia, South Korea,		System name: Sea of Japan LME		Region: North Pacific
Complete these columns then assess issues using the arrangements tables			After completing the arrangements tables, complete these columns		
Trans-boundary issue ²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – Shared small pelagics and demersal finfish and invertebrates	4		14		There is no identifiable arrangement
Biodiversity - marine protected areas and marine invasive species	4		38		These are treated as separate arrangements because there are different NOWPAP RACs involved
Biodiversity - habitat and community modification	4		23		
Pollution - LBS (marine litter, nutrients) and oil spills	4		38		
Pollution - MBS (oil spills)	4		38		
	System architecture completeness index >>>		30		<< System priority for intervention

2.3 Assess meant of transboundary integration of arrangements within the systems

The assessment of transboundary integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Table 5) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Policy cycle stage	Fisheries - Shared small pelagics and demersal finfish and invertebrates	Biodiversity - Marine invasive species, Marine Protected Areas	Biodiversity - Habitat and community modification	Pollution - LBS and oil spills
Policy analysis and advice	PICES, APEC-OFWG	NOWPAP-RCU	NOWPAP-RCU	NOWPAP-RCU, CEARAC, MERRAC
Policy decision-making	Countries	NOWPAP-IGM	NOWPAP-IGM	NOWPAP-IGM
Planning analysis and advice	PICES, APEC-OFWG	NOWPAP	NOWPAP	NOWPAP-RCU, CEARAC, MERRAC
Planning decision-making	Countries	NOWPAP-IGM	NOWPAP-IGM	NOWPAP-IGM
Implementation	Countries	Countries	Countries	Countries
Review and evaluation	Countries	NOWPAP	NOWPAP	CEARAC, MERRAC
Data and information	PICES	NOWPAP- DINRAC	NOWPAP- DINRAC	DINRAC, MERRAC, CEARAC

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
2 and 3	1	1	1	1	0	1	1	0.9
2 and 4	1	1	1	1	0	1	1	0.9
2 and 5	1	1	1	1	0	1	1	0.9
3 and 4	1	1	1	1	0	1	1	0.9
3 and 5	1	1	1	1	0	1	1	0.9
Average	0.6	0.6	0.6	0.6	0.0	0.6	0.6	0.5

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the four issues is 0.5 out of a possible 1. The appearance of high integration among arrangements 2, 3, 4 and 5 arises because they are all under NOWPAP. However, it must be recalled that NOWPAP is purely a coordination mechanism that has no international legal

standing. Therefore, the apparent degree of integration that may arise from sharing a common organisation is essentially informal.

No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The absence of North Korea from the arrangements weakens them despite the fact that North Korea's portion of the LME is relatively small (Table 1).

3 Conclusions

There is essentially no transboundary fisheries arrangement. However, PICES does provide opportunity for transboundary cooperation in assessment in science. The fact that there is no regional seas convention covering the area, only an action plan seriously weakens capacity for transboundary governance in areas relating to biodiversity and pollution. There is the potential for integration of pollution and biodiversity issues under NOWPAP should it proceed to the level of a Convention. There does not appear to be any organisation other than NOWPAP that could integrate and coordinate across the full range of issues required for EBM.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Sea of Japan LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Sea of Japan LME	Completeness	Integration	Engagement
	30%	0.5	88%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Rosenberg, A. A. 2009. A of A: North West Pacific Ocean. An Assessment of Assessments: Findings of the Group of Experts. Volume 1. UNESCO, Paris

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱTable notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱTable notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Sea of Okhotsk LME

1 The system to be governed

The system is the Sea of Okhotsk LME. This includes the marine waters of Japan and Russia as shown in Table 1; as well as a disputed area and a small but significant area of high seas.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter X-26), so a review is not provided here. This assessment is also informed by the GIWA assessment (Alekseev et al 2006).

2 Governance arrangements

2.1 Transboundary issues to be governed

Although this is a transboundary LME (Table 1), the majority of the LME lies within Russia's EEZ. Therefore, there are few significant transboundary issue to be addressed by governance in this LME. Fisheries are important in this area, but their management is for the most part at the national level, by Russia.

Whereas, the area covered by the West Central Pacific Fisheries Commission (WCPFC), which has the mandate for management of tunas and billfishes in the western Pacific, does cover the Sea of Okhotsk LME (Table 2), the fisheries that it manages are not a significant issue in this LME. Therefore the relevance of the WCPFC to the LME is minor. However, it can be said that an arrangement for highly migratory species is in place for the tuna and billfish stocks in this LME.

Biodiversity issues identified by Sherman and Hempel (2009) for this LME are primarily Russian national issues. Given that the Kuril Islands are disputed, it is not clear whether biodiversity in this area should be considered a transboundary issue. If most biodiversity threats are coastal in nature, or due to habitat damage from fishing within EEZs then the issue cannot be considered to be transboundary. Pollution issues affecting marine waters are all considered to be transboundary.

The issue identified as requiring transboundary governance is:

- Pollution – LBS and MBS

There may be transboundary fisheries resources but these are not identified and the issue is likely to be a small one given the preponderance of the area that belongs to Russia. This does not consider the need for a mechanism for managing coastal resources in the disputed area.

Table 1. Percentage of Sea of Okhotsk LME area taken up by the EEZ of each country and the High Seas (area = 1,556,459km²)

Country	Percent of LME area
Disputed	4.1
Japan	2.1
Russia	91.3
High Seas	2.5

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2.2 Identify transboundary arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. UNEP Northwest Pacific Action Plan – NOWPAP
 - a. Special Monitoring and Coastal Environment Assessment Regional Activity Centre- CEARAC, Toyama, Japan;
 - b. Marine Environmental Emergency Preparedness and Response Regional Activity Centre- MERRAC, Taejon, Republic of Korea
 - c. Pollution Monitoring Regional Activity Centre- POMRAC, Vladivostok, Russian Federation.
 - d. Data and Information Network RAC- DINRAC, Beijing, China
2. Arctic Council (AC)
3. The North Pacific Marine Science Organization (PICES)
4. Asia-Pacific Economic Cooperation (APEC), Oceans and Fisheries Working Group (OFWG)¹
5. North Pacific Anadromous Fisheries Commission (NPAFC)²

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Sea of Okhotsk LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the Sea of Okhotsk LME			
Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME ³
AC	0.2	2.6	D
PICES	6	100	B
NPAFC	<1	3	D
WCPFC	1	62	D
NOWAP			

The extent of country membership in these bodies and instruments for the Sea of Okhotsk LME is shown in Table 3.

¹ Merger of former Marine Resource Conservation and Fisheries Working Groups

² Applies to the High Seas area

³ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Sea of Okhotsk LME					
Coastal countries in the LME	Agreements				
	AC	PICES	NPAFC	WCPFC	NOWPAP
Japan	N	B	B	B	C
Russia	C	B	B		C
% engagement	100	100	100	50	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed					

2.2.1 Assessment of issues

The governance arrangements for the issues identified above are presented in Table 4a. They are summarised in Table 5

Table 4: Sea of Okhotsk LME^I – Transboundary arrangement for pollution – LBS and MBS (oil spills)

Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		<ul style="list-style-type: none"> • CEARAC's main activities are to monitor and assess harmful algal blooms, to develop new monitoring tools using remote sensing and to assess land-based sources of marine litter. It does not cover the full range of LBS pollution. • MERRAC is to develop effective regional cooperative measures in response to marine pollution incidents including oil and hazardous and noxious substances. It is also working on MBS of marine litter. • POMRAC is responsible for cooperation regarding atmospheric deposition of contaminants and river and direct inputs of contaminants to the marine and coastal environment.
Policy decision-making	NOWPAP-IGM	Supra-LME	1		
Planning analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		
Planning decision-making	NOWPAP-IGM	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	CEARAC, MERRAC	Supra-LME	1		
Data and information	DINRAC, MERRAC, CEARAC	Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 5: Sea of Okhotsk LME governance architecture - System summary ⁱⁱ					
IW category: LME		Countries: Japan, Russia	System name: Sea of Okhotsk LME		Region: North Pacific
Complete these columns then assess issues using the arrangements tables			After completing the arrangements tables, complete these columns		
Trans-boundary issue ²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Pollution – LBS			38		NOWPAP
Pollution – MBS (oil spills)			38		
	System architecture completeness index >>		38%		<< System priority for intervention

2.3 Assess transboundary integration of arrangements within systems

The assessment of transboundary integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Table 4a) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table5)	
Policy cycle stage	Pollution – LBS and MBS
Policy analysis and advice	NOWPAP-RCU, CEARAC, MERRAC
Policy decision-making	NOWPAP-IGM
Planning analysis and advice	NOWPAP-RCU, CEARAC, MERRAC
Planning decision-making	NOWPAP-IGM
Implementation	Countries
Review and evaluation	CEARAC, MERRAC
Data and information	DINRAC, MERRAC, CEARAC

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	1	1	1	1	0	1	1	0.9
Average	1	1	1	1	0	1	1	0.9

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the two issues is 0.9 out of a possible 1. This is because the only two issues are under the same organisation NOWPAP. However, it must be recalled that NOWPAP is purely a coordination mechanism that has no international legal standing. Therefore, the apparent degree of integration that may arise from sharing a common organisation is essentially informal.

No transboundary integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found.

3 Conclusions

The fact that there is no regional seas convention covering the area, only an action plan, seriously weakens capacity for transboundary governance in areas relating to pollution and biodiversity. There is no indication of transboundary integration, other than through cooperation in science. There is the potential for integration of pollution issues under NOWPAP should it proceed to the level of a Convention. There does not appear to be any other transboundary organisation than NOWPAP that could integrate and coordinate across the full range of issues required for EBM.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Sea of Okhotsk LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Sea of Okhotsk LME	Completeness	Integration	Engagement
	38%	0.9	100%

4 References

- Alekseev, A.V., Baklanov, P.J., Arzamastsev, I.S., Blinov, Yu.G., Fedorovskii, A.S., Kachur, A.N., Khrapchenkov, F.F., Medvedeva, I.A., Minakir, P.A., Titova, G.D., Vlasov, A.V., Voronov, B.A. and H. Ishitobi. 2006. Sea of Okhotsk, GIWA Regional assessment 30. University of Kalmar, Kalmar, Sweden.
- Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.
- Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.
- <http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.
- Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ **Policy cycle stage:** This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 4 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the South Brazil Shelf LME

1 The system to be governed

The system is the South Brazil Shelf LME which extends along the eastern coast of South America from 22°S to 34°S. While the definition of the LME results in only Brazil having a coastline bordering the LME, Uruguay also has jurisdiction over a tiny fraction of the LME (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter XVI-54), so a review is not provided here.

Table 1. Percentage of South Brazil Shelf LME area taken up by the EEZ of each country and the High Seas (area = 563,923 km²)

Country	Percent of LME area
Brazil	98.3
Uruguay	1.2
High Seas	0.5

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified in the profile of the LME as follows:

- Fisheries
 - over-exploitation of nearshore pelagic and demersal fish stocks
 - destructive fishing practices including discards and bycatch
 - potential for expansion of oceanic pelagic fisheries
- Pollution
 - eutrophication, sedimentation, pesticides, heavy metals
 - HABs, microbial and parasitic leading to beach closures, fish kills
- Biodiversity
 - changes in ecosystem structure
 - habitat modification resulting in loss of marshland, mangroves and rocky shores, smothering of benthos, anoxic zones

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. International Convention for the Conservation of Atlantic Tuna (ICCAT)

2. Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the South Brazil Shelf LME is shown in Table 2.

Table 2: Spatial overlap of transboundary agreement with the South Brazil Shelf LME			
Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
The International Commission for the Conservation of Atlantic Tunas (ICCAT)	1	100	C
Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)		100	C

The extent of country membership in these bodies and instruments for the South Brazil Shelf LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the South Brazil Shelf LME		
Coastal countries in the LME	Agreements	
	ICCAT	IAC
Brazil	B	B
Uruguay	B	B
% engagement	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed		

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-b. They are summarised in Table 5.

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 4a. South Brazil Shelf LME ⁱ – Transboundary arrangement for fisheries – HMS (tunas and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Supra-LME	3		Uruguay has only signed the Convention, not ratified
Policy decision-making	ICCAT Commission	Supra-LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	Supra-LME	3		
Planning decision-making	ICCAT Commission	Supra-LME	3		
Implementation	Countries	Supra-LME	0		
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	Supra-LME	3		
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	Supra-LME	3		
Overall total and % completeness >>			18/21 = 86%		

Table 4b: South Brazil Shelf LME – Transboundary Arrangements for Biodiversity – Specific (Turtles)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		Both countries have ratified the Convention
Policy decision-making	IAC Consultative Committee and CoP	Supra-LME	3		
Planning analysis and advice	IAC Consultative and Scientific Committees	Supra-LME	2		
Planning decision-making	IAC CoP	Supra-LME	3		
Implementation	IAC Countries	National	0		
Review and evaluation	IAC Countries	National	1		
Data and information	IAC Countries	National	1		
Overall total and % completeness >>			12/21 = 57%		

Table 5: South Brazil Shelf LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Brazil, Uruguay	System name: South Brazil Shelf		Region: ??
Complete these columns then assess issues using the arrangements tables			After completing the arrangements tables, complete these columns		
Trans-boundary issue ²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – tunas and tuna-like species	2		86%		
Biodiversity - Turtles	2		57%		
Pollution – MBS	2		0%		
Pollution - LBS	2		0%		
	System architecture completeness index >>		36%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

Given the extremely small component of the LME that is under Uruguay's jurisdiction, it is not surprising that the issues confronting the LME do not appear to be addressed in a transboundary manner.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-b) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 4a-b)		
Policy cycle stage	Fisheries - HMS	Biodiversity - Turtles
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	IAC Consultative and Scientific Committees
Policy decision-making	ICCAT Commission	IAC Consultative Committee and CoP
Planning analysis and advice	ICCAT SCRS and Species Panels	IAC Consultative and Scientific Committees
Planning decision-making	ICCAT Commission	IAC CoP
Implementation	Countries	IAC Countries
Review and evaluation	Conservation and Management Measures Compliance Committee (CMMCC)	IAC Countries
Data and information	Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	IAC Countries

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
Average	0	0	0	0	0	0	0	0

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the four issues is 0 out of a possible 1.

3 Conclusions

Neither of the two arrangements have any formal linkages although both species that they address are highly migratory pelagic species, one of high commercial value and one for conservation purposes. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6-0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the South Brazil Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

South Brazil Shelf LME	Completeness	Integration	Engagement
	36%	0	100%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

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Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
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- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
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- 0 = Countries alone
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- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

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- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

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Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the South China Sea LME

1 The system to be governed

The system is the South China Sea LME which covers an area of approximately 3.1 million km². Brunei-Darussalam, China, Paracel Islands, Spratly Islands, Indonesia, Malaysia, Philippines, Singapore, Singapore, Taiwan and Vietnam are the countries bordering this LME (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, (Chapter VIII-15), so a review is not provided here. This assessment is also informed by the TDA 2000, Strategic Action Program (SAP) 2008 and PRODOC.

Table 1. Percentage of South China Sea LME area taken up by the EEZ of each country and the High Seas (area = 3,139,900 km²)

Country	Percent of LME area
Brunei-Darussalam	--
China	10.6
Paracel Islands	9.2
Spratly Islands	13.8
Indonesia	17.0
Malaysia	9.1
Philippines	12.8
Singapore	0.0
Taiwan	7.9
Vietnam	18.4
High Seas	1.3

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified by Sherman and Hempel (2009), the TDA (2000) and the SAP (2008) as including:

- Fisheries
 - exploitation of migratory and pelagic species (excessive bycatch)
- Habitat Modification
 - depletion of coral reefs, decline in mangroves, damaged seagrass habitats
 - massive coastal habitat destruction
- Biodiversity
 - endangered species resulting from large-scale mangrove decline, reef degradation
- Pollution
 - LBS - increase in sediments, severe solid waste (localized), hydrocarbons
 - MBS - ship based sources (moderate pollution from spills, with episodic discharges from shipping and occasional spills from oil exploration and production)

2.2 Identify arrangements for each transboundary issue

The countries involved in the governance of the South China Sea LME share concerns about the marine environment and an awareness of the importance of the Sea as a source of protein for the growing coastal populations. The South China Sea LME is included as part of the UNEP-administered East Asian Regional Seas Programme. The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Asia Pacific Fisheries Commission (APFIC)
2. Pacific Islands Forum Fisheries Agency/South Pacific Forum Fisheries Agency Convention (FFA)
3. South East Asian Fisheries Development Center (SEAFDEC)
4. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
5. Coordinating Body on the Seas of East Asia (COBSEA)
6. Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)
7. Indian Ocean- South East Asian (IOSEA) Marine Turtle Memorandum of Understanding
8. Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)
9. Strategic Action Programme for the South China Sea, 2008
10. Action Plan for the Protection and Development of the Marine and Coastal Areas of the East Asian Region, 1981
11. Coral Triangle Initiative – Coral Reefs, Fisheries and Food Security (CTI-CFF) – Regional Plan of Action and Agreement to Establish a CTI-CFF Regional Secretariat

The extent to which the geographical area of coverage of these bodies and instruments overlaps the South China Sea LME is shown in Table 2

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ¹
Asia Pacific Fisheries Commission (APFIC)	23	100	C
Pacific Islands Forum Fisheries Agency/South Pacific Forum Fisheries Agency Convention (FFA)	4	73	D
South East Asian Fisheries Development Center (SEAFDEC)	9	61	D
Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean	3	100	C

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

(WCPFC)			
Coordinating Body on the Seas of East Asia (COBSEA)		100	C
Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)		100	C
Indian Ocean- South East Asian (IOSEA) Marine Turtle Memorandum of Understanding			
Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)			

The extent of country membership in these bodies and instruments for the South China Sea LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the South China Sea LME								
LME coastal countries	Agreement							
	APFIC	FFA	SEAFDEC	WCPFC	COBSEA	PEMSEA	IOSEA	Dugong
China	B	N	N	B	C	C	N	
Indonesia	B	N	C	C	C	C	C	
Malaysia	B	N	C		C	C	C	
Philippines	B	N	C	B	C	C	C	C
Singapore		N	C	N	C	C	N	
Taiwan	N	N	N	N	N	N	N	N
Vietnam	B	N	C		C	C	C	
% engagement	83	0	100	40	100	100	100	17
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed								

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-e. They are summarised in Table 5

Table 4a: South China Sea LME ¹ – Transboundary arrangement for fisheries – HMS (Tuna and tuna-like species)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	Supra-LME	3	IUCN PIF/FFA	<ul style="list-style-type: none"> Only 1 country has ratified the WCPF Agreement. What the implications of this, if any, given that there is negligible high seas area in the LME? Fishing mortality on key non-target oceanic species, including sharks, seabirds and sea turtles is covered under this arrangement. The PIF/FFA oversees the implementation of several treaties and agreements relating to HMS but even though its area of competence extends into the South China Sea LME, none of the countries of this LME are members. What are the implications of this for this LME?
Policy decision-making	WCPFC Commission.	Supra-LME	3		
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	Supra-LME	3		
Planning decision-making	WCPFC Commission.	Supra-LME	3		
Implementation	CPs WCPFC Secretariat FFA	Supra-LME	2		
Review and evaluation	The Technical and Compliance Committee (TCC)	Supra-LME	2		
Data and information	SPC OFP	Supra-LME	3		
Overall total and % completeness >>			19/21 = 90%		

Table 4b: South China Sea LME – Transboundary arrangement for fisheries – EEZ-ABNJ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	FAO Secretariat	Supra-LME	1	SEAFDEC	SEAFDEC Process is purely advisory. SEAFDEC has a MOU with ASEAN and provides technical advice in fisheries under the ASEAN SEAFDEC Strategic Partnership. SEAFDEC also has a memorandum of understanding with FAO.
Policy decision-making	APFIC Commission	Supra-LME	1		
Planning analysis and advice	FAO Secretariat	Supra-LME	1		
Planning decision-making	APFIC Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	FAO Secretariat Countries	Supra-LME National	2		
Data and information	FAO Secretariat Countries	Supra-LME National	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4c: South China Sea LME – Transboundary arrangement for Pollution (LBS and MBS) and Biodiversity – Habitat Modification					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	COBSEA Secretariat PEMSEA Technical Committee	Supra-LME	1	APEC, ASEAN, PEMSEA and the SCS Project. Both COBSEA and ASEAN are inter-governmental groupings that share several member countries. The geographical focus (seas of Southeast Asia and southern part of the People's Republic of China) for the activities is similar. APEC is another inter-governmental grouping with a more extensive geographical coverage, which includes the East Asian Seas region.	<p>Among the Regional Seas Programmes, East Asia has steered a unique course. There is no regional convention; instead the programme promotes compliance with existing environmental treaties and is based on member country goodwill.</p> <p>PEMSEA is the regional coordinating mechanism for the implementation of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA)</p>
Policy decision-making	COBSEA PEMSEA Executive Committee	Supra-LME	1		
Planning analysis and advice	COBSEA Secretariat PEMSEA Technical Committee Countries	Supra-LME National	1		
Planning decision-making	Countries	National	1		
Implementation	Countries	National	2		
Review and evaluation	COBSEA PEMSEA Executive Committee	Supra-LME	0		
Data and information	Countries	National	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4d: South China Sea LME – Transboundary arrangement for Biodiversity - Specific (sea turtles)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		This is an MOU under CMS
Policy decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Planning analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		
Planning decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Implementation	IOSEA – sea turtle MOU CPs	National	0		
Review and evaluation	IOSEA – sea turtle MOU Secretariat	Supra-LME	2		
Data and information	IOSEA – sea turtle MOU CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 4e: South China Sea LME – Transboundary arrangement for biodiversity - specific (dugong)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CPs	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	CPs	Supra-LME	2		
Planning analysis and advice	CPs	Supra-LME	2		
Planning decision-making	CPs	Supra-LME	2		
Implementation	CPs	Supra-LME National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 5: South China Sea LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Brunei-Darussalam, China, Indonesia, Malaysia, Paracel Islands, Philippines, Singapore, Spratly Islands, Taiwan, Viet Nam	System name: South China Sea		Region: East Asia
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – HMS (Tuna and tuna-like species)	7		90%		
Fisheries – EEZ	7		38%		
Pollution - LBS	7		38%		
Pollution – MBS	7		38%		
Biodiversity – Hab Mod	7		38%		
Biodiversity – Specific (Turtles)	7		52%		
Biodiversity – specific (dugong)	7		52%		CMS MOU
	System architecture completeness index >>		50%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-e)							
Policy cycle stage	Fisheries – HMS	Fisheries – EEZ	Pollution – LBS	Pollution - MBS	Biodiversity – Hab Mod	Biodiversity - Specific	Biodiversity - specific (dugongs)
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	FAO Secretariat	COBSEA Secretariat PEMSEA Technical Committee	COBSEA Secretariat PEMSEA Technical Committee	COBSEA Secretariat PEMSEA Technical Committee	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Policy decision-making	WCPFC Commission.	APFIC Commission	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	FAO Secretariat	COBSEA Secretariat PEMSEA Technical Committee Countries	COBSEA Secretariat PEMSEA Technical Committee Countries	COBSEA Secretariat PEMSEA Technical Committee Countries	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Planning decision-making	WCPFC Commission.	APFIC Commission	Countries	Countries	Countries	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Implementation	Countries WCPFC Secretariat FFA	Countries	Countries	Countries	Countries	IOSEA – sea turtle MOU CPs	MOU CPs
Review and evaluation	The Technical and Compliance Committee (TCC)	FAO Secretariat Countries	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	IOSEA – sea turtle MOU Secretariat	Secretariat
Data and information	SPC OFP	FAO Secretariat Countries	Countries	Countries	Countries	IOSEA – sea turtle MOU CPs	MOU CPs

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
3 and 4	1	1	1	0	0	1	0	0.57
3 and 5	1	1	1	0	0	1	0	0.57
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
4 and 5	1	1	1	0	0	1	0	0.57
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
5 and 7	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
Average	0.14	0.14	0.14	0	0	0.14	0	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the seven issues is 0.1 out of a possible 1.

3 Conclusions

The two arrangements for fisheries in the areas (WCPFC and APFIC) each cover high sea highly migratory tuna and tuna-like fisheries and the fisheries within national jurisdiction. There does not appear to be any formal connection between the two arrangements, possibly since they have different areas of competence. However, the arrangement for the regional seas programme cover both for pollution and biodiversity, falling under the Coordinating Body of the Seas of South east Asia (COBSEA), with linkages to the Partnership in Environmental Management for the Seas of East Asia (PEMSEA). However neither of these “within national jurisdiction” arrangements appears to be integrated with each other or with the tuna

arrangement. Similarly, the specific biodiversity arrangement for turtles does not appear to be integrated with the other arrangements in the LME. No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the South China Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

South China Sea LME	Completeness	Integration	Engagement
	50%	0.1	68%

4 References

GEF. 2011. International Waters: Review of legal and institutional frameworks. UNDP, NY, 309 p.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.
<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Southeast U.S. Continental Shelf LME

1 The system to be governed

The system is the Southeast U.S. Continental Shelf LME. This includes the marine waters of the USA and the Bahamas (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter XV-51), so a review is not provided here.

2 Governance arrangements

2.1 Issues to be governed

Sherman and Hempel (2009) do not identify any transboundary issues other than highly migratory fishery species (tunas and tuna-like species). From fisheries perspective the landings are overwhelmingly from the USA and most of the major fisheries are managed at the national and state level. Similarly, fisheries within the waters of the Bahamas are likely to be mainly for sedentary species and not to require transboundary arrangements. An exception may be the deep slope snappers and groupers in areas close to the boundary between the two countries.

Whereas, pollution is being seen as a transboundary issue for all LMEs, the majority of land-based and marine-based pollution within this LME is likely to come from US sources, and thus to be covered by their national and state of governance arrangements.

Therefore, the key transboundary issues to be addressed by governance are considered to be:

- Fisheries
 - HMS (tunas and tuna-like species)
- Pollution
 - LBS and MBS
- Biodiversity
 - Specific (sea turtles)

2.2 Identify transboundary arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

Table 1. Percentage of Southeast U.S. Continental Shelf LME area taken up by the EEZ of each country and the High Seas (area =299,127 km²)

Country	Percent of LME area
Bahamas	15.4
United States	86.1
High Seas	0.8
The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.	

1. Cartagena Convention – Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention).
 - a. Protocol Concerning Co-operation in Combating Oil Spills in the Wider Caribbean Region (Oil Spills Protocol);
 - b. Protocol Concerning Specially Protected Areas and Wildlife (SPAW) in the Wider Caribbean Region (SPAW Protocol)
 - c. Protocol Concerning Pollution from Land-Based Sources and Activities (LBS Protocol)
2. WECAFC - FAO Western Central Atlantic Fishery Commission
3. ICCAT - International Commission for the Conservation of Atlantic Tunas
4. Caribbean Regional Fisheries Mechanism (CRFM)
5. Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Southeast U.S. Continental Shelf LME is shown in Table 2.

Table 1: Spatial overlap of transboundary agreements with the Southeast U.S. Continental Shelf LME.			
Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME ¹
Cartagena Convention and Protocols	2	43	D
ICCAT	<1	100	B
WECAFC)	2	99	D
CRFM	2	15	D
IAC		100	C

The extent of country membership in these bodies and instruments for the Southeast U.S. Continental Shelf LME is shown in Table 3.

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Southeast U.S. Continental Shelf LME								
Coastal countries in the LME	Agreements							
	Cartagena Convention	Cartagena Oil Spills Protocol	Cartagena LBS Protocol	Cartagena SPAW Protocol	ICCAT	WECAFC	CRFM	IAC
Bahamas	B	B	B			C	B	
USA	B	B	B	B	B	C	N	B
% engagement	100	100	100	50	50	100	100	50
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed								

2.2.1 Assessment of issues

The governance arrangements for the issues identified above are presented in Tables 4 a-c. They are summarised in Table 5

Table 4a: Southeast U.S. Continental Shelf LME ⁱ – Transboundary arrangement for fisheries - tuna					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	LME	3	International Game fish Foundation (IGF), International Billfish Foundation (IBF) WECAFC CRFM	<ul style="list-style-type: none">• Both countries are ICCAT members• Bahamas only allows recreational fishing for tunas and tuna-like species
Policy decision-making	ICCAT Commission	LME	2		
Planning analysis and advice	ICCAT SCRS and Species Panels	LME	3		
Planning decision-making	ICCAT Commission	LME	3		
Implementation	Countries	National	0		
Review and evaluation	SCRS and Conservation and Management Measures Compliance Committee (CMMCC)	LME	3		
Data and information	SCRS and Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	LME	3		
Overall total and % completeness >>			17/21 = 81%		

Table 4b: Southeast U.S. Continental Shelf LME – Pollution – LBS and MBS					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Cartagena Convention LBS Scientific and Technical Advisory Committee (STAC)	LME	3		The policy process for the Cartagena convention LBS protocol is primarily focused in the Caribbean sea, North Brazil shelf, and Gulf of Mexico LMEs. Governance of LBS pollution emanating from mainland USA is viewed largely as an issue for the US Federal and State governments.
Policy decision-making	Cartagena Convention IGM LBS COP	LME	1		
Planning analysis and advice	Cartagena Convention LBS Scientific and Technical Advisory Committee (STAC) CIMAB-RAC- Cuba IMA-RAC-Trinidad	LME	2		
Planning decision-making	Cartagena Convention LBS COP	LME	1		
Implementation	CPs Cartagena Convention RCU RACs	LME	2		
Review and evaluation	LBS STAC	LME	2		
Data and information	CP Cartagena Convention RCU RAC	LME	2		
Overall total and % completeness >>			13/21 = 62%		

Table 4c: Southeast U.S. Continental Shelf LME – Biodiversity – specific (sea turtles)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Consultative Committee Scientific Committee	Supra-LME	2		IAC is not a very active organisation
Policy decision-making	COP Consultative Committee	Supra-LME	3		
Planning analysis and advice	Consultative Committee Scientific Committee	Supra-LME	2		
Planning decision-making	COP Consultative Committee	Supra-LME	3		
Implementation	Countries	National	0		
Review and evaluation	Countries	National	1		
Data and information	Countries	National	1		
Overall total and % completeness >>			12/21 = 57%		

Table 5: Southeast U.S. Continental Shelf LME governance architecture - System summary ⁱⁱ					
IW category: LME		Countries: USA, Bahamas	System name: Southeast US Continental Shelf		Region: Western Atlantic
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – HMS (tunas and tuna-like species)	2		81		ICCAT
Pollution - LBS	2		62		Cartagena - LBS
Pollution - MBS	2		62		Cartagena – Oil spills
Biodiversity – specific (sea turtles)	2		57		IAS
	System architecture completeness index >>		65		<< System priority for intervention

2.3 Assess transboundary integration of arrangements within systems

The assessment of transboundary integration is based on the extent to which issue specific arrangements in the LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4 a - c) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table5)			
Policy cycle stage	Fisheries - HMS	Pollution – LBS, MBS	Biodiversity – specific
Policy analysis and advice	ICCAT Standing Committee on Research and Statistics (SCRS)	Cartagena Convention LBS Scientific and Technical Advisory Committee (STAC)	Consultative Committee Scientific Committee
Policy decision-making	ICCAT Commission	Cartagena Convention IGM LBS COP	COP Consultative Committee
Planning analysis and advice	ICCAT SCRS and Species Panels	Cartagena Convention LBS Scientific and Technical Advisory Committee (STAC) CIMAB-RAC- Cuba IMA-RAC-Trinidad	Consultative Committee Scientific Committee
Planning decision-making	ICCAT Commission	Cartagena Convention LBS COP	COP Consultative Committee
Implementation	Countries	CPs Cartagena Convention RCU RACs	Countries

Review and evaluation	SCRS and Conservation and Management Measures Compliance Committee (CMMCC)	LBS STAC	Countries
Data and information	SCRS and Permanent Working for the Improvement of ICCAT Statistics and Conservation Measures (PWG)	CP Cartagena Convention RCU RAC	Countries

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
2 and 3	1	1	1	1	1	1	1	1
2 and 4	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
Average	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the six issues is 0.2 out of a possible 1. There do not appear to be any bilateral arrangements between the USA and Bahamas with regard to transboundary issues in this LME². The fact that implementation and monitoring of ICCAT decisions are solely the responsibility of countries seriously weakens this arrangement.

3 Conclusions

Only the two arrangements for pollution in the areas within national jurisdiction are closely connected under the Cartagena Convention. No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

² Rebecca Shuford, email, 2014 02 28

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Southeast U.S. Continental Shelf LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Southeast U.S. Continental Shelf LME	Completeness	Integration	Engagement
	65%	0.2	81%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

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<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
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- 3 = Implemented through a coordinated regional/global mechanism^{viii}

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- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
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End notes

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Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

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Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

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This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

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System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national

level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Sulu-Celebes Sea LME

1 The system to be governed

The system is the Sulu-Celebes Sea LME comprised of the Sulu and Celebes Seas located in the tropical seas of Asia. This semi-enclosed LME is bounded by the coasts of Malaysia, the Philippines and Indonesia, but most of the LME falls within the archipelagic waters of either the Philippines or Indonesia (Table 1). The LME covers an area of about one million km²

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter VIII-16, so a review is not provided here. This assessment is also informed by the PRODOC and the Regional Strategic Action Program (2013).

Table 1. Percentage of Sulu-Celebes Sea LME area taken up by the EEZ of each country and the High Seas (area = 1,003,640 km²)

Country	Percent of LME area
Indonesia	32.5
Malaysia	3.6
Philippines	62.9
High Seas	1.0

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues identified by Sherman and Hempel (2009) and outlined in the SAP (2103) to be addressed by governance include:

- Fisheries
 - decline of demersal and pelagic fish and invertebrate populations
 - presence of by-catch of endangered or threatened species
- Biodiversity/Habitat Modification
 - destruction of coral reefs by blast-fishing and trawling
 - severe degradation , extensive degradation of mangroves and coral reefs
 - high percentage of species at risk of extinction (20-30%)
 - death of seagrass beds and coral reefs due to excessive freshwater that lower the salinity of coastal waters
- Pollution
 - LBS - high sedimentation; sewage, agriculture, aquaculture, and forest clearing; significant eutrophication in enclosed areas leading to HABs and concomitant fish kills
 - MBS - marine pollution from shipping activities

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Asia Pacific Fisheries Commission (APFIC)
2. Pacific Islands Forum Fisheries Agency/South Pacific Forum Fisheries Agency Convention (FFA)
3. South East Asian Fisheries Development Center (SEAFDEC)
4. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
5. Coordinating Body on the Seas of East Asia (COBSEA)
6. Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)
7. Indian Ocean- South East Asian (IOSEA) Marine Turtle Memorandum of Understanding
8. Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)
9. Strategic Action Programme for the Sulu-Celebes Large Marine Ecosystem, 2013
10. Action Plan for the Protection and Development of the Marine and Coastal Areas of the East Asian Region, 1981
11. Coral Triangle Initiative – Coral Reefs, Fisheries and Food Security (CTI-CFF) – Regional Plan of Action and Agreement to Establish a CTI-CFF Regional Secretariat

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Sulu-Celebes Sea LME is shown in Table 2.

Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME ¹
Asia Pacific Fisheries Commission (APFIC)	7	100	C
Pacific Islands Forum Fisheries Agency/South Pacific Forum Fisheries Agency Convention (FFA)	2	100	C
South East Asian Fisheries Development Center (SEAFDEC)	5	100	C
Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)	1	100	C
Coordinating Body on the Seas of East Asia (COBSEA)		100	C
Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)		100	C
Indian Ocean- South East Asian (IOSEA) Marine Turtle Memorandum of Understanding			

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MOU)			
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The extent of country membership in these bodies and instruments for the Sulu-Celebes Sea LME is shown in Table 3.

Table 3. Country membership in regional marine agreements relevant to the Sulu-Celebes Sea LME								
LME coastal countries	Agreement							
	APFIC	FFA	SEAFDEC	WCPFC	COBSEA	PEMSEA	IOSEA	Dugong
Indonesia	B	N	C	C	C	C	C	
Malaysia	B	N	C		C	C	C	
Philippines	B	N	C	B	C	C	C	C
% engagement	100	0	100	33	100	100	100	33
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed								

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-e. They are summarised in Table 5

Table 4a: Sulu-Celebes Sea LME¹ – Transboundary arrangement for fisheries – HMS (Tuna and tuna-like species)

Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	Supra-LME	3	IUCN PIF/FFA	<ul style="list-style-type: none"> Only 1 country has ratified the WCPFC Agreement. What the implications of this, if any, given that there is negligible high seas area in the LME? Fishing mortality on key non-target oceanic species, including sharks, seabirds and sea turtles is covered under this arrangement. The PIF/FFA oversees the implementation of several treaties and agreements relating to HMS but even though its area of competence extends into the Sulu-Celebes Sea LME, none of the countries of this LME are members. What are the implications of this for this LME?
Policy decision-making	WCPFC Commission.	Supra-LME	3		
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	Supra-LME	3		
Planning decision-making	WCPFC Commission.	Supra-LME	3		
Implementation	CPs WCPFC Secretariat FFA	Supra-LME	2		
Review and evaluation	The Technical and Compliance Committee (TCC)	Supra-LME	2		
Data and information	SPC OFP	Supra-LME	3		
Overall total and % completeness >>			19/21 = 90%		

Table 4b: Sulu-Celebes Sea LME – Transboundary arrangement for fisheries – EEZ					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	FAO Secretariat	Supra-LME	1	SEAFDEC	SEAFDEC Process is purely advisory. SEAFDEC has a MOU with ASEAN and provides technical advice in fisheries under the ASEAN SEAFDEC Strategic Partnership. SEAFDEC also has a memorandum of understanding with FAO.
Policy decision-making	APFIC Commission	Supra-LME	1		
Planning analysis and advice	FAO Secretariat	Supra-LME	1		
Planning decision-making	APFIC Commission	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	FAO Secretariat Countries	Supra-LME National	2		
Data and information	FAO Secretariat Countries	Supra-LME National	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4c: Sulu-Celebes Sea LME – Transboundary arrangement for Pollution (LBS and MBS) and Biodiversity (General)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	COBSEA Secretariat PEMSEA Technical Committee	Supra-LME	1	APEC, ASEAN, PEMSEA and the SCS Project. Both COBSEA and ASEAN are inter-governmental groupings that share several member countries. The geographical focus (seas of Southeast Asia and southern part of the People's Republic of China) for the activities is similar. APEC is another inter-governmental grouping with a more extensive geographical coverage, which includes the East Asian Seas region.	Among the Regional Seas Programmes, East Asia has steered a unique course. There is no regional convention; instead the programme promotes compliance with existing environmental treaties and is based on member country goodwill. PEMSEA is the regional coordinating mechanism for the implementation of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA)
Policy decision-making	COBSEA PEMSEA Executive Committee	Supra-LME	1		
Planning analysis and advice	COBSEA Secretariat PEMSEA Technical Committee Countries	Supra-LME National	1		
Planning decision-making	Countries	National	1		
Implementation	Countries	National	2		
Review and evaluation	COBSEA PEMSEA Executive Committee	Supra-LME	0		
Data and information	Countries	National	2		
Overall total and % completeness >>			8/21 = 38%		

Table 4d:Sulu-Celebes Sea LME – Transboundary arrangement for Biodiversity - Specific (sea turtles)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		This is an MOU under CMS
Policy decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Planning analysis and advice	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	Supra-LME	2		
Planning decision-making	IOSEA – sea turtle MOU Meeting of Parties	Supra-LME	2		
Implementation	IOSEA – sea turtle MOU CPs	National	0		
Review and evaluation	IOSEA – sea turtle MOU Secretariat	Supra-LME	2		
Data and information	IOSEA – sea turtle MOU CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 4e: Sulu-Celebes Sea LME – Transboundary arrangement for biodiversity - specific (dugong)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	CPs	Supra-LME	2		• This is an MOU under CMS
Policy decision-making	CPs	Supra-LME	2		
Planning analysis and advice	CPs	Supra-LME	2		
Planning decision-making	CPs	Supra-LME	2		
Implementation	CPs	Supra-LME National	0		
Review and evaluation	Secretariat	Supra-LME	2		
Data and information	CPs	National	1		
Overall total and % completeness >>			11/21 = 52%		

Table 5: Sulu-Celebes Sea LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Indonesia, Malaysia, Philippines	System name: Sulu-Celebes Sea		Region: East Asia
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries – HMS (Tuna and tuna-like species)	3		90%		
Fisheries – EEZ	3		38%		
Pollution - LBS	3		38%		
Pollution – MBS	3		38%		
Biodiversity – Hab Mod	3		38%		
Biodiversity - Specific	3		52%		
Biodiversity – specific (dugong)	3		52%		CMS MOU
	System architecture completeness index >>		50%		<< System priority for intervention

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-e) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from tables 4a-e)							
Policy cycle stage	Fisheries – HMS	Fisheries – EEZ	Pollution – LBS	Pollution - MBS	Biodiversity - General	Biodiversity - Specific	Biodiversity - specific (dugongs)
Policy analysis and advice	WCPFC Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee	FAO Secretariat	COBSEA Secretariat PEMSEA Technical Committee	COBSEA Secretariat PEMSEA Technical Committee	COBSEA Secretariat PEMSEA Technical Committee	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Policy decision-making	WCPFC Commission.	APFIC Commission	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Planning analysis and advice	The Technical and Compliance Committee (TCC) The Northern Committee (NC) Scientific Committee FFA	FAO Secretariat	COBSEA Secretariat PEMSEA Technical Committee Countries	COBSEA Secretariat PEMSEA Technical Committee Countries	COBSEA Secretariat PEMSEA Technical Committee Countries	IOSEA – sea turtle MOU CPs Secretariat Advisory Committee	MOU CPs
Planning decision-making	WCPFC Commission.	APFIC Commission	Countries	Countries	Countries	IOSEA – sea turtle MOU Meeting of Parties	MOU CPs
Implementation	Countries WCPFC Secretariat FFA	Countries	Countries	Countries	Countries	IOSEA – sea turtle MOU CPs	MOU CPs
Review and evaluation	The Technical and Compliance Committee (TCC)	FAO Secretariat Countries	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	COBSEA PEMSEA Executive Committee	IOSEA – sea turtle MOU Secretariat	Secretariat
Data and information	SPC OFP	FAO Secretariat Countries	Countries	Countries	Countries	IOSEA – sea turtle MOU CPs	MOU CPs

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	0
1 and 3	0	0	0	0	0	0	0	0
1 and 4	0	0	0	0	0	0	0	0
1 and 5	0	0	0	0	0	0	0	0
1 and 6	0	0	0	0	0	0	0	0
1 and 7	0	0	0	0	0	0	0	0
2 and 3	0	0	0	0	0	0	0	0
2 and 4	0	0	0	0	0	0	0	0
2 and 5	0	0	0	0	0	0	0	0
2 and 6	0	0	0	0	0	0	0	0
2 and 7	0	0	0	0	0	0	0	0
3 and 4	1	1	1	0	0	1	0	0.57
3 and 5	1	1	1	0	0	1	0	0.57
3 and 6	0	0	0	0	0	0	0	0
3 and 7	0	0	0	0	0	0	0	0
4 and 5	1	1	1	0	0	1	0	0.57
4 and 6	0	0	0	0	0	0	0	0
4 and 7	0	0	0	0	0	0	0	0
5 and 6	0	0	0	0	0	0	0	0
5 and 7	0	0	0	0	0	0	0	0
6 and 7	0	0	0	0	0	0	0	0
Average	0.14	0.14	0.14	0	0	0.14	0	0.1

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the four issues is 0.1 out of a possible 1.

3 Conclusions

The two arrangements for fisheries (WCPFC and APFIC) in the areas each cover high sea highly migratory tuna and tuna-like fisheries and the fisheries within national jurisdiction. There does not appear to me any formal connection between the two arrangements, possibly since they have different areas of competence. However, the arrangement for the regional seas programme cover both for pollution and biodiversity, falling under the Coordinating Body of the Seas of South east Asia (COBSEA), with linkages to the Partnership in Environmental Management for the Seas of East Asia (PEMSEA). However neither of these within national

jurisdiction arrangements appears to be integrated with each other or with the tuna arrangement.

No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. There may be interaction amongst the arrangements through participation in each other's meetings, but this appears to be informal.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Sulu Celebes Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Sulu Celebes Sea LME	Completeness	Integration	Engagement
	50%	0.1	71%

4 References

Sulu Sulawesi Marine Ecoregion Tri-National Committee. 2013. Strategic Action Program for the Sulu-Celebes Sea Large Marine Ecosystem. Prepared for the Sulu-Celebes Sustainable Fisheries Management Project under GEF/UNDP/UNPOS.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

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Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the West Bering Sea LME

1 The system to be governed

The system is the West Bering Sea LME. The West Bering Sea LME lies off Russia's northeast coast and borders the Aleutian Trench. The LME has a surface area of just over 720,000 km², reduced from the former 2 million km² due to revisions in the boundaries of the LME. The newly revised West Bering Sea LME includes the marine waters primarily under the jurisdiction of Russia at over 90%, with the US and high seas making up the remainder (Table 1).

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel 2009, Chapter X-27), so a review is not provided here.¹ Additional information on issues affecting the LME was obtained from the website of the international NGO, International Bering Sea Forum at www.beringseaforum.org

Table 1. Percentage of West Bering LME area taken up by the EEZ of each country and the High Seas (area = 721,940 km ²)	
Country	Percent of LME area
Russia	90.4
US	7.9
High Seas	1.8
The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.	

2 Governance arrangements

2.1 Transboundary Issues to be governed

The transboundary issues to be addressed by governance were identified as:

- Fisheries
 - over-exploitation primarily from factory trawlers and IUU fishing
 - poaching of salmon eggs
- Pollution
 - oil and gas exploration and mining
 - Hg and POPs from long-range transport
- Biodiversity
 - declines in marine mammals and seabirds
 - habitat modification – mining and seabed alteration from trawling

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

¹ Chapter 27 of the Sherman and Hempel (2009) report describes the LME based on its old boundaries?

2.2 Identify arrangements for each transboundary issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. Arctic Council (AC)
2. The North Pacific Marine Science Organization (PICES)
3. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
4. Agreement on the Conservation of Polar Bears (ACPB)

The extent to which the geographical area of coverage of these bodies and instruments overlaps the West Bering Sea LME is shown in Table 2.

Agreement	Percentage of agreement in LME	Percentage of LME in agreement	Fit of agreement to LME ²
Arctic Council (AC)	2.9	73.8	D
The North Pacific Marine Science Organization (PICES)	3	100	C
Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)	<1	26	D
Agreement on the Conservation of Polar Bears (ACPB)		100	C

The extent of country membership in these bodies and instruments for the West Bering Sea LME is shown in Table 3.

Coastal countries in the LME	Agreements			
	AC	ACPB	PICES	WCPFC
Russia	C	B	B	
United States	C	B	B	B
% engagement	100	100	100	50
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed				

2.2.1 Assessment of transboundary issues

The governance arrangements for the issues identified above are presented in Tables 4 a-b. They are summarised in Table 5

² A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 4a: West Bering LME ¹ – Transboundary Arrangement for Pollution (LBS and MBS), Biodiversity, Fisheries and Climate Change					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; Conservation of Arctic Flora and Fauna; Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Supra-LME	3	International Arctic Science Committee (IASC) PICES?	All countries are members of the Arctic Council
Policy decision-making	Arctic Council	Supra-LME	1		
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; Conservation of Arctic Flora and Fauna; Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces Senior Arctic Officials (SAO)	Supra-LME	3		
Planning decision-making	Arctic Council	Supra-LME	1		
Implementation	Countries	National	1		
Review and evaluation	Arctic Council	Supra-LME	2		
Data and information	Countries Secretariat	National Supra-LME	3		
Overall total and % completeness >>			14/21 = 67%		

Table 4b: West Bering Sea LME – Transboundary Arrangement for Biodiversity - Protection of Marine Mammals					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	ACPB – IUCN Polar Bear Specialist Group and Country experts	Supra-LME National	1	Arctic Council	Both coastal states are members of ACPB although Russia has only signed, not ratified The arrangement only covers some 18% of the eastern part of the LME
Policy decision-making	ACPB- Countries	National	0		
Planning analysis and advice	ACPB – IUCN Polar Bear Specialist Group and Country experts	Supra-LME National	2		
Planning decision-making	ACPB Countries	National	0		
Implementation	ACPB Countries	National	0		
Review and evaluation	ACPB - IUCN Polar Bear Specialist Group	Supra-LME	2		
Data and information	ACPB – IUCN Polar Bear Specialist Group and Country experts	National Supra-LME	3		
Overall total and % completeness >>			8/21 = 38%		

Table 5: West Bering Sea LME governance architecture - System summary ⁱⁱ					
IW category: Marine region		Countries: Russia, United States	System name: West Bering Sea		Region: North Polar
<i>Complete these columns then assess issues using the arrangements tables</i>			<i>After completing the arrangements tables, complete these columns</i>		
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Pollution (LBS)	2		67%		
Pollution (MBS)	2		67%		
Biodiversity – General	2		67%		
Biodiversity – Specific (Polar Bear)	2		38%		
	System architecture completeness index >>		60%		<< System priority for intervention

2.2.2 Issues mentioned in the TDA but not addressed above:

Issues such as the poaching of salmon eggs, while clearly having a transboundary effect, are not discussed since these are presumably primarily dealt with at the national level.

2.3 Assess integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an IW system share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-b) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from Table 4a-b)				
Policy cycle stage	Pollution - LBS	Pollution - MBS	Biodiversity - General	Biodiversity - Specific (Polar Bear)
Policy analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Emergency preparedness, Prevention and response; Protection of Arctic Marine Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	ACPB – IUCN Polar Bear Specialist Group and Country experts
Policy decision-making	Arctic Council	Arctic Council	Arctic Council	ACPB- Countries
Planning analysis and advice	Arctic Council - Arctic Contaminants Action Program; Arctic Monitoring and Assessment programme; SD Working Group	Emergency preparedness, Prevention and response; Protection of Arctic Marine	Arctic Council Conservation of Arctic Flora and Fauna; SD Working Group Expert Groups; Task Forces;	ACPB – IUCN Polar Bear Specialist Group and Country experts

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from Table 4a-b)

Policy cycle stage	Pollution - LBS	Pollution - MBS	Biodiversity - General	Biodiversity - Specific (Polar Bear)
	Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Environment; SD Working Group Expert Groups; Task Forces; Senior Arctic Officials (SAO)	Senior Arctic Officials (SAO)	
Planning decision-making	Arctic Council	Arctic Council	Arctic Council	ACPB Countries
Implementation	Countries	Countries	Countries	ACPB Countries
Review and evaluation	Arctic Council	Arctic Council	Arctic Council	ACPB - IUCN Polar Bear Specialist Group
Data and information	Countries Secretariat	Countries Secretariat	Countries Secretariat	ACPB – IUCN Polar Bear Specialist Group and Country experts

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	1	0	1	0	1	1	0.57
1 and 3	0	1	0	1	0	1	1	0.57
1 and 4	0	0	0	0	0	0	0	0
2 and 3	0	1	0	1	0	1	1	0.57
2 and 4	0	0	0	0	0	0	0	0
3 and 4	0	0	0	0	0	0	0	0
Average	0	0.5	0	0.5	0	0.5	0.5	0.3

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the four issues is 0.3 out of a possible 1.

3 Conclusions

Transboundary issues of concern in this LME are addressed by the Arctic Council, primarily due to its integrative nature. However, while it does appear that the Arctic Council has the potential to develop into an informal overall policy coordinating organization, its policy coordination role with respect to fisheries is weak. Also, it should also be noted that the majority of the LME is within Russia's marine jurisdiction.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the West Bering Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

West Bering Sea LME	Completeness	Integration	Engagement
	60%	0.3	100%

4 References

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp. <http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱ Table notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱ Table notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement % (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 7 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

Assessment of transboundary governance architecture for the Yellow Sea LME

1 The system to be governed

The system is the Yellow Sea LME. This includes the marine waters of the countries as shown in Table 1.

An overview of the LME from the perspective of the five LME modules is provided by Sherman and Hempel (2009, Chapter X-28), so a review is not provided here. This assessment is also informed by the TDA, PRODOC, and SAP (UNDP/GEF 2007, UNDP/GEF 2009).

2 Governance arrangements

2.1 Issues to be governed

The issues to be addressed by governance were identified in the TDA and SAP (UNDP/GEF 2007):

- Fishing effort exceeding ecosystem carrying capacity
- Mariculture facing unsustainable problems
- Pollution and contaminants
- Eutrophication
- Harmful algal blooms (habs)
- Habitat loss and degradation
- Change in ecosystem structure
- Jellyfish blooms
- Climate change-related issues

From a transboundary governance perspective it is possible and desirable to combine several of the above issues under single governance arrangements.

2.2 Identify arrangements for each issue

The key transboundary bodies and instruments that have been identified and that may be expected to comprise the arrangements are:

1. UNEP Northwest Pacific Action Plan – NOWPAP
 - a. Special Monitoring and Coastal Environment Assessment Regional Activity Centre- CEARAC, Toyama, Japan;

Table 1. Percentage of Yellow Sea LME area taken up by the EEZ of each country and the High Seas (area = 435,539 km²)

Country	Percent of LME area
China	61.6
North Korea	5.5
South Korea	32.3
High Seas	0.6

The figures shown in this table are based on the equidistant EEZ boundaries from marineregions.org and are for discussion purposes only. They do not reflect any position on maritime boundary delimitation.

- b. Marine Environmental Emergency Preparedness and Response Regional Activity Centre- MERRAC, Taejeon, Republic of Korea
 - c. Pollution Monitoring Regional Activity Centre- POMRAC, Vladivostok, Russian Federation.
 - d. Data and Information Network RAC- DINRAC, Beijing, China
2. Yellow Sea Partnership established by the YSLME Project and intended as a precursor to the YSLME Commission
 3. The North Pacific Marine Science Organization (PICES)
 4. Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)
 5. Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC)
 6. Strategic Action Programme (SAP) for the Yellow Sea Large Marine Ecosystem, 2009

The extent to which the geographical area of coverage of these bodies and instruments overlaps the Yellow Sea LME is shown in Table 2. The country membership in these bodies and instruments for the Yellow Sea LME is shown in Table 3.

Table 2: Spatial overlap of transboundary agreement with the Yellow Sea LME			
Agreement	Percent of agreement in LME	Percent of LME in agreement	Fit of agreement to LME ¹
PICES	2	100	C
WCPFC	<1	100	C
NOWPAP		100	C

¹ A = Exact match between agreement and LME; B = LME larger than and includes arrangement; C = Arrangement larger than and includes LME; D = Arrangement and LME offset.

Table 3. Country membership in regional marine agreements relevant to the Yellow Sea LME			
Coastal countries in the LME	Agreements		
	PICES	WCPFC	NOWPAP
China	B	B	C
North Korea		N	C
South Korea	B	B	C
% engagement	67	100	100
B = a binding commitment to the agreement by ratification, accession, acceptance or adoption C = agreement to cooperate by signing N = country not eligible to join this agreement. Some agreements can be ratified and have potential to be all Bs, others can only be signed			

2.2.1 Assessment of issues

The transboundary arrangements covering the key issues outlined in tables 4 a – c. These are summarised in table 5.

Table 4a: Yellow Sea LME ⁱ – Transboundary arrangement for fisheries – all resources within EEZs					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	PICES	Supra-LME	1		<ul style="list-style-type: none">• There is no structured transboundary arrangement for fisheries other than tuna under the WCPFC, and as already noted the majority of tuna fisheries do not extend into the Yellow Sea.• There is some collaboration in fisheries science and assessment through PICES and countries may engage in some level of policy discussion through the APEC-OFWG.• The YSLME Project has developed a YS Partnership which has promoted a lot of cooperation
Policy decision-making	Countries	National	0		
Planning analysis and advice	PICES	Supra-LME	1		
Planning decision-making	Countries	National	0		
Implementation	Countries	National	0		
Review and evaluation	Countries	National	0		
Data and information	PICES	Supra-LME	1		
Overall total and % completeness >>			3/21 = 14%		

Table 4b: Yellow Sea LME – Transboundary arrangement for pollution – LBS and MBS (oil spills)					
Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		<ul style="list-style-type: none">• CEARAC’s main activities are to monitor and assess harmful algal blooms, to develop new monitoring tools using remote sensing and to assess land-based sources of marine litter. It does not cover the full range of LBS pollution.• MERRAC is to develop effective regional cooperative measures in response to marine pollution incidents including oil and hazardous and noxious substances. It is also working on MBS of marine litter.• POMRAC is responsible for cooperation regarding atmospheric deposition of contaminants and river and direct inputs of contaminants to the marine and coastal environment.• For DINRAC’s objectives see Table 5a.
Policy decision-making	NOWPAP-IGM	Supra-LME	1		
Planning analysis and advice	NOWPAP-RCU, CEARAC, MERRAC	Supra-LME	2		
Planning decision-making	NOWPAP-IGM	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	CEARAC, MERRAC	Supra-LME	1		
Data and information	DINRAC, MERRAC, CEARAC	Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

Table 4c: Yellow Sea LME – Transboundary arrangement for (a) biodiversity - Marine Protected Areas and marine invasive species, and (b) biodiversity – Habitat and community modification

Policy cycle stage	Responsible organisation or body			Other key organisations	Observations
	Names	Scale level(s)	Score		
Policy analysis and advice	NOWPAP-RCU	Supra-LME	2		<ul style="list-style-type: none"> DINRAC's objectives are to develop a region-wide data and information exchange network, to promote regional cooperation and exchange of information on the marine and coastal environment in the NOWPAP region. There does not appear to be any specialised part of NOWPAP focused on habitat and community modification.
Policy decision-making	NOWPAP-IGM	Supra-LME	1		
Planning analysis and advice	NOWPAP	Supra-LME	2		
Planning decision-making	NOWPAP-IGM	Supra-LME	1		
Implementation	Countries	National	0		
Review and evaluation	NOWPAP	Supra-LME	1		
Data and information	NOWPAP- DINRAC	Supra-LME	1		
Overall total and % completeness >>			8/21 = 38%		

2.2.2 Issues mentioned in the TDA but not addressed above:

Table 5: Yellow Sea LME governance architecture - System summary ⁱⁱ					
IW category: LME	Countries: China, North Korea, South Korea		System name: Yellow Sea LME		Region: North West Pacific
Trans-boundary issue²	Number of countries involved	Collective importance for countries involved	Completeness of governance arrangement % (category)	Priority for intervention to improve governance	Observations
Fisheries - EEZs	3		14		No arrangement
Pollution - LBS	3		38		NOWPAP
Pollution - MBS	3		38		
Biodiversity - PAs	3		38		
Biodiversity – habitat and community modification	3		38		
	System architecture completeness index >>		33%		<< System priority for intervention

2.3 Assess transboundary integration of arrangements within systems

The assessment of integration is based on the extent to which issue specific arrangements in an LME share a responsible body at various policy cycle stages. This was determined directly by extracting the information from the arrangement summaries (Tables 4a-c) and summarizing it in Table 6 to facilitate comparison. The integration scores for each pair of issues at each policy cycle stage are then determined and entered into Table 7 from which average scores per issue pair or per policy cycle stage can be calculatedⁱⁱⁱ.

Table 6. Summary of the responsible agencies for each arrangement at each policy cycle stage (from table 5)

Policy cycle stage	Fisheries – All in EEZs	Pollution – LBS and MBS	Biodiversity - Pas and habitats
Policy analysis and advice	PICES	NOWPAP-RCU, CEARAC, MERRAC	NOWPAP-RCU
Policy decision-making	Countries	NOWPAP-IGM	NOWPAP-IGM
Planning analysis and advice	PICES	NOWPAP-RCU, CEARAC, MERRAC	NOWPAP
Planning decision-making	Countries	NOWPAP-IGM	NOWPAP-IGM
Implementation	Countries	Countries	Countries
Review and evaluation	Countries	CEARAC, MERRAC	NOWPAP
Data and information	PICES	DINRAC, MERRAC, CEARAC	NOWPAP- DINRAC

Table 7. Assessment of integration among arrangements. Each policy cycle stage is given a score of 0 or 1 for each combination of arrangements depending on whether there is a common agency or not.

Common agency between arrangements	Policy analysis and advice	Policy decision-making	Planning analysis and advice	Planning decision-making	Implementation	Review and evaluation	Data and information	Overall average
1 and 2	0	0	0	0	0	0	0	-
1 and 3	0	0	0	0	0	0	0	-
1 and 4	0	0	0	0	0	0	0	-
1 and 5	0	0	0	0	0	0	0	-
2 and 3	1	1	1	1	0	1	1	0.9
2 and 4	1	1	1	1	0	1	1	0.9
2 and 5	1	1	1	1	0	1	1	0.9
3 and 4	1	1	1	1	0	1	1	0.9
3 and 5	1	1	1	1	0	1	1	0.9
4 and 5	1	1	1	1	0	1	1	0.9
Average	0.6	0.6	0.6	0.6	-	0.6	0.6	0.5

Table 7 provides insight into the stages at which integration is highest, as well as the arrangements which might be clustered. In this system, integration across the arrangements for the six issues is 0.5 out of a possible 1.

3 Conclusions

The appearance of high integration among arrangements in this LME arises because they are all under NOWPAP. However, it must be recalled that NOWPAP is purely a coordination mechanism that has no international legal standing. Therefore, the apparent degree of integration that may arise from sharing a common organisation is essentially informal. No integrating mechanisms, such as an overall policy coordinating organisation for the LME, could be found. The Yellow Sea Partnership established by the YSLME Project and intended as a precursor to the YSLME Commission is an arrangement that has the potential to become an integrating agency.

The Level One governance architecture assessment focuses on identifying an overall scoring for the LME based on three governance indicators:

- (i) the average **level of completeness** of all formal arrangements in place for addressing key transboundary issues. Completeness indicator ranges from 0-100%.
- (ii) the **level of integration** across different arrangements addressing the key transboundary issues. Integration indicator ranges from 0-1.
- (iii) the average **level of engagement** by countries in the LME for each of the agreements in place for addressing key transboundary issues. Engagement indicator ranges from 0-100%.

In order to link the assessed scores for the three indicators to a perceived level of risk, a five-point score was developed as provided below:

Risk Rank	Completeness Range	Integration Range	Engagement Range
Very Low	80-100%	0.8-1.0	80-100%
Low	60-80%	0.6 -0.8	60-80%
Medium	40-60%	0.4-0.6	40-60%
High	20-40%	0.2-0.4	20-40%
Very High	0-20%	0.0-0.2	0-20%

For the Yellow Sea LME, the following overall scores for the assessment of governance architecture and corresponding ranking of risk were:

Yellow Sea LME	Completeness	Integration	Engagement
	33%	0.5	83%

4 References

Sherman, K. and Hempel, G. [Eds]. 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Mahon, R., L. Fanning, R. and P. McConney. 2012. Governance assessment methodology for CLME pilot projects and case studies. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 53 (English): 20p.

Mahon, R., L. Fanning, and P. McConney. 2011. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, 61 pp.

<http://twap.iwlearn.org/publications/databases/volume-1-methodology-for-the-assessment-of-transboundary-aquifers-lake-basins-river-basins-large-marine-ecosystems-and-the-open-ocean/view>.

UNDP/GEF 2007. UNDP/GEF Project: Reducing Environmental Stress in the Yellow Sea Large Marine Ecosystem. Strategic Action Programme. 98 p.

UNDP/GEF 2009. UNDP/GEF Project: Reducing Environmental Stress in the Yellow Sea Large Marine Ecosystem. Strategic Action Programme. 56 p.

Kullenberg, G. and M. Huber. 2011. UNDP/GEF Project on Reducing Environmental Stress in the Yellow Sea Large Marine Ecosystem: Final Evaluation Report

UNDP/GEF. 2008. The Yellow Sea: Governance analysis reports. UNDP/GEF Yellow Sea Project, Ansan, Republic of Korea (334 pages).

Appendix 1: Scoring criteria

Advisory mechanism (policy and management)

- 0 = No transboundary science policy mechanism, e.g. COP self advises^{iv}
- 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation
- 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process
- 3 = Science-policy interface clearly specified in the agreement^v

Decision-making (policy and management):

- 0 = No decision-making mechanism^{vi}
- 1 = Decisions are recommendations to countries
- 2 = Decisions are binding with the possibility for countries to opt out of complying
- 3 = Decisions are binding

Implementation:

- 0 = Countries alone
- 1 = Countries supported by secretariat
- 2 = Countries and regional/global level support^{vii}
- 3 = Implemented through a coordinated regional/global mechanism^{viii}

Review:

- 0 = No review mechanism
- 1 = Countries review and self-report
- 2 = Agreed review of implementation at regime level
- 3 = Agreed compliance mechanism with repercussions

Data and information:

- 0 = No DI mechanism
- 1 = Countries provide DI which is used as is
- 2 = DI centrally coordinated, reviewed and shared^{ix}
- 3 = DI centrally managed and shared^x

End notes

ⁱTable notes:

Policy cycle stage: This column lists the governance functions that are considered to be necessary at two levels (a) the policy setting level and (2) the policy implementation level.

Responsible organisation or body: Organisation or organisations responsible for the function should be listed here

Scale level or levels: These are the institutional scale level or levels at which the function is performed. These include local, national, sub regional (Sub-LME), regional (LME), extra-regional (Supra-LME).

Completeness: Rate on a scale of 0 – 3 based on the criteria in Appendix 1.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided, but is not intended to be a substitute for annotation.

Overall total and % completeness: Assume each step is equally important and receives equal weighting. Total possible score is 21.

ⁱⁱTable notes:

This table provides an overview of all the arrangements in the system and their status.

Issues: There is the question of how far down in detail these should go. This can be a matter of choice, and part of the flexibility of the system, but it should ideally be to the level where the transboundary issue requires a separate arrangement for management. To use a fishery example, individual species or groups of species may each require their own assessment and measures, but may all be handled in one institutional arrangement. However, for geopolitical reasons, some species or groups of species may require separate processes and should be treated as separate issues needing separate arrangements. Ideally, these issues should be identified and quantified in a TDA. If not, experts knowledgeable about the system may have to identify them.

Number of countries involved: Indicates how many of the total number of countries are involved in the particular issue.

Collective importance for countries involved: This should be based on the TDA but may have to be based on expert judgement, or other sources of regional information. It is to be scored from 0-3.

Completeness of governance arrangement% (category): The percentage given in this column is derived from the completeness scores allocated in the arrangement specific Table. This score will then be reallocated into a category where none = 3, low = 2, medium = 1 and high = 0) for input into the Priority for intervention column. The reason for reversing the score is that the higher the completeness, the less the need for intervention.

Priority for intervention to improve governance: This priority would be calculated as the product of the 'collective priority for countries involved for the issue' and completeness category. It can range from 0-9.

Observations: This provides the opportunity for brief comments that may help the user interpret the information provided on the summary page, but is not intended to be a substitute for annotation.

System architecture completeness: Average for issues.

ⁱⁱⁱ The individual integration scores to be entered in Table 4 can range from zero where each of the two arrangements has a totally separate set of responsible bodies to one where both arrangements share the same responsible bodies at that stage. It is generally expected that responsibility at any stage will lie with one primary agency; however there may be situations where there is more than one agency. In such cases, it must be decided whether to give a score between 0 and 1 based on the number of agencies that are shared or simply to give a 1 if any agency is shared. For transboundary systems, when responsibility for the policy cycle stage is at the national level, the score will be 0. Even where the responsible agency is the counterpart in each country (e.g. the Ministry of Environment) this cannot be considered to be a common agency.

^{iv} Nothing in documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by decision-making body.

^v This can be internal or external

^{vi} This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the organization itself, such as process or organizational structure.

^{vii} This means support from regional programmes or partner organizations arranged via secretariat

^{viii} For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, for example the FFA surveillance flag

^{ix} In both 2 and 3 data are checked for quality and consistency. The difference is that in 3 there is a place where all the data can be found, whether as actual data or metadata.

^x Here the regime could also be the actual collector and compiler of the data, e.g. as in IPHC

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Transboundary Waters Assessment Programme (TWAP) Assessment of Governance Arrangements for the Ocean

Volume 2 • Areas Beyond National Jurisdiction



Intergovernmental Oceanographic Commission
Technical Series 119

Transboundary Waters Assessment Programme (TWAP) Assessment of Governance Arrangements for the Ocean

Volume 2 **Areas Beyond National Jurisdiction**

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Additional information:

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Preface

This report is an output of the Open Ocean Component of the Global Environment Facility (GEF) Transboundary Waters Assessment Programme (TWAP) (2013-2015). TWAP conducted indicator-based assessments for transboundary water systems in five categories: aquifers, rivers, lakes, Large Marine Ecosystems (LMEs) and Open Ocean. These included assessment of governance arrangements and overall architecture for transboundary systems. This report covers the arrangements for the Open Ocean with a focus on areas beyond national jurisdiction (ABNJ), while its companion (Volume 1) covers arrangement for LMEs. Each report is summarised as a chapter in the overall assessment report for the respective water category (Open Ocean and LME).

The database of agreements that formed the basis of this report is available [online](#) as part of the GEOWOW/TWAP OneSharedOcean.org initiative (hosted by the UNESCO-IOC International Oceanographic Data and Information Exchange (IODE)). It will provide a focal access point for ocean scientists and policy makers to retrieve and share data. This will also include an interactive website where the agreements and regional clusters can be explored spatially.

The authors thank Kimberley Baldwin for conducting the GIS analyses used in this report and Katherine Blackman for assistance with compiling data on governance agreements. We also wish to thank the reviewers Julian Rochette and Jakob Granit for their valuable comments. We are grateful to UNESCO-IOC for the opportunity to carry out this work.

We take this opportunity to let readers know that this report covers primarily the extent to which arrangements are in place and appear to conform to widely accepted governance norms. It does not assess the performance or effectiveness of these arrangements. It also examines the extent to which the set of arrangements for ABNJ have an overall pattern that might be useful in understanding them, and how they relate to arrangements for areas within national jurisdiction (AWNJ). Assessment of the performance or effectiveness of these arrangements and how these relate to the presence of 'good governance' characteristics should be the next stage of this work.

RM, LF

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Summary

The ocean area beyond national jurisdiction (ABNJ) covers about half of the surface of planet Earth, with those within national jurisdiction (AWNJ) covering a further 20 percent. ABNJ provide many important ecosystem services. These ecosystem services are increasingly under threat from a diversity of anthropogenic impacts arising from fisheries, land and marine-based sources of pollution, and climate change. Several recent high-level meetings and reports have concluded that poor governance is a root cause of unsustainability of ecosystem services from the global ocean. Current thinking about governance suggests that addressing this root cause will require much more than the conventional historical focus on regulatory processes and enforcement. It recognizes that governance is much broader than this and encompasses the private sector, civil society and resource users of all kinds. This has led to increased attention to the institutional arrangements and structures within which governance processes play out.

The global governance arrangements for the ocean fall under the constitutive framework of the 1982 United Nations Convention on the Law of the Sea (UNCLOS). The preamble to UNCLOS acknowledges that ‘the problems of ocean space are closely interrelated and need to be considered as a whole’. This perception of the need to manage ocean issues in an integrated and coordinated manner runs throughout the Convention. However, despite the large array of global and regional conventions, treaties and other arrangements for governance of the major ocean issues, coordination and integration among issues such as biodiversity, fisheries, pollution and climate are often weak.

As with other social-ecological systems, governance of the ocean involves much more than these global conventions. It includes governmental structures, markets, and civil society arrangements. Thus, in deciding where future interventions can help to mediate the relationship between human and natural systems and increase human well-being, both the existing global legal framework and linkages with other critical components and actors of the system will need to be fully appreciated by the Global Environment Facility (GEF) and other stakeholders. Given the interconnectedness of the world’s ocean, linkages to national and even local level governance processes will also play critical roles in the governance of ocean areas beyond national jurisdiction (ABNJ).

This report examines the plethora (over 100) of international agreements comprising the global ocean governance architecture for the key issues, fisheries, pollution, biodiversity and climate change, in ABNJ. Indeed, these issues are critical for all ocean areas, so the report also considers the linkages of governance arrangements in ABNJ with those for areas within national jurisdiction (AWNJ). This study confirms that there is indeed considerable room for improvement in integration at the global and regional levels, and that there are significant gaps in coverage of issues, especially biodiversity. It provides indications of where interventions may be needed and proposes an overall structure to make ocean governance architecture more approachable.

It is important to note that the assessment is intended to look only at governance arrangements and architecture. Due to limitations in time and resources, it does not examine governance effectiveness, important as assessment of effectiveness may be.

Approach to the assessment

The approach to the assessment was to assemble all governance agreements that were found to have relevance to the four issues of concern in the ABNJ: fisheries, biodiversity, pollution, and climate change. These agreements were compiled into a database to facilitate assessment of the extent to which the issues are covered either globally or regionally. An arrangement is any multilateral agreement, together with organizational structures and processes in place to give effect to it¹. The assessment also examined each arrangement to determine whether policy processes considered to be adequate for good governance are in place. The arrangements are

¹ In the governance literature the term ‘regime’ is also often used to refer to arrangements as defined here.

also examined from a spatial perspective to determine geographical overlaps and gaps as well as the extent to which ABNJ are covered by governance arrangements.

The determination of direct relevance is based on whether the agreement is intended to address an ABNJ or straddling issue. On this basis, all relevant global agreements were included as well as many regional ones, such as regional fisheries conventions and Regional Seas Programme conventions that address ABNJ. With regard to fisheries, all agreements for Regional Fishery Management Organisations (RFMOs) and Regional Fisheries Bodies (RFBs) with responsibility extending into ABNJ or for highly migratory or straddling stocks were included. It should be noted that this includes a wide diversity of types of fisheries bodies with mandates ranging from purely advisory to those with the capacity to make binding decisions on fisheries management. With regard to pollution, all land-based sources of pollution (LBS) impacting ABNJ pass through coastal waters. Therefore, regional agreements addressing LBS were considered to be directly relevant to ABNJ. Most marine-based sources of pollution (MBS) may also be transported by currents from EEZs into ABNJ. This approach leads to a preponderance of pollution-oriented agreements which are primarily aimed at addressing coastal pollution problems. For biodiversity, the inclusion of agreements oriented towards national waters was considered. These are primarily protocols arising from Regional Seas conventions. It was thought that while the inclusion of pollution agreements under Regional Seas conventions was important for the reasons given above, the case for inclusion of biodiversity agreements was less clear. Most Regional Seas-based biodiversity agreements only relate to ABNJ when protected areas or other measures provide protection for straddling or highly migratory species (HMS) such as sea turtles, seabirds, and marine mammals. It was decided that including these agreements would provide a biased picture regarding biodiversity conservation in ABNJ.

For each of the agreements included in the database, a variety of information was obtained. The primary sources for the information included in the database were the actual conventions and agreements, rules of procedure for the organisations and secretariats for the agreements, and organisational websites. When the desired information could not be found in these sources, other documentation and websites were explored. Typically, intergovernmental agreements fall into two categories: (1) constituting agreements² and (2) implementing or operational agreements. Constituting agreements are aimed at setting the broad context and issues for cooperation, with the expectation that these will be further refined and made actionable by operating agreements. The operating agreements are aimed at giving specific effect to the broader objectives of constituting agreements. They often appear as protocols or annexes to constituting agreements. In this study, protocols are treated as separate agreements as they often have different membership and timeframes to their constituting agreements, whereas annexes are part of the constituting agreement.

Findings

Overall, 100 arrangements were considered to be relevant to ABNJ with regard to the four issues of concern (Table A). Of these, 18 are constituting agreements and 82 are operational. The majority of the arrangements address pollution (55) and fisheries (43), with far fewer for biodiversity (25) and climate change (8). Of the entire set of arrangements, 23 are global in scope, with the remainder being specific to individual oceans or marine regions. The number of regional agreements varies widely among ocean regions, from 25 in the North Atlantic and adjacent seas (Mediterranean, Caribbean, Baltic, Black) to 8 in the South Atlantic. The polar regions also have relatively few agreements, with six for the Southern Ocean and three for the Arctic Ocean. However, the assessment identifies the set of governance arrangements for the Southern Ocean to be among the most comprehensive for any region.

Regional agreements are considered to be important means of translating global agreements to specific geographical areas, which is essential for an ecosystem approach. A closer look at the

² Also sometimes referred to as framework agreements.

coverage of issues by regional agreements reveals some of the gaps (Table A). For example, there are several regions with no agreement of any kind for biodiversity. Several of the biodiversity agreements are also species (polar bears) or taxon (seals, albatrosses and petrels, sea turtles) specific and do not provide broad coverage of habitats and communities. In the case of climate change, there are two global agreements, the UNFCCC and its Kyoto Protocol, and six combined issue regional agreements in which climate change is identified only as a factor that must be taken into consideration in dealing with the other issues.

Assessment of policy cycles

Scoring criteria were used to assign each arrangement a score for each of the stages of its policy cycle. The advisory and decision-making stages of the policy cycle are each considered in two modes -- policy mode and management mode -- making a total of seven stages to be assessed: (1) Provision of policy advice, (2) Policy decision-making, (3) Provision of management advice, (4) Management decision-making, (5) Management implementation, (6) Management review, and (7) Data and information management. Provision for carrying out each of these policy cycle stages is considered to be an important component of the institutional arrangements needed for good. The scores in each case ranged from 0 to 3 and are intended to reflect the institutional strength of the arrangement for transboundary governance at that particular policy cycle stage. An overall policy cycle score is derived from the scores of the individual stages and expressed as a percent completeness. It is important to note that a high completeness score means that the arrangements are specified on paper but does not mean that they are operating in practice.

Table A. Numbers of arrangements by issues, types and regions (B = biodiversity, F = fisheries, P = pollution, C = climate change)

Region	Type of arrangement	Issues covered												Total
		F	P	B	C	FP	FB	PB	PC	BP	FPB	PBC	FPBC	
Overall	Constituting	0	10	1	1	1	2	0	0	0	2	1	0	18
	Operational	27	34	5	1	0	6	2	1	1	0	0	5	82
	Total	27	44	6	2	1	8	2	1	1	2	1	5	100
Global	Constituting	0	2	1	1		2	0	0		1			7
	Operational	3	8	1	1		1	1	1		0			16
	Total	3	10	2	2		3	1	1		1			23
Atlantic	Operational	1		1										2
North Atlantic	Constituting	0	3	0			0	0		0			0	3
	Operational	4	10	1			2	1		1			1	20
	Total	4	13	1			2	1		1			1	23
South Atlantic	Constituting	0	1				0							1
	Operational	2	2				1							5
	Total	2	3				1							6
North Pacific	Constituting	0									1		0	1
	Operational	4									0		1	5
	Total	4									1		1	6
South Pacific	Constituting	0	1									1	0	2
	Operational	9	5									0	1	15
	Total	9	6									1	1	17
Indian Ocean	Constituting	0	3				0							3
	Operational	2	8				1							11
	Total	2	11				1							14
Arctic Ocean	Operational	1		1									1	3
Southern Ocean	Constituting	0	0	0		1	0						0	1
	Operational	1	1	1		0	1						1	5
	Total	1	1	1		1	1						1	6

The analysis of policy cycle stage scores shows differences in strength among the policy cycle stages, and between constituting and operational agreements. Both types of agreements score higher for the advisory stages, where the majority score 3, than for the decision-making stages, where the majority score 1. This is because while the majority of arrangements do have clearly identified mechanisms for both policy and management advice, the decisions made are predominantly recommendations which contracting parties may or may not choose to implement. As might be expected, the extent to which decisions made are binding is considerably higher for operational agreements than for constituting agreements. As regards implementation, the peak for operational agreements is 0, which means that it is entirely up to the member countries. It is only slightly higher for constitution agreements with a peak at 1 indicating that there is some secretariat support for implementation. Overall, the picture for most policy cycle stages, and for overall completeness, is that there is clearly considerable scope for strengthening most stages of the policy cycles for both types of agreement.

The analysis of policy cycle scores by issue also shows some differences in strength among the issues. For both policy and management advice, the distribution of scores appears similar among issues, although advisory mechanism scores in fisheries and biodiversity arrangements were higher than for pollution. For decision-making, fisheries arrangements clearly scored highest, with decisions made for pollution being primarily in the form of recommendations for contracting parties. In contrast, fisheries arrangements scored lowest for implementation, which is predominantly at the level of contracting parties. Biodiversity and pollution arrangements (primarily within national waters) were considerably more likely to have regional level support.

Overall structure of arrangements

The analysis of the entire set of global and regional arrangements for ABNJ governance reveals an overall pattern that may provide a useful framework for identifying gaps and weak areas and for developing interventions to address them. The overall picture is one of two complementary sets of networks (Figure A). The first set is the 'global-to-regional issue-based networks'. They are shown as vertical rectangles which reflect the major global arrangements for each of the four issues of fisheries, pollution, biodiversity and climate change. The second set is the crosscutting 'regional intersectoral clusters/networks'. They are illustrated in Figure A by horizontal rectangles representing five hypothetical 'regional intersectoral clusters/networks' (Regions A-E). The solid circles indicate that representation of 'global-to-regional issue-based networks' is incomplete in the regional clusters, reflecting gaps to be filled.

Issue areas		GLOBAL-TO REGIONAL ISSUE-BASED NETWORKS						
		Fisheries Straddling	Fisheries HMS	Pollution LBS	Pollution MBS	Biodiversity		Climate Change
Global agreements		UNFSA		GPA	MARPOL London	CBD	Ballast Water	UNFCCC Kyoto
Program/agency		FAO		UNEP-RS	IMO	UNEP-CBD, IMO		UNFCCC, WMO
REGIONAL CLUSTERS/NETWORKS	Region A	<div></div>	<div></div>	<div></div>	<div></div>			
	Region B	<div></div>	<div></div>		<div></div>			
	Region C	<div></div>		<div></div>	<div></div>	<div></div>		
	Region D			<div></div>		<div></div>		
	Region E	<div></div>			<div></div>	<div></div>		<div></div>

Figure A. The global ocean governance structure comprising ‘global-to-regional issue-based networks’ of arrangements and complementary ‘crosscutting regional intersectoral networks’ of arrangements illustrated here for five hypothetical regions A-E. The solid circles indicate that the issue covered by the global-regional network is reflected in the arrangements comprising the regional cluster.

Global-to-regional issue-based networks

The global-to-regional issue-based networks comprise constituting and operational agreements at global and regional levels. They provide the potential for vertical interplay between regional and global arrangements. The majority of the arrangements that have been included in the database are either directly administered by, or associated with, the programmes of a relatively small number of UN agencies and programs which serve to anchor these networks as shown in Figure A. It should be noted that the United Nations Convention on the Law of the Sea (UNCLOS) is a constituting agreement that provides an overarching framework for governance of the ocean, including ABNJ, and so is not shown in Figure B. It should also be noted that not all agreements with relevance ABNJ are connected to UNCLOS, e.g. CITES, CBD, GPA.

For fisheries, the UN Fish Stocks Agreement (UNFSA), along with the FAO Compliance Agreement and FAO Code of Conduct are the major global constituting agreements, with the FAO being the agency responsible for promoting implementation of its Code of Conduct and Compliance Agreement and the UN General Assembly (UNGA) being responsible for the UNFSA. To some extent, the Committee of Fisheries (COFI), a subsidiary body of the FAO Council, can be seen as an overarching policy setting body for RFBs globally, although none of the agreements or the voluntary code explicitly identifies COFI as playing this role.

The International Maritime Organisation (IMO) is home to another cluster of arrangements pertaining largely to pollution. It provides the secretariat for six global level operational agreements relating to marine based pollution and one relating to biodiversity - the Ballast Water Management Convention (BWMC). Given that these relate to global shipping, there is less imperative for them to be reflected in regional level arrangements. The IMO itself promotes implementation of these agreements at the regional level through five IMO Regional Presence

initiatives. Perhaps more significantly, the promotion and implementation of IMO arrangements is often facilitated at the regional level through Regional Seas Programme protocols. It should be noted that there are global level pollution arrangements that are not part of the IMO cluster: The Vienna Convention/Montréal Protocol, and the Stockholm Convention.

The Regional Seas Programme of UNEP, which began in 1974, is the most extensive initiative promoting regional implementation of global arrangements. There are 18 Regional Seas areas of which 17 are indirectly or directly connected to ABNJ. One of the most prominent activities across Regional Seas areas is implementation of the 1995 Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA) (UNEP/GPA 2006). This is approached through 11 regional protocols addressing land-based sources of pollution and activities (LBSA).

While the networks described above help to make global level fisheries and pollution arrangements applicable at the regional level, there is no comparable network or institutional arrangement for place-based biodiversity conservation in ABNJ. Several important biodiversity arrangements may be facilitated at the regional level under the Regional Seas Secretariats but these are almost entirely within areas under national jurisdiction. The 2008 effort under the CBD to address this gap is focused on cataloguing and describing Ecologically or Biologically Significant Areas (EBSAs) and is aimed at providing scientific information and advice for place-based biodiversity conservation in both AWNJ and ABNJ. However, there is still a lack of a complete global level policy process for ABNJ that can make decisions about which areas should be protected, and the regional institutional arrangements needed for implementation.

Climate change, the fourth issue to be addressed, is in some ways qualitatively different from the other three. Its effects will be experienced in all regions and ecosystems of the planet. Thus far, discussions about mitigation have taken place in global level arenas and do not appear to have a regional implementation component with an ocean focus. Adaptation on the other hand will need to be implemented at regional, national and local levels. Only three regional agreements could be found that made reference to addressing climate change adaptation or vulnerability in ABNJ - the Antarctic Treaty System, the Arctic Council, and the Pacific Islands Forum - of which the latter two are constituting agreements. It is not clear from the agreements examined how climate change will be dealt with at the regional level. It is likely that it will be dealt with largely as a crosscutting issue in sectoral agreements.

The 'global-to-regional issue-based networks' above play an important role in facilitating lateral linkages among regional organisations and connecting them with the global level arrangements. However, they are largely sector or issue specific, leaving the question as to how integration across issues and sectors is structured for ocean governance. It can be argued that there is a need for integration at both global and regional levels. It is the role of UN-Oceans to provide effective, transparent and regular inter-agency coordination on ocean and coastal issues among the 15 UN bodies involved in ocean affairs. An evaluation of UN-Oceans concluded that due to its ad hoc structure and lack of dedicated human and financial resources, it was ineffective, and unlikely to be able to achieve its objectives. The review recommended that UN-Oceans be provided with a Secretariat and that it be institutionalised with clear procedures for program development and decision-making. New Terms of Reference for UN-Oceans were approved by the UNGA in 2013. What is not clear is whether the mechanism will be provided with the resources needed to be effective.

Regional clusters for EBM

At the regional level, there appear to be 16 regions in the world where arrangements pertaining to ABNJ issues (and often to ocean issues in general) overlap and interact (Figure B). These clusters of arrangements provide potential for improving regional or 'place-based' implementation of global arrangements. They also provide potential arenas for horizontal interplay needed for integration across issues, and for the integration of regional issue-specific arrangements with the wider spectrum of regional economic cooperation activities

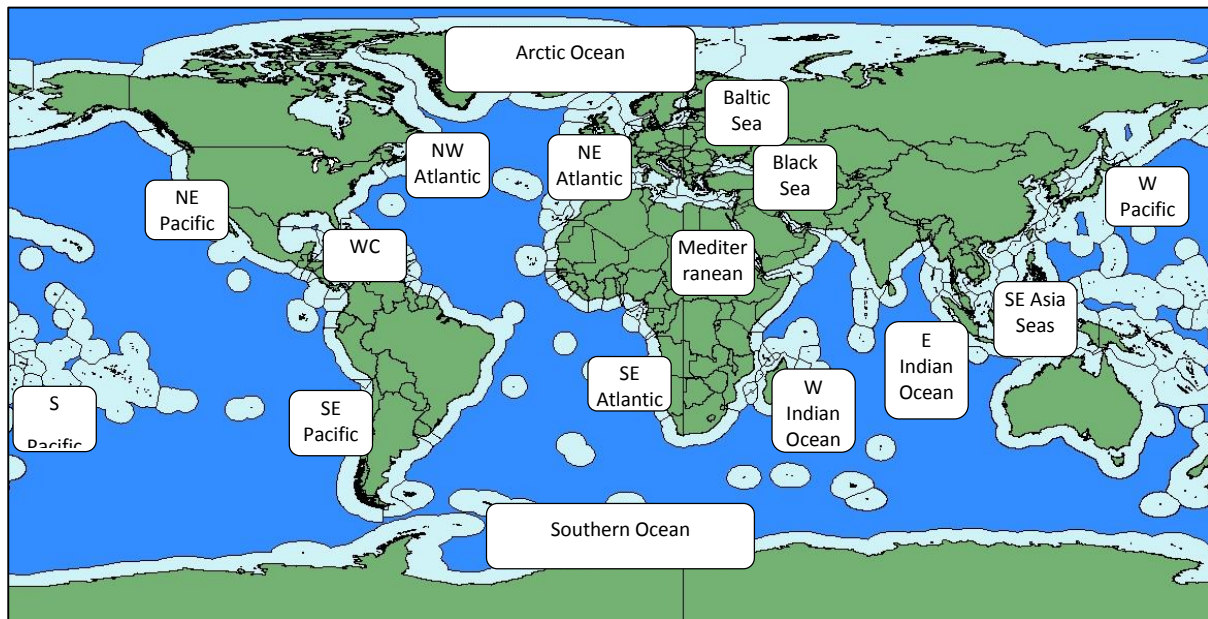


Figure B. The 16 regional clusters identified.

Discussion

This study has focused on the governance arrangements and architecture for ocean ABNJ taking a structural approach to the many arrangements that relate to governance of ABNJ and the way that they appear to be interrelated, globally and regionally. It has looked at the individual arrangements from the perspective of whether they have been established in such a way as to be able to carry out the full policy process considered necessary for 'good governance'. The study has also looked for any patterns among organisations at global and regional levels that may relate to governance functioning and that may also make it easier for stakeholders to understand and interact with global ocean governance. Attention was paid to science-policy interfaces, and the extent to which there appeared to be separate sets of governance arrangements for areas under and areas beyond national jurisdiction.

Good governance and effective governance

The assessment of the individual arrangements indicated areas of weakness in the policy cycle stages for ocean governance arrangements. A key challenge in this study was to deal with governance arrangements and architecture without venturing into the assessment of governance effectiveness. This limitation was necessary because assessing governance effectiveness would involve evaluation of outcomes and impacts that require a substantial amount of physical, ecological, social and economic information over appropriate periods of time. Much of what was assessed in the policy cycle scoring process can be considered as reflecting whether 'good governance' practices are in place. For example, having clearly specified processes and mechanisms across the seven policy cycle stages is seen as likely to improve characteristics of 'good governance' such as transparency, accountability, and ease with which stakeholders can engage with the process. Ultimately, these characteristics might be expected to produce better governance results, and are often cited as being desirable characteristics of governance processes in their own right. However, the state of governance research is such that it is not possible to be definitive about the relationship between these 'good governance' characteristics and governance effectiveness.

The global architecture for ocean governance

This study takes a holistic perspective of global architecture for ocean governance as comprising 'issue-based global-regional networks' and cross-cutting 'regional intersectoral clusters/networks'. This structure may be seen as emerging, but far from complete and with much

dysfunctionality. It is thought that the holistic perspective provided here can move the global-regional ocean governance community towards a better understanding of what has been achieved over the past several decades, where the major gaps are, and what the critical next steps may be to address these gaps and strengthen the entire system. This holistic perspective is thought to be of value in helping those working within parts of the system to see the full picture and especially those working outside the system to engage with what has been described as a very complex, disordered and fragmented set of arrangements for the ocean.

The ideas relating to networks, nesting of arrangements, the importance of scale and interplay among arrangements underpinning this perspective are prominent in conceptual discourses on governance. Polycentric approaches such as regional clusters juxtaposed with global clusters facilitate achieving benefits at multiple scales as well as experimentation and learning from experience with diverse policies. There is also an ongoing discourse about how lessons learned from research on governing 'the commons' at smaller scales might inform approaches at regional and global levels. However, much of this thinking has failed to gain traction in the world of practitioners and institution builders for global environmental governance. It is thought that this study can make a contribution towards bringing those working at the conceptual level together with those responsible for making regimes work in practice.

Characteristics and potential role of regional clusters

The 16 regional clusters for ocean governance reflect a diversity of regional level approaches to pursuing (or not) intersectoral integration and ecosystem-based management for the ocean. They vary widely with regard to: spatial extent, the extent to which there appears to be overarching integration, what is in place for each of the four issues, and relevance to ABNJ. Within the clusters identified, interaction appears highest among fisheries management arrangements. In many instances Regional Seas conventions and action plans are also active in integrating pollution and biodiversity aspects, although few include ABNJ. In most clusters, the FAO Ecosystem Approach to Fisheries (EAF) and the UNFSA mandate to protect marine biodiversity are obvious starting points for building capacity for EBM and would require linkages with Regional Seas and other non-fisheries arrangements in the cluster. One can envisage the strengthening of clusters to the level where the full range of ocean governance interests, including biodiversity and pollution in ABNJ, is engaged and integrated.

Few of the clusters were found to have clearly identifiable overarching mechanisms for integrated policy development and coordination. The Pacific Islands Forum (PIF) and its Council of Regional Organisations of the Pacific (CROP) is the most prominent example of such a mechanism. Two other mechanisms developed with the express purpose of coordination are the Antarctic Treaty System and the Arctic Council. In the Mediterranean, coordination for sustainable development is approached through the establishment of the Mediterranean Commission on Sustainable Development (MCSD) in 1996, in association with the Barcelona Convention. The Secretariat of the Barcelona Convention supports the activities of the MCSD. In the southeast Pacific, the interaction between the FAO and CPPS, which also serves as the Secretariat for the Lima Convention, has the potential to promote EBM. In Southeast Asia, PEMSEA, a home-grown coordination body emerged as a bottom-up response to a perceived lack of regional policy/coordination capability. In other regions, an ocean specific mechanism for overarching policy development and coordination is either absent or is partially taken up by the Secretariat of the Regional Seas Conventions (or its counterpart). However, this may mean that linkages between the major issues of Regional Seas Conventions, such as pollution and environment/biodiversity, with other sectors, notably fisheries, shipping and tourism, remain weak or absent.

In most clusters, provisions for technical advice appear to be largely by mechanisms that are internal to the individual arrangements that comprise them. A few of the regional clusters also appear to have crosscutting arrangements for the provision of technical advice involving separate bodies, namely PICES in the North Pacific, ICES in the North Atlantic, the SCAR in the Antarctic

and the IASC in the Arctic. Each of these technical advisory arrangements has a different history and relationship with the other arrangements in their cluster.

The extent to which the arrangements within regional clusters are integrated with the broader regional political economies undertaken by bodies such as ASEAN, SADC, SAARC, MERCOSUR and CARICOM is also of interest. Only the coordinating mechanisms for the Pacific Island Region and the Mediterranean Sea appear to have strong linkages with regional multipurpose political organisations. Some connectivity is evident in the Western Central Atlantic, the Bay of Bengal and southern Africa. For the most part, these mechanisms are focussed on areas within national jurisdiction. As indicated above, these are preliminary observations and will require further investigation.

The findings from this study indicate that despite their current deficiencies, regional clusters could have a potentially important role in implementing EBM in their respective regions, including ABNJ if their mandates are extended, and should be the focus of initiatives to build and strengthen them. The regional clusters would complement the desired 'global-to-regional, issue-based networks'. To pursue this, further work needs to be done on assessing their role and developing approaches and programs to strengthen them.

Science-policy interfaces

The UNEP Foresight Process on Emerging Environmental Issues for the 21st century, concluded that the cross-cutting issue "Broken Bridges: Reconnecting Science and Policy" is the fourth most pressing one regarding efforts to achieve sustainable development. The panel noted that critical scientific knowledge is not being communicated effectively to audiences ranging from decision-makers to the general public. The importance of the science-policy interface is a main reason for the policy cycle based approach in this assessment and more explicitly the inclusion of the policy cycle stages relating to development and provision of policy and management advice.

It is also important to look beyond the mechanisms within individual arrangements to determine if there are identifiable overarching science-policy interfaces within the global and regional networks. These are thought to be essential for the network integration needed for EBM. There are science-policy interfaces at each of the three levels that require further investigation regarding the extent to which: The advisory mechanism is independent of the decision-making and implementation mechanisms; the policy advice tends to come from the same body that is providing technical/management advice; and the science-policy interface processes are adaptable with regard to being able to change the questions that are being put to advice providers.

Assessment of current status

The evaluation of the strengths of the policy processes for arrangements for ABNJ and the overall global structure constitute an assessment of what is currently in place. This is a partial baseline assessment of ocean governance architecture. However, there are other aspects of governance architecture that could be pursued to develop a more comprehensive baseline, such as the extent to which there is: spatial fit of arrangements and regional clusters to the spatial issues; spatial coherence among arrangements within a regional cluster; engagement of countries in arrangements, regional clusters and global networks; progress within arrangements in moving towards EBM; a mechanism specified for integrating policy and management across issues within regional clusters and at the global level.

A comprehensive baseline for ocean governance architecture will also require considerably more detail on the structural aspects of the global framework for ocean governance described in this report. For example, the extent and nature of vertical and lateral interplay among arrangements is an important aspect of architecture that could not be adequately explored in this assessment. While the identification of networks and regional clusters is based on inferred linkages, a baseline that would provide a basis for monitoring change should include information on actual linkages. This requires a substantial investigation using approaches such as social network analysis.

One ocean, one governance architecture?

The perspective on the overall, emerging, global architecture for ocean governance developed in this study provides the opportunity to take a holistic view of the entire set of arrangements and their interrelations. In some areas, there may be overlap between arrangements that pertain to ABNJ and those that pertain to AWNJ. Some regional regime clusters include a combination of arrangements with mandates for areas within EEZs, mandates for ABNJ and mandates for straddling issues. Consequently, it may be most appropriate to perceive ocean governance arrangements globally as a single set of integrated arrangements structured as described in this study: 'global-to-regional issue-based networks' complemented by 'regional intersectoral clusters'. This structure could reflect what is desirable and therefore needed to address governance in both ABNJ and AWNJ in an integrated and holistic fashion. The key point regarding structure is that it is more advanced for areas within national jurisdiction, and weak for ABNJ, particularly with regard to biodiversity and ecosystems.

From this perspective, the emphasis should then be on strengthening the existing set of global/regional arrangements to address deficiencies and fill gaps. This includes:

- Strengthening regional clusters (both mandate and capacity) to address issues in adjacent ABNJ.
- Strengthening the global level constituting and operational arrangements for biodiversity.
- Paying attention to structures that are needed to improve adaptive capacity.
- Exploring ways of strengthening lateral linkages among regional clusters.
- Subscribing to a general emerging set of principles, in particular conservation in addition to sustainable use, as well as the ecosystem and precautionary approaches, that cuts across AWNJ and ABNJ.

Recommendations

Based on the analysis conducted for this study, recommendations can be made in three areas:

- (1) Individual arrangements
- (2) Regional intersectoral clusters
- (3) Global-to-regional issue-based clusters.

At the level of individual arrangements, there is the need to support monitoring of the extent to which 'good governance' practices are observed and to assess how these practices relate to governance effectiveness. Monitoring of 'good governance' should be context specific, based on a common set of criteria. The refinement of 'good governance' criteria at the arrangement level will be an iterative process.

Strengthening regional clusters of agreements, particularly so that they can undertake EBM in offshore waters, including ABNJ, is seen as a critical component of strengthening ABNJ governance. This will include promotion of integration mechanisms, expansion of mandates to include biodiversity conservation in ABNJ, improvement of interplay among arrangements within clusters, as well as building new linkages with regional multipurpose organisations to increase political understanding of and support for ocean governance. Clearly this will also strengthen governance in AWNJ.

Vertical interplay between regional and global processes and the capacity to integrate at the global policy level is also weak and requires attention. UN-Oceans is currently the primary UN programme specialized to achieving such integration, and efforts to strengthen UN-Oceans appear to have stalled. However, the proposal for an UNCLOS Implementing Agreement, if it sets forth the conditions necessary for effective interplay, i.e. non-hierarchical organizations operating in sync based on a common purpose and set of principles, could improve vertical as well as regional horizontal interplay for the key issue of biodiversity.

1 Introduction

The ocean area beyond national jurisdiction (ABNJ) covers about half of the surface of planet Earth with those within national jurisdiction (AWNJ) covering a further 20 percent (Figure 1). While not as ecologically productive as Large Marine Ecosystems³ (LMEs) – which are primarily associated with continental shelves but include the outer margins of boundary currents and provide over 80% of the world's total marine fish catches (FAO 2006, Garibaldi and Limongelli 2003, Sherman and Duda 1999) - ABNJ provide many important ecosystem services, including regulatory services, provision of food, energy, recreational and cultural services (UNEP 2006, UNESCO-IOC et al. 2011). These ecosystem services are increasingly under threat from many anthropogenic impacts arising from fisheries, land and marine-based sources of pollution, and climate change (GESAMP 2001). The monetary value of ecosystem services from ABNJ is poorly known, especially for nonmarket services such as their role in moderating climate change (Murillas-Maza 2011) but are thought to be huge (IPCC 2014). This lack of knowledge, combined with the vastness and remoteness of ABNJ, has resulted in inadequate attention to the protection and preservation of the ocean's capacity to deliver these services.

The global governance arrangements for the ocean fall under the constitutive framework of the 1982 UN Convention on the Law of the Sea (UNCLOS). The preamble to UNCLOS acknowledges that 'the problems of ocean space are closely interrelated and need to be considered as a whole'. This perception of the need to manage ocean issues in an integrated and coordinated manner runs throughout the Convention. **However, despite the large array of global and regional conventions, treaties and other arrangements for governance of the major ocean issues, coordination and integration among issues such as biodiversity, fisheries, pollution and climate are often weak** (Freestone 2010, Rothwell and Stephens 2010).

As with other social-ecological systems, governance of the ocean involves much more than these global conventions. It includes governmental structures, markets, and civil society arrangements. Thus, in deciding where future interventions can help to mediate this relationship between human and natural systems and increase human well-being, both the existing global legal framework and linkages with other critical components and actors of the system will need to be fully appreciated by the Global Environment Facility (GEF) and other stakeholders. Given the interconnectedness of the world's ocean, linkages to national and even local level governance processes may also play critical roles in the governance of ocean ABNJ.

There are many documents calling for improved governance arrangements for the ocean (UNESCO-IOC et al. 2011, Global Oceans Commission 2013, World Bank 2014). The 'Blueprint for Ocean and Coastal Sustainability' emphasises three areas: (i) the need for governance arrangements for biodiversity in ABNJ, (ii) the need for improved implementation capacity in Regional Fishery Management Organisations (RFMOs); and, (iii) the need for better coordination among UN agencies with responsibility for the ocean (UNESCO-IOC et al. 2011). The ocean section of the Rio+20 outcome document entitled 'The Future We Want' also provides a tour of the areas of ocean governance in need of critical attention (United Nations 2012).

³ Large Marine Ecosystems (LMEs) are relatively large areas of ocean space of approximately 200,000 km² or greater, adjacent to the continents in coastal waters where primary productivity is generally higher than in open ocean areas. They produce about 80% of the annual world's marine fisheries catch; and are centres of coastal ocean pollution and nutrient over enrichment, habitat degradation, overfishing, biodiversity loss, and climate change effects. <http://www.lme.noaa.gov/>.

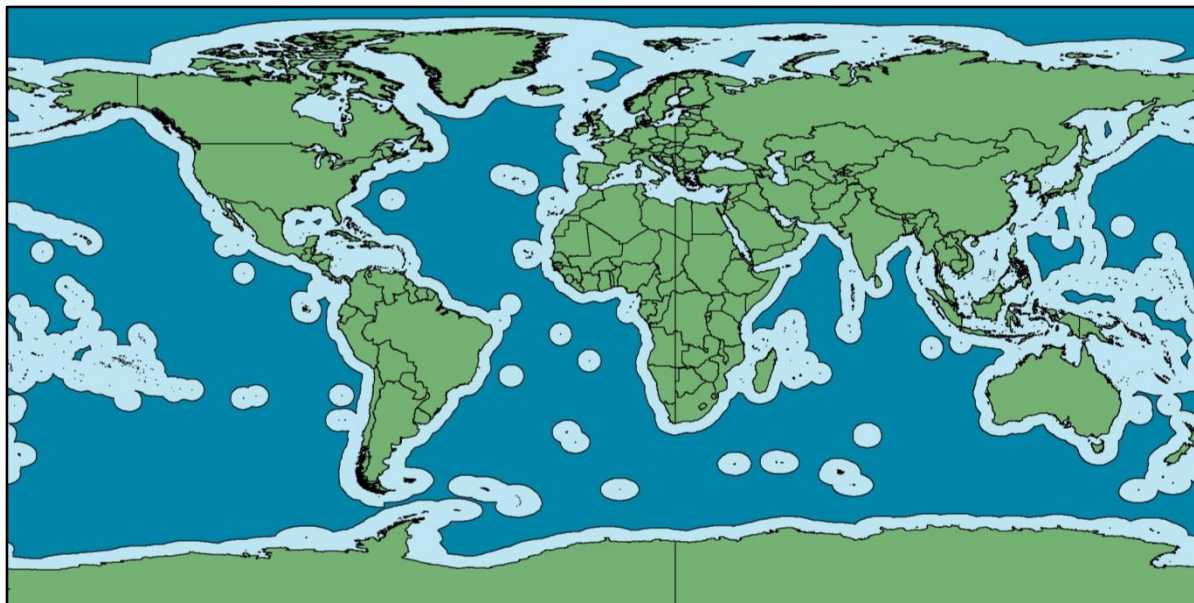


Figure 1: The 'high seas' (dark blue) are all parts of the sea that are not included in the exclusive economic zone (generally extending out to 200 nm), the territorial seas, and the internal waters of a State in the archipelagic waters of an archipelagic State (UNCLOS article 86). The 200 nm boundaries shown on this map are indicative only, and do not reflect the views of the authors, their institutions or GEF on the status of political boundaries. The figure is based on the equidistant EEZ boundaries from marineregions.org. Note that area is distorted in this projection.

This report examines the entirety of global and regional conventions, treaties and other arrangements for governance of ABNJ to determine if there is an emerging governance architecture for the ocean that can provide a basis for discussion of ocean governance needs, and interventions to meet these needs.

1.1 The GEF IW TWAP and the Open Ocean Assessment

The Global Environment Facility International Waters Programme (GEF-IW) supports projects and other activities aimed at improving the capacity of transboundary water systems to deliver ecosystem services. This programme has been active for over 20 years with considerable investments in these water systems (Duda and Hume 2013). The aim of the GEF-IW Transboundary Waters Assessment Programme Full-size Project (TWAP FSP) (2013-2015) is to produce the first truly global assessment of all five categories of transboundary water systems: (1) aquifers, (2) lake/reservoir basins, (3) river basins, (4) Large Marine Ecosystems (LMEs), and (5) open ocean (Jeftic et al. 2011). This will be accomplished by applying the methodologies developed during the TWAP Medium-sized Project (2009-2010) (Jeftic et al. 2011). At the same time, TWAP will formalize the network of partners involved in the assessment as a basis for future periodic assessments. A primary purpose of the TWAP FSP is to assist the GEF and other international organizations in priority setting by providing a baseline and priorities for intervention. The main assessment report arising from the TWAP FSP is also expected to provide a baseline for future periodic assessments.

The overall ABNJ assessment consists of two main components (UNESCO-IOC 2011b). The first component focuses on four major themes that are assessed through a suite of biophysical indicators aiming to reflect the status of:

- Climate change and variability in the global ocean, and their global and local impacts;
- Ocean ecosystems, habitats and biodiversity;
- Fisheries;
- Pollution as a stressor of the marine environment.

The second component focuses on governance that cuts across the four themes by examining current governance arrangements for ABNJ at the global level, and their links with regional and national arrangements. This crosscutting governance assessment for ABNJ is the subject of this report. The objective of this study is to assess global governance architecture for ABNJ governance and global governance aimed at mitigation of global environmental issues related to the ocean. Specifically, the assessment will:

- Address the four themes of the Open Ocean Assessment (climate, biodiversity and ecosystems, fisheries, and pollution);
- Focus on identifying the governance architecture (networks) and the roles of organizations and institutions in the policy cycle, identifying gaps and overlaps,
- Pay particular attention to science-policy interfaces,
- Note links to regional governance architectures, and
- Incorporate emerging global governance concepts and their application to the ocean.

It is important to note that the assessment is intended to look only at governance arrangements and architecture. Due to limitations in time and resources, it does not examine governance effectiveness, important as an assessment of effectiveness may be.

1.2 Assessing governance arrangements - where governance architecture fits

The assessment of governance arrangements and their effectiveness is a complex and multifaceted task (Young 2013). To facilitate evaluation, one perspective is to break what governance is expected to achieve into three components (Young 1999):

- The first is 'outputs', which are the arrangements that are put in place to translate agreements from paper to practice.
- The second is 'outcomes' which encompass changes in the behaviour of people that are the target of the arrangement.
- The third is 'impact' which represents changes in the state of the system that is the target of the arrangement.

These can be assessed separately, and in sequence, as it is likely that there will be time lags in changes in these components. This perspective is consistent with the formulation of the GEF IW programme approach to evaluation of its projects and intervention, which has been based on three categories of indicators: (1) process indicators, (2) stress reduction indicators and (3) environmental status indicators (Duda 2002).

Mahon et al. (2011a) noted that with the increased understanding of governance over the past decade, the GEF IW evaluative approach should be expanded to include four additional categories of indicators that are critical when assessing governance effectiveness for sustainable development. They proposed that for the indicator scheme to be in accord with current thinking regarding the goal of sustainable development, there should be additional categories of indicators for participation, social justice and human well-being that are in tandem with those for environment (Mahon et al. 2012) (Figure 2). They also proposed that assessment of the existing or proposed additional categories of indicators will be dependent upon the institutional structure in place to facilitate decision-making and that there is therefore the need for a fourth additional category of indicators that assesses governance architecture.

Accepting the assumption that an appropriate governance structure is a necessary but insufficient factor to successfully achieving improved human well-being, Mahon et al. (2011a, 2012) called for the assessment of governance architecture to precede the assessment of governance process. This is considered to be particularly important in the case of multilevel nesting typical of international environmental governance systems (Fanning et al. 2007, Biermann 2007). Biermann and Pattberg (2012 p.274) observe that "... increasingly the debate turns toward what we describe as an overarching 'architecture' of global environmental governance, that is, the entire interlocking web of widely shared principles institutions and practices that shape decisions by stakeholders at all levels in this field." This report is primarily concerned with assessing this specific category of institutional arrangements for governance of ocean ABNJ and its overarching 'architecture'.

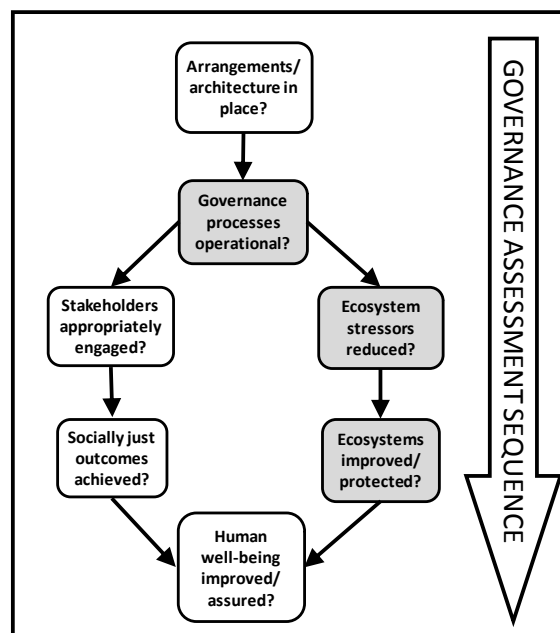


Figure 2. The expanded GEF IW indicator framework of Mahon et al. (2013). The original GEF IW indicator categories (Duda 2002) are shaded in grey. The additional indicator categories are unshaded.

1.3 The scope of and approach to the ABNJ governance assessment

Conventional definitions of ocean space are presented in Box 1. This assessment focusses on ABNJ which includes the High Seas and the Area which are politically defined areas beyond zones of national jurisdiction. Thus, its focus is slightly different than the focus of the TWAP Open Ocean Assessment. The definition of open ocean is more biophysical than political, and thus the term includes some areas under national jurisdiction, such as the many island EEZs in the large ocean basins, particularly in the tropical Pacific. It should be noted that the other GEF IW marine water system category, LMEs, may also include areas of open ocean under national jurisdiction, as well as ABNJ. Thus, there is spatial overlap between these two categories.

Scoped within the confines of the four main issue areas of climate, biodiversity and ecosystems, fisheries, and pollution, this assessment focuses on evaluating the entire set of transboundary governance arrangements that is in place globally for ABNJ. A primary aim of this assessment is to determine if there are broad or emerging patterns that could be useful in (a) understanding the governance status of ABNJ in particular or the ocean in general, (b) monitoring and communicating that status, and (c) designing interventions aimed at improving ocean governance.

Box 1: Definitions (from UNEP 2010)

Areas beyond national jurisdiction (ABNJ): includes the High Seas and the Area.

The Area: legal term for the seabed and ocean floor and subsoil thereof beyond the limits of national jurisdiction, as defined in the United Nations Convention on the Law of the Sea Article1(1)(1). Generally starts at 200 nm from coastal baselines, but may start 350 nm or beyond in certain circumstances.

Deep Sea: ocean waters and seafloor beyond the depth where photosynthesis can occur, generally below 200 m.

High Seas: legal term for waters beyond the zones of national jurisdiction: parts of the sea that are not included in the EEZ, in the territorial sea or in the internal waters of a State, or in the archipelagic waters of an archipelagic State (UNCLOS Article 86).

Open Ocean: ocean waters above and beyond the physical continental shelf. Often thought of as remote, in many places such as the western side of continents, or at heads of submarine canyons, or off volcanic islands, the open ocean begins just beyond the coastal zone.

A holistic perspective on ocean governance arrangements could significantly enhance our understanding of how best to implement governance of the ocean in the integrated and coordinated fashion envisaged by UNCLOS. This holistic perspective is approached by first exploring the entire set of arrangements to determine the issues they cover, the regions within which they operate, and the formal interrelations among them. Of particular interest is the organisational and geographical nesting of arrangements, and the horizontal and vertical interplay among them according to ideas developed by Young (2002).

Nesting and interplay are often closely connected with specific stages of the policy cycles that are central to most arrangements. Fanning et al. (2007) developed a conceptual model or Large Marine Ecosystem Governance Framework based on nested policy cycles at multiple levels (local to global), with vertical and horizontal linkages providing the basis for interplay. The policy cycles comprise five stages considered to be important for adaptive governance: (i) development and provision of advice, (ii) decision-making, (iii) implementation, (iv) review and (v) generation and management of data and information. While for conceptual simplicity the model depicts complete policy processes within levels, the reality is that policy, management planning, and implementation decisions for a particular issue may take place at different levels within the governance system. This is discussed and further illustrated using specific examples from fisheries and biodiversity in the Caribbean by Fanning et al. (2013).

This assessment of governance arrangements for the ocean includes an evaluation, based on criteria that are considered to reflect 'good governance', of the extent to which the stages of the policy process are in place for each arrangement. It must be emphasised that while the presence of policy processes that meet good governance criteria might be expected to result in better outcomes and impacts, the ultimate test of effective governance, a causal link between good governance processes and effective governance has not been demonstrated in the literature. The criteria for good governance that are used to evaluate the policy processes for the arrangements are largely based on operational principles, such as transparency, accountability, participation, and efficiency that are considered desirable and that appear in the preambles to many multilateral environmental agreements.

The approach taken to the assessment has been to assemble all governance arrangements that were found to have relevance to the four issues of concern in the ABNJ: fisheries, biodiversity, pollution, and climate change. These arrangements were then compiled into a database to facilitate assessment of the extent to which the issues are covered either globally or regionally. The assessment also examines each arrangement from the perspective of policy processes to determine whether processes considered to be adequate for good governance are in place as described above. The arrangements are also examined from a spatial perspective to determine geographical overlaps and gaps as well as the extent to which ABNJ are covered by governance arrangements.

2 Developing and analysing a database of governance arrangements for ABNJ

This assessment includes governance arrangements addressing any of the four issue areas that have direct relevance to ABNJ. An arrangement is any multilateral agreement, together with organizational structures and processes in place to give effect to it⁴. The determination of direct relevance is based on whether the agreement is intended to address an ABNJ or straddling issue. On this basis, all global agreements were included as well as many regional ones, such as regional fisheries conventions and Regional Seas Programme conventions that were considered to be relevant to ABNJ. The criteria for selection of regional arrangements to be included differed depending on the issue area. The nature of the issues differs to the extent that it was not possible to have a universal set of criteria that applied across them all.

With regard to fisheries, all Regional Fishery Management Organizations (RFMOs) and Regional Fisheries Bodies (RFBs) with responsibility extending into ABNJ or for highly migratory or straddling stocks were included. It should be noted that this includes a wide diversity of types of fisheries bodies with mandates ranging from purely advisory to the capacity to make binding decisions on fisheries management (Molenaar 2005, Freestone 2011).

With regard to pollution, the approach taken recognized that all land-based sources of pollution (LBS) impacting ABNJ pass through coastal waters. Therefore, regional arrangements addressing LBS were considered to be directly relevant to ABNJ. Most marine-based sources of pollution (MBS) also have the potential to be transported by currents from EEZs into ABNJ. The exception would be dumping of non-polluting non-soluble solids. However, dumping agreements also cover many kinds of wastes that can be transported by currents and were therefore included. From the outset, this approach leads to a preponderance of pollution-oriented arrangements which are primarily aimed at addressing coastal pollution problems.

For biodiversity, the inclusion of arrangements oriented towards national waters was considered. These are primarily protocols arising from Regional Seas conventions. It was thought that while the inclusion of pollution agreements under Regional Seas conventions was important for the reasons given above, the case for inclusion of biodiversity arrangements was less clear. For the majority of Regional Seas-based biodiversity agreements, the only connection with ABNJ would be when protected areas or other measures were established that provided protection for straddling or highly migratory species (HMS) such as sea turtles, seabirds, and marine mammals. It was decided that including these arrangements would provide a biased picture regarding biodiversity conservation on the High Seas. However, agreements and MOUs under the Convention on Migratory species which were aimed at protecting species throughout their range were included when the range extended into ABNJ, for example, the Agreement for the Conservation of Albatrosses and Petrels (ACAP)

The inclusion of shipping arrangements was also considered. For example, the IMO routing measures under the Safety of Life at Sea (SOLAS) Convention have been used to minimise impacts of shipping on biodiversity. However, it was agreed that these conventions could not be perceived as having a stated mandate for biodiversity conservation or ecosystem-based management (EBM), and that it should not be included in the database.

2.1 Developing the database of governance arrangements

The approach taken to the assessment was to compile a database of all the ABNJ relevant agreements based on the criteria provided above. Relevant agreements were sought in the

⁴ In the governance literature the term 'regime' is also often used to refer to arrangements as defined here.

literature and on the Internet where several databases of international agreements can be found⁵. The process of identifying agreements continued until no new ones were encountered. For each of the agreements included in the database, a variety of information was compiled (Table 1). The first part of each database record includes basic background information on the agreement. The second part of each record includes information aimed at evaluating the policy processes that are intended to give effect to the agreement. Table 2 provides an explanation of the scoring assigned to each stage of the policy cycle.

Table 1. The information included in the database of arrangements for ABNJ

Field	Description
Part 1 – Background information	
Acronym/Short name	The name used to refer to the arrangement
Full name	The complete formal name of the arrangement
Type	The arrangements were categorised as either - CN = Constituting (seeks to develop broad policy to address issues, to be later refined by specific agreements), or OP = Operational (aimed at putting regulations in place to reduce stressors and improve system state). See text for further explanation.
Purpose	A narrative summary of the purpose of the arrangement
Year opened	The year in which the arrangement was first available for signature
Year entered force	The year in which the arrangement entered into force
Year revised	The year, if any, in which the arrangement was revised
Ratification	Whether the arrangement could be ratified/acceded/accepted/approved (1) or only signed (0)
Responsible organisation and secretariat location	The major organisation under which the arrangement was developed. The location of the Secretariat and the number of professional-technical staff.
Geographical area of coverage	A brief description of the area of coverage, and indication of whether a geospatial shape file is available for it
Region	The global or regional geographic coverage of the arrangement (GO = Global, AT = Atlantic, AN = North Atlantic, AS = South Atlantic, IO = Indian Ocean, PN = North Pacific, PS = South Pacific, SO = Southern Ocean, AO = Arctic Ocean)
Types of membership	The different types of membership permitted by the arrangement, e.g. full, associate, observer, etc., and the criteria for membership
States/organizations eligible for membership	The numbers of states and organisations that are eligible for membership in each of the above types (names provided in the comment)
States/organizations who are actual members	The numbers of states and organisations that are actually members in each of the above types (names provided in the comment)
High Seas/Straddling Issues covered	The ABNJ governance issues that are covered by the arrangement (e.g., fisheries - highly migratory species, straddling species, discrete High Seas stocks; pollution - marine-based sources, land-based sources; biodiversity - highly migratory species, general)

⁵ Mainly: ECOLEX <http://www.ecolex.org/start.php>; National University of Singapore <http://cil.nus.edu.sg/2009/cil-documents-database/>; University of Oslo, Faculty of Law, treaty database <http://www.jus.uio.no/english/services/library/treaties/>; International Environmental Agreements (IEA) Database Project, <http://iea.uoregon.edu/page.php?file=home.htm&query=static>

Principles	The explicitly stated principles upon which the arrangement is based.
Part 2 – Assessment of provisions for policy processes	
Provision of policy advice - responsible body and score	The body with primary responsibility for carrying out this policy stage scored using a scale of 0 to 3 (Table 2).
Policy decision-making - responsible body and score	The body with primary responsibility for carrying out this policy stage scored using a scale of 0 to 3 (Table 2).
Provision of management advice - responsible body and score	The body with primary responsibility for carrying out this policy stage scored using a scale of 0 to 3 (Table 2).
Management decision-making - responsible body and score	The body with primary responsibility for carrying out this policy stage scored using a scale of 0 to 3 (Table 2).
Management implementation - responsible body and score	The body with primary responsibility for carrying out this policy stage scored using a scale of 0 to 3 (Table 2).
Management review - responsible body and score	The body with primary responsibility for carrying out this policy stage scored using a scale of 0 to 3 (Table 2).
Data and information management - responsible body and score	The body with primary responsibility for carrying out this policy stage scored using a scale of 0 to 3 (Table 2).
Completeness and score	The narrative summary of the extent to which the arrangement is perceived to be complete and the score for overall completeness of the arrangement based on the sum of completeness scores for the seven policy cycle stages expressed as a percentage of the maximum possible score.
Dispute resolution	The presence of a mechanism for dispute resolution is explicitly identified in the arrangement (0 = none, 1 = present)
Adaptability - amendment provisions	The presence of provisions in the arrangement for its amendment (0 = none, 1 = present)
Linkages with other arrangements and agreements	The extent to which the arrangement stands alone and is self-sufficient or is connected with other arrangements and agreements to form a complete process.

Table 2. The criteria used to assign scores to the policy cycles stages for each arrangement.

Provision of policy advice - responsible body and score	0 = No transboundary science policy mechanism, e.g. COP self advises ⁶ 1 = Science-policy interface mechanism unclear - irregular, unsupported by formal documentation 2 = Science-policy interface not specified in the agreement, but identifiable as a regular process 3 = Science-policy interface clearly specified in the agreement ⁷
Policy decision-making - responsible body and score	0 = No decision-making mechanism ⁸ 1 = Decisions are recommendations to countries 2 = Decisions are binding with the possibility for countries to opt out of complying 3 = Decisions are binding
Provision of management advice - responsible body and score	Same as for policy advice above
Management decision-making - responsible body and score	Same as for policy decision-making above
Management implementation - responsible body and score	0 = Countries alone 1 = Countries supported by secretariat 2 = Countries and regional/global level support ⁹ 3 = Implemented through a coordinated regional/global mechanism ¹⁰
Management review - responsible body and score	0 = No review mechanism 1 = Countries review and self-report 2 = Agreed review of implementation at regime level 3 = Agreed compliance mechanism with repercussions
Data and information management - responsible body and score	0 = No DI mechanism 1 = Countries provide DI which is used as is 2 = DI centrally coordinated, reviewed and shared ¹¹ 3 = DI centrally managed and shared ¹²

⁶ Nothing in the documentation indicates a mechanism by which scientific or policy advice is formulated at the transboundary level prior to consideration by the decision-making body.

⁷ This can be internal or external.

⁸ This refers to decisions on matters that will have a direct impact on ecosystem pressures or state. It does not refer to mechanisms for making decisions on the operation of the organization itself.

⁹ This means support from regional programmes or partner organizations arranged via the secretariat.

¹⁰ For example a coordinated enforcement system with vessels following a common protocol and flying a common flag identifying them as part of the mechanism, such as the Forum Fisheries Agency surveillance flag.

¹¹ For both 2 and 3 data are checked for quality and consistency, but for 3 there is a place where all the data can be found, whether as actual data or metadata.

¹² Here the regime could also be the actual collector and compiler of the data, as in the International Pacific Halibut Commission.

The primary sources for the information included in the database were the actual conventions and agreements, rules of procedure for the organisations and secretariats for the arrangements, and organisational websites. When all the desired information could not be found in these sources other documentation and websites were explored. The database is in the form of an Excel spreadsheet with the key information in the cells. Comment boxes are used to record details, such as excerpts from agreements that are considered necessary context for what was included in the table cells.

2.1.1 Levels of commitment to and types of arrangements

Several terms are used to indicate the level of commitment of a country to take part in an agreement¹³. While these have different legal meanings, two levels are recognised in this study and reflected in the database: (1) countries that have signed, indicating willingness to engage, and are referred to as signatories, and (2) countries which have ratified, acceded, approved or accepted, indicating commitment, and are referred to as contracting parties (CPs). It must be borne in mind that many agreements relating to ocean governance cannot be committed to at the second level and have only signatories. A further complication in interpreting country engagement with agreements is that some countries that have not signed an agreement may nonetheless accept and comply with many of its conditions as customary international law, for example, the USA with UNCLOS.

Typically, intergovernmental agreements fall into two categories: (1) constituting agreements and (2) implementing or operational agreements (Breitmeier et al. 2006). Constituting agreements are aimed at setting the broad context and issues for cooperation, with the expectation that these will be further refined and made actionable by operating agreements. The operating agreements are aimed at giving specific effect to the broader objectives of constituting agreements. They often appear as protocols or annexes to constituting agreements. In this study, protocols are treated as separate agreements as they often have different membership and timeframes to their constituting agreements, whereas annexes are part of the constituting agreement.

2.1.2 Scoring criteria for the policy cycle stages

Scoring criteria were used to assign each arrangement a score for seven policy cycle stages: (1) Provision of policy advice, (2), Policy decision-making, (3) Provision of management advice, (4) Management decision-making, (5) Management implementation, (6) Management review, and (7) Data and information management (Table 2). In this assessment the advisory and decision-making stages of the policy cycle (Figure 2) are each considered in two modes -- policy mode and management mode -- making a total of seven stages to be assessed. Provision for carrying out each of these policy cycle stages is considered to be an important component of the institutional arrangements needed for good governance (Fanning et al. 2007, Mahon et al. 2013). The scores in each case ranged from 0 to 3 and are intended to reflect the institutional strength of the arrangement for transboundary governance at that particular policy cycle stage. An overall policy cycle completeness score is derived from the sum of scores of the individual stages and expressed as a percentage of the highest score attainable¹⁴.

2.1.3 Principles

The principles upon which arrangements are based are important indicators of the intent of the arrangement. When explicitly stated, principles provide a basis for assessing and adapting the institutional arrangements and practices for the arrangement. Explicit statement of principles also allows for the principles themselves to be revisited and adapted from time to

¹³ https://treaties.un.org/pages/Overview.aspx?path=overview/glossary/page1_en.xml

¹⁴ Note that a high score means that the arrangements are specified on paper but does not mean that they are operating in practice.

time. When there is the need for arrangements to work together, shared values and principles can be an important basis for collaboration (Orsini et al. 2013). Principles and values may also be implied in arrangements, but this is subject to interpretation. In developing the database, a list of principles was prepared, and only those that were explicitly stated were included in the database.

2.2 Database analysis

The database variables that were either numeric or could be categorised were converted into an SPSS database for analysis. This facilitated the preparation of a variety of tabular and graphical summaries.

2.3 Spatial analyses

GIS shape-files representing the area covered were acquired or developed for most of the agreements. These shape-files were used to estimate the spatial overlap for the regional agreements. A [web-based interface](#) has been developed that allows users to visually explore the spatial interrelationships among the arrangements and to graphically illustrate the extent of coverage of ABNJ by the arrangements¹⁵. The sources of information, the procedures used in developing new spatial files and the procedures of analysis are documented by Baldwin and Mahon (2014).

3 The characteristics of ABNJ governance arrangements

Overall, 100 arrangements were found that were considered to be relevant to ABNJ with regard to the four issues of concern (Table 3). Of these, 18 were constituting arrangements and 82 were operational (Table 3, top panel). The majority of arrangements address pollution (55) and fisheries (43), with far fewer dealing with biodiversity (25) and climate change (8)¹⁶. Of the entire set of arrangements, 23 are global in scope, with the remainder being specific to individual oceans or ocean regions. A breakdown of these arrangements by issue, type and region is provided in Table 3. A list of the arrangements included in the database can be found in Appendix 1 with their acronyms for ease of reference. The database can be accessed at <http://onesharedocean.org/data>.

The number of regional arrangements varies widely among ocean regions. The region with by far the most was the North Atlantic with 25 (includes arrangements that apply to the entire Atlantic), although it should be noted that this included adjacent seas (Baltic, Black, Caribbean, Mediterranean). In contrast, in the South Atlantic there are only seven arrangements (again includes entire Atlantic)). The polar regions also have relatively few arrangements, with six for the Southern Ocean and three for the Arctic Ocean. However, as will be discussed later, the set of governance arrangements for the Southern Ocean is among the most comprehensive for any region.

¹⁵ http://onesharedocean.org/open_ocean/governance/regional_clusters

¹⁶ Multiple-issue arrangements are counted for each issue, so the total exceeds 100.

Table 3. Numbers of arrangements by issues, types and regions (B = biodiversity, F = fisheries, P = pollution, C = climate change)

Region	Type of arrangement	Issues covered												Total
		F	P	B	C	FP	FB	PB	PC	BP	FPB	PBC	FPBC	
Overall	Constituting	0	10	1	1	1	2	0	0	0	2	1	0	18
	Operational	27	34	5	1	0	6	2	1	1	0	0	5	82
	Total	27	44	6	2	1	8	2	1	1	2	1	5	100
Global	Constituting	0	2	1	1		2	0	0		1			7
	Operational	3	8	1	1		1	1	1		0			16
	Total	3	10	2	2		3	1	1		1			23
Atlantic	Operational	1		1										2
North Atlantic	Constituting	0	3	0			0	0		0			0	3
	Operational	4	10	1			2	1		1			1	20
	Total	4	13	1			2	1		1			1	23
South Atlantic	Constituting	0	1				0							1
	Operational	2	2				1							5
	Total	2	3				1							6
North Pacific	Constituting	0									1		0	1
	Operational	4									0		1	5
	Total	4									1		1	6
South Pacific	Constituting	0	1									1	0	2
	Operational	9	5									0	1	15
	Total	9	6									1	1	17
Indian Ocean	Constituting	0	3				0							3
	Operational	2	8				1							11
	Total	2	11				1							14
Arctic O.	Operational	1		1									1	3
Southern Ocean	Constituting	0	0	0		1	0						0	1
	Operational	1	1	1		0	1						1	5
	Total	1	1	1		1	1						1	6

Regional arrangements are considered to be important means of translating global arrangements to specific geographical areas, which is essential for an ecosystem approach (Crowder et al. 2006, Young et al. 2007, Rice et al. 2011); although not all regional arrangements are directly associated with global ones. A look at the coverage of issues by regional arrangements reveals some of the gaps (Table 4).

Table 4. Numbers of arrangements by issues and regions (B = biodiversity, F = fisheries, P = pollution, C = climate change).

Issue	Region									Total
	Global	Atlantic	North Atlantic	South Atlantic	North Pacific	South Pacific	Indian Ocean	Arctic Ocean	Southern Ocean	
F	3	1	4	2	4	9	2	1	1	27
P	10		13	3		6	11		1	44
B	2	1	1					1	1	6
C	2									2
FP									1	1
FB	3		2	1			1		1	8
PB	1		1							2
PC	1									1
BP			1							1
FPB	1				1					2
PBC						1				1
FPBC			1		1	1		1	1	5
Total	23	2	23	6	6	17	14	3	6	100

For example, there are several regions with no arrangement of any kind for biodiversity. Several of the biodiversity arrangements are also species (polar bears) or taxon (seals, albatrosses and petrels, sea turtles) specific and do not provide broad coverage of habitats and communities. In the case of climate change, there are two global arrangements, the UNFCCC and its Kyoto Protocol, and six combined issue regional arrangements in which climate change is identified. In these, climate change is identified only as a factor that must be taken into consideration in dealing with the other issues rather than an issue to be addressed directly. This is not unexpected for an issue that is essentially global in nature.

3.1 Timeline of development of arrangements

Governance arrangements with relevance for the ocean first began to come into force in the late 1940s (Figure 3a). However, it was not until the late 70s that a proliferation of both constituting and operational arrangements occurred, with constituting arrangements peaking in the late 1980s. While the peak for operational arrangements also occurs then, they continue to come into force at for the next 15 years. Since the early 2000s, few constituting arrangements have come into force, while operational arrangements have continued to come into force, albeit at a lower rate.

An initial interpretation of the broad pattern for entry into force of arrangements could be that the majority of constituting arrangements originally considered necessary for governance of the ocean are already in place, and that much of what remains to be done is to give effect to them with operational arrangements. Even the numbers of operational arrangements coming into force appears to be tapering off (Figure 3a). Based on the above interpretation, it could be argued that the past 40 years represent an era of arrangement formation, and that the next decades should be a period of implementation, evaluation, adaptation and integration. However, as discussed above, a review of the completeness and coverage of the governance

arrangements for specific issues, such as biodiversity conservation for ABNJ, reveals significant gaps.

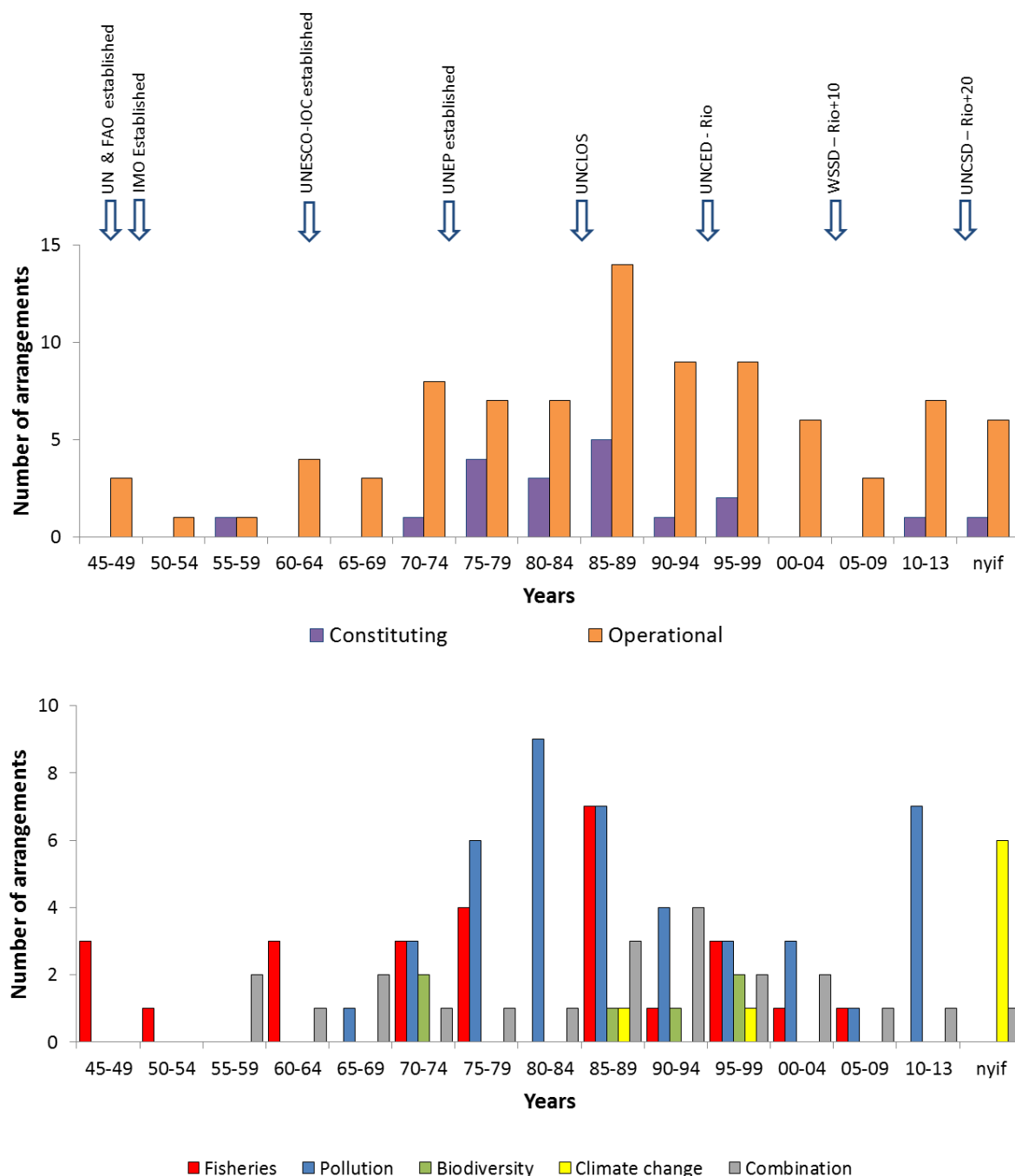


Figure 3. The timeline of development of ocean governance arrangements in five-year intervals by (a) type of arrangement, and (b) issues covered.

The timing of arrangements for the four issues shows that those for fisheries were the first to be put in place, with those for pollution and biodiversity only beginning to come into force in the late 1970s (Figure 3b). The majority of the pollution arrangements are associated with UNEP's Regional Seas Programme, launched in 1974. While the Convention on Biological Diversity (CBD) has not resulted in operational arrangements that are area specific, its goals, objectives and funding mechanisms have been frequently incorporated into the programmes of Regional Seas conventions and action plans. The CBD has also promoted efforts in cooperation with Regional Seas secretariats to describe Ecologically and Biologically

Significant Areas (EBSAs) in AWNJ and ABNJ (Gjerde et al. 2008, Druel 2012, Druel et al. 2012). As the CBD has no management authority, the management of EBSAs is up to States and competent intergovernmental organisations. This is an area of current high activity in ABNJ governance that will be taken up later in this report.

An aspect that must be kept in mind when looking for temporal patterns in the development of these arrangements is the length of time between adoption and entry into force (Figure 4). It is not uncommon for arrangements to take up to 10 years to enter into force, and some have taken longer. The average times for constituting and operational arrangements to come into force are 4.7 and 4.3 years.

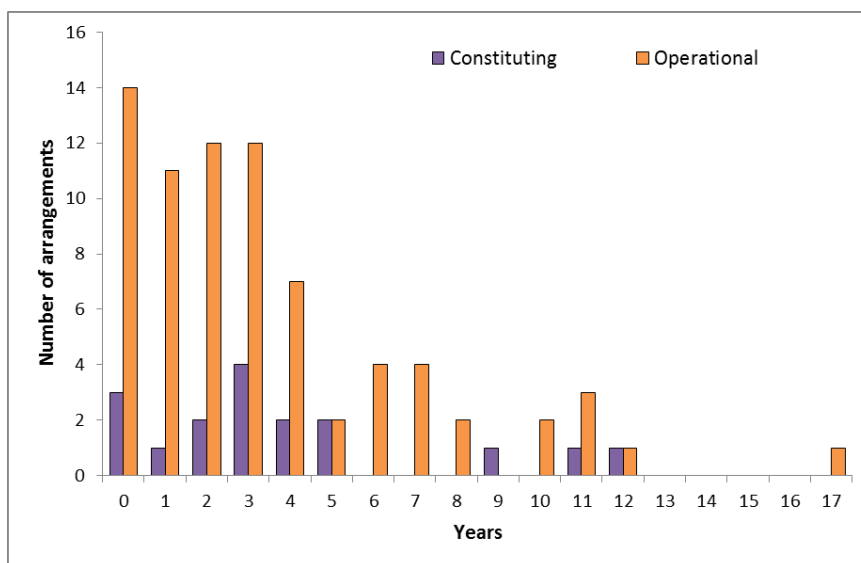


Figure 4. The number of years taken for arrangements to enter into force.

3.2 Policy cycle stage scores and the completeness of arrangements

The analysis of policy cycle stage scores shows differences in strength among the policy cycle stages, and between constituting and operational agreements (Figure 5). Both types of agreements score higher for the advisory stages, where the majority score 3, than for the decision-making stages, where the majority score 1. This is because while the majority of arrangements do have clearly identified mechanisms for both policy and management advice, the decisions made are predominantly recommendations which contracting parties may or may not choose to implement. As might be expected, the extent to which decisions made are binding is considerably higher for operational agreements than for constituting agreements. However, there is clearly considerable scope for strengthening both advisory and management decision-making stages.

The implementation stage scores lowest, with the majority of arrangements having implementation primarily at the level of the contracting parties with support from the arrangement secretariat (Figure 5). There are relatively few instances where arrangements have coordinated transboundary programs for implementation. It is also striking that for most operational arrangements, implementation is left entirely to the contracting parties. In contrast, for review of implementation, the large majority of both constituting and operational arrangements have clearly identified mechanisms at the transboundary level. Transboundary data and information management mechanisms score higher for operational arrangements than for constituting arrangements, as might also be expected.

The overall picture of completeness or strength of arrangements is illustrated in the final panel of Figure 5. It indicates that for both types of arrangements, there is substantial scope for

strengthening towards levels that could be considered to reflect good governance practices. That operational arrangements generally scored higher than constituting ones is to be expected given that the scope of the former is generally narrow and focused on specific aspects of an issue. **However, it should be noted that for constituting arrangements, clearly specified mechanisms based on sound information inputs are equally important, as this is the level at which policy adaptation and integration is most likely to take place.**

Global and regional levels of constituting and operational arrangements are compared in Figure 6. The distribution of policy cycle stage scores between global and regional arrangements is broadly similar, with the major differences being due to the aggregation of scores at a particular level. For example at the implementation stage for regional constituting arrangements there is an aggregation at score 1 while the scores for global constituting arrangements are distributed among scores 0-2. For constituting agreements, the completeness is slightly higher at the regional level than for constituting arrangements and the opposite is the case for operational arrangements. The differences between global and regional arrangements were not considered to be large enough to warrant interpretation.

The analysis of policy cycle scores by issue shows some differences in strength among the issues (Figure 7). For both policy and management advice, the distribution of scores appears similar among issues, although mechanisms may score a bit higher for fisheries and biodiversity than for pollution. For decision-making, fisheries arrangements clearly scored highest, with decisions for pollution being primarily in the form of recommendations for contracting parties. In contrast, fisheries arrangements scored lowest for implementation, which is predominantly at the level of contracting parties. Biodiversity and pollution arrangements were considerably more likely to have regional level support for implementation. The distribution of scores for review mechanisms is similar among issues, but only fisheries arrangements have review mechanisms with built-in repercussions for non-compliance, for example ICCAT, GFCM, IPHC and PNA (Figure 7). It is interesting that for data and information, biodiversity arrangements scored highest. Fisheries arrangements also scored high in this policy cycle stage, probably because for transboundary stocks, there is the need to bring data together into a single dataset if meaningful analysis is to be carried out. For pollution arrangements, national reporting and compilation of national reports predominates (Figure 7).

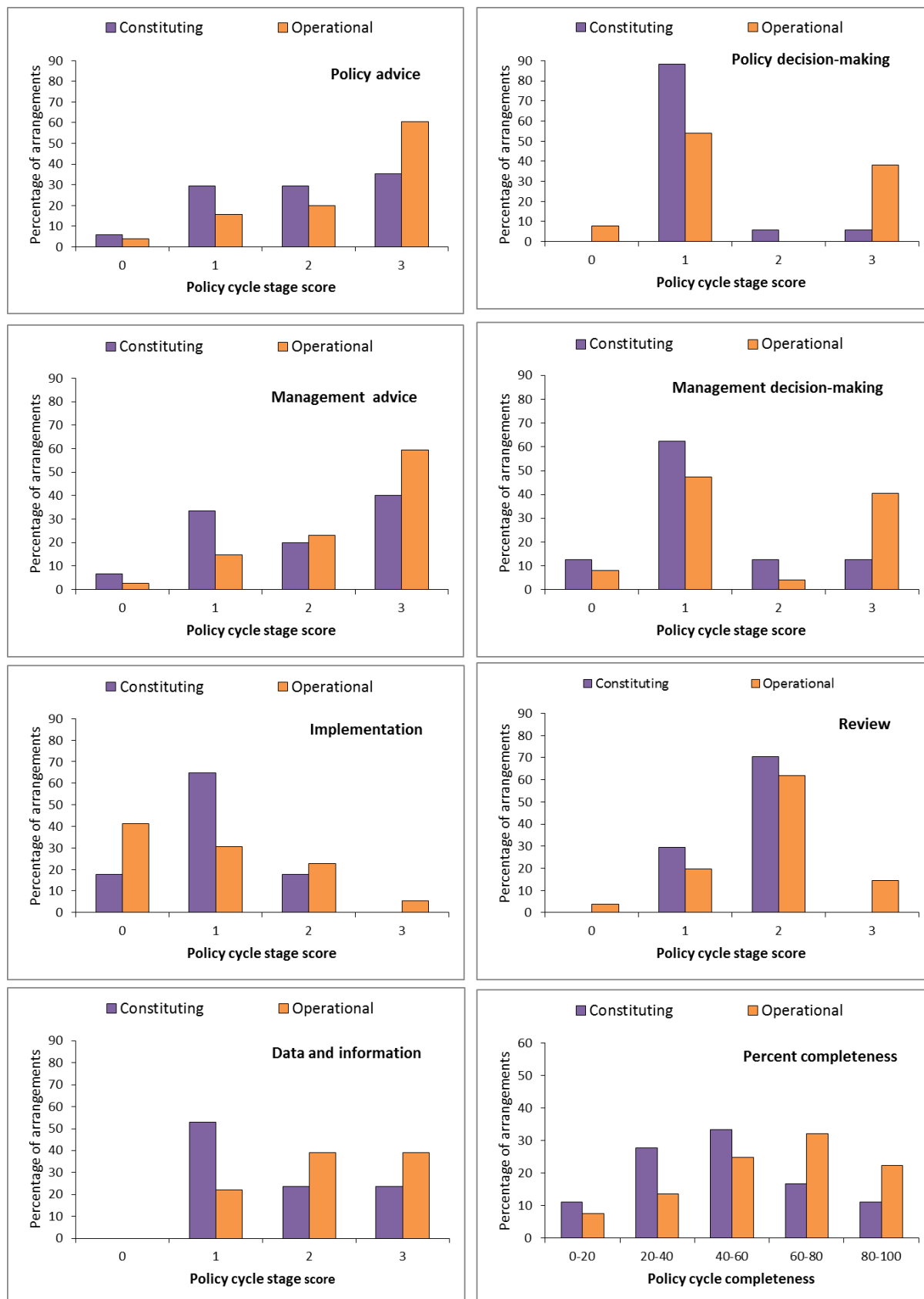


Figure 5. The distribution of scores for each of the seven policy cycle stages, and overall policy cycle completeness for the two major types of arrangements (see Table 2 for the scoring criteria).

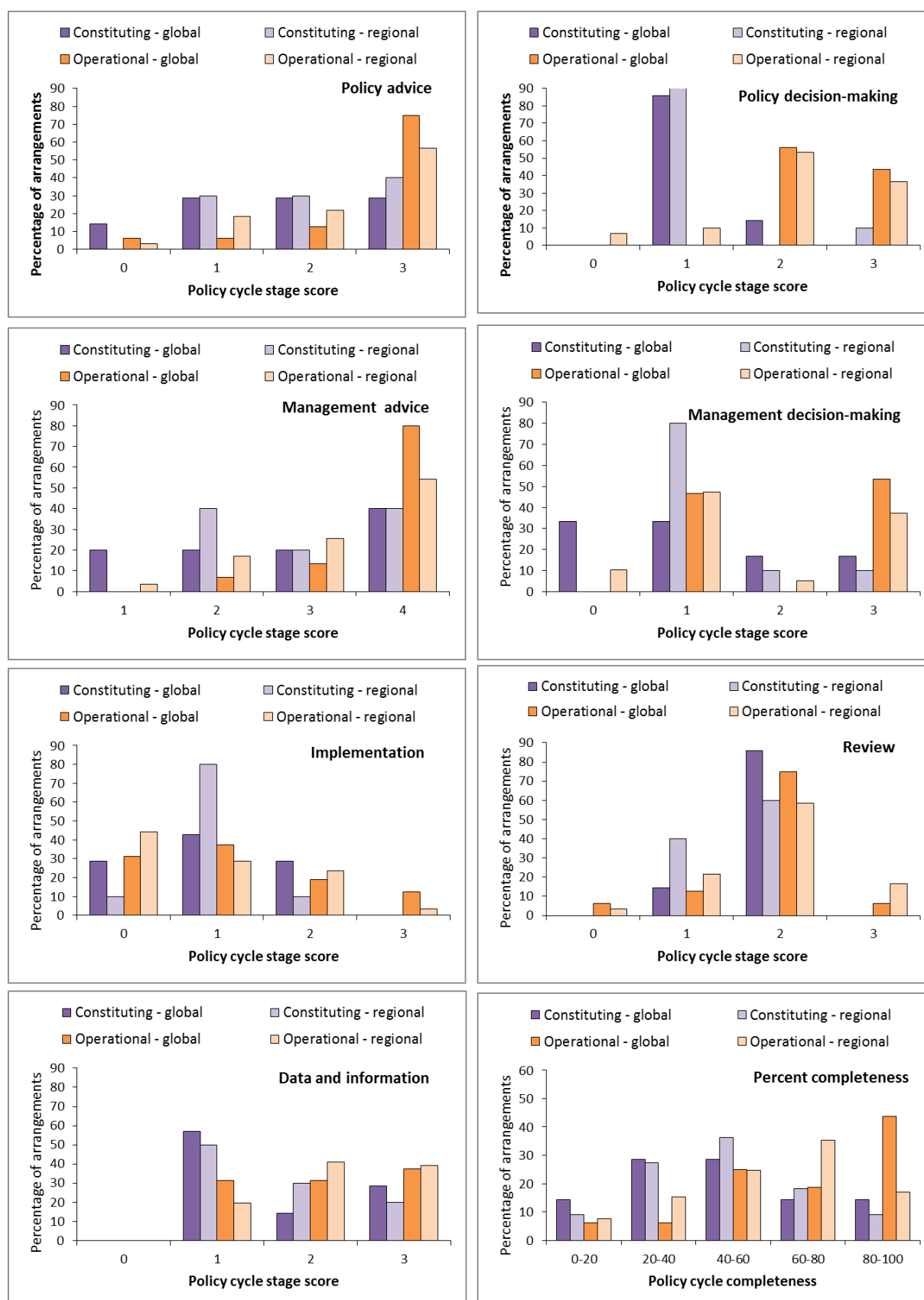


Figure 6. The distribution of scores for each of the seven policy cycle stages, and overall policy cycle completeness for constituting and operational arrangements at global and regional levels (see Table 2 for the scoring criteria).

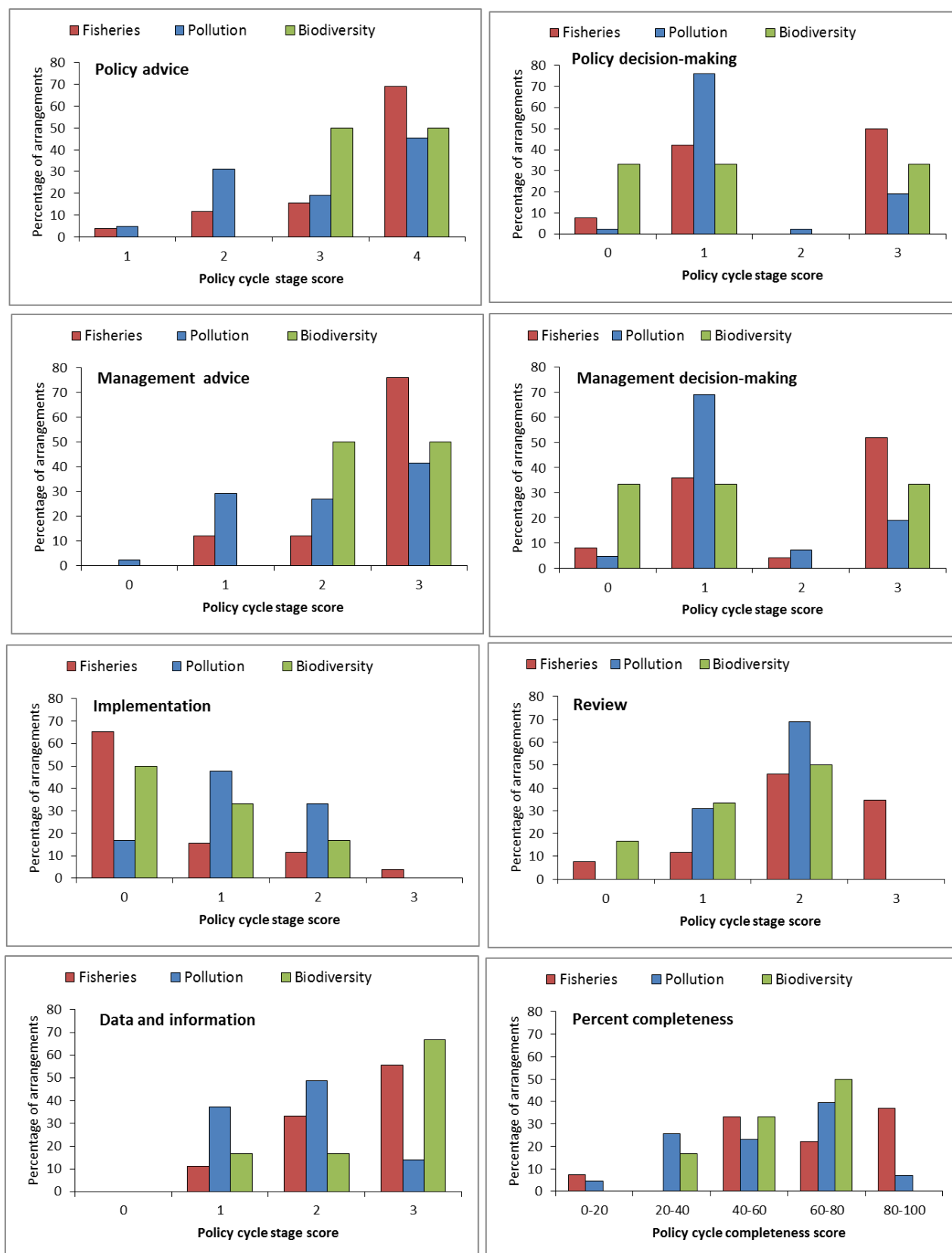


Figure 7. The distribution of scores by issues (fisheries, biodiversity and pollution) for each of the seven policy cycle stages, and overall policy cycle completeness. (see Table 2 for the scoring criteria).

The differences among policy cycle stages and issues shown in Figure 7 are thought to provide insight into where attention should be focussed in order to promote good governance. For fisheries, attention to collaboration in implementation of measures is clearly needed. For pollution the analysis points to the need for strengthening arrangements in the area of data and information reporting and the capacity building needed to support this function. For biodiversity the high proportions of agreements without either policy or management decision making mechanisms (about 30% in each case) is a serious shortcoming.

3.3 Principles

The formulation and explicit statement of principles that reflect foundational values upon which agreements are based are considered to be important aspects of institutional development. These can provide a basis for review of performance, adaptive revision, and for collaboration among arrangements. Ultimately, it was not possible to pursue a comprehensive assessment of the principles upon which arrangements are based. There were too many instances in which principles were not explicitly stated in agreements for this analysis to be feasible. The principles that were stated are compiled in Appendix 3 by issue area and time period.

Overall 24 different principles appeared in the 100 agreements reviewed. Of these, nine occurred in five or more agreements (numbers in parentheses): conservation (42), cooperation (31), sustainability (31), precaution (26), ecosystem approach (14), equity (9), participation (5), prevention of pollution (5), best available scientific evidence (5). It is important to distinguish between how the term 'conservation' is used. In some instances, it may refer to 'conservation of fish stocks' and in other instances refers to 'conservation of living marine resources' or biodiversity per se.

Several principles usually considered to be important for good governance did not appear in any agreement (efficiency, empowerment, rationality, representativeness, responsiveness, stewardship, subsidiarity).

Temporal patterns were expected in the prominence of various principles in agreements. For example, as the ecosystem and precautionary approaches became more widely accepted post UNCED, one would expect to see them more frequently stated in later agreements. However, the data are too sparse to reflect clear patterns over time for any of the principles encountered. Similarly, differences in frequency of occurrence among issues were not discernible, although as might be expected, sustainability ranked highest among fisheries agreements; cooperation was highest for pollution, and conservation was highest for biodiversity. The lack of clearly stated principles in agreements may reveal the lack of a set of common principles or even a shared purpose, which could hamper future efforts towards cooperation and integration in ABNJ.

3.4 Dispute resolution mechanisms

Dispute resolution mechanisms are considered to be an important component of transboundary agreements. Such mechanisms were observed to be present in the majority of constituting arrangements. However, only two thirds of operational arrangements had these mechanisms or were stated as relying on their constituting arrangements for this function (Table 5).

Table 5. The extent to which dispute resolution mechanisms are clearly identified in arrangements (percent (number)).

Dispute resolution mechanism	Type of arrangement		Total
	Constituting	Operational	
No mechanism	11 (2)	36 (29)	32 (31)
Mechanism present	89 (16)	64 (51)	68 (67)
Total	(18)	(89)	(98)

3.5 Provisions for revision and amendment

The capacity to change in response to new information and changing circumstances is an important element in effective transboundary and ABNJ arrangements. The current awareness that climate change brings a high level of uncertainty into the global governance arena reinforces the need for this capacity. The completeness of the policy cycle reflected in Figures 5-7 is an important facet of adaptive capacity. In particular, mechanisms for policy review, advice and decision-making are key components. Adaptive capacity is further strengthened when arrangements clearly specify the process by which they can be revised and amended; albeit in a longer time frame than may be needed for adaptive management.

Provisions for revision and amendment were present in 89% of the arrangements. All 17 constituting arrangements had clearly identifiable mechanisms, as did the majority of operational arrangements (Table 6). As with other aspects of arrangements thought to reflect 'good governance', the presence of a revision and amendment mechanism does not mean that it is effectively used.

Table 6. The extent to which the mechanism for revision is clearly identified in the arrangement (percent (number)).

Adaptive mechanism	Type of arrangement		Total
	Constituting	Operational	
No mechanism	6 (1)	9 (7)	118 (8)
Mechanism present	94 (17)	91 (74)	92 (91)
Total	(18)	(81)	(99)

4 The global structure of ocean governance

The analysis of the entire set of global and regional arrangements for ABNJ governance reveals an overall pattern that may provide a useful framework for identifying gaps and weak areas and for developing interventions to address them. The overall picture is one of two complementary sets of networks (Figure 8). The first set is the 'global-to-regional issue-based networks'. They are shown as vertical rectangles which reflect the major global arrangements for each of the four issues of fisheries, pollution, biodiversity and climate change. The second set is the crosscutting 'regional intersectoral clusters/networks'. They are illustrated in Figure 8 by horizontal rectangles representing five hypothetical 'regional intersectoral clusters/networks' (Regions A-E). The solid circles indicate that representation of 'global-to-regional issue-based networks' is incomplete in the regional clusters, reflecting gaps to be filled. The regional clusters of arrangements reflected in the rows in Figure 8 provide the

potential for horizontal interplay within regions that is needed for integration across issues, and for their integration with the wider spectrum of regional economic cooperation activities.

In the following sections, these two complementary sets of networks are examined in greater detail. Of particular interest is the extent to which the regional clusters can be viewed as networks that form the basis for integrated management or EBM. If so, they can be a locus for interventions aimed at filling gaps and building capacity to strengthen governance at the regional level.

4.1 Global-to-regional issue-based networks

The majority of the arrangements that have been included in the database are either directly administered by, or associated with, the programmes of a relatively small number of UN agencies and programs (Figure 8). These form the set of issue-based global-to-regional networks that will be examined in greater detail in this section.

4.1.1 The networks

For fisheries, the UN Fish Stocks Agreement (UNFSA), along with the FAO Compliance Agreement and FAO Code of Conduct are the major global constituting arrangements¹⁷, with the FAO being the agency with responsibility for promoting implementation of the Code of Conduct and Compliance Agreement and the UNGA having responsibility for the UNFSA. Many of the Regional Fisheries Bodies (RFBs) and Regional Fisheries Management Organisations (RFMOs) in the database are established with reference to the Constitution of the FAO under Articles VI and XIV. Article XIV bodies are established by treaty, generally have a management mandate and are more independent than Article VI bodies (Freestone 2011). Other RFBs which are independently constituted by the contracting parties are also loosely associated with the FAO through an FAO-facilitated network of regional fisheries bodies' secretariats. To some extent, the Committee of Fisheries (COFI), a subsidiary body of the FAO Council, can be seen as an overarching policy setting body for RFBs globally, although none of the agreements or the voluntary code explicitly identified COFI as playing this role. COFI presently constitutes one of two¹⁸ global inter-governmental fora where major international fisheries and aquaculture problems and issues are examined and recommendations addressed to governments, regional fishery bodies, NGOs, fishworkers, FAO and the international community, periodically on a world-wide basis. COFI has met 29 times to date. COFI has also been used as a forum in which global agreements and non-binding instruments were negotiated (FAO 2013). The RFB network first convened in 1999 as the 'Meeting of FAO and Non-FAO Regional Fishery Bodies or Arrangements' (FAO 1999) and met four times before changing its name in 2005 to the Regional Fishery Body Secretariats Network (RSN).

¹⁷ Categorized as fisheries and biodiversity in Table 3 due to their ecosystem aspects.

¹⁸ The UNGA also serves in this role both through its review conferences of FSA implementation and its annual sustainable fisheries resolution. FAO COFI is largely fisheries ministries, whereas the UNGA represents all nations and all interests.

Issue areas		GLOBAL-TO REGIONAL ISSUE-BASED NETWORKS						
		Fisheries Straddling	Fisheries HMS	Pollution LBS	Pollution MBS	Biodiversity		Climate Change
Global agreements		UNFSA		GPA	MARPOL London	CBD	Ballast Water	UNFCCC Kyoto
Program/agency		FAO		UNEP-RS	IMO	UNEP-CBD, IMO		UNFCCC/ WMO
REGIONAL CLUSTERS/NETWORKS	Region A	<div></div>	<div></div>	<div></div>	<div></div>			
	Region B	<div></div>	<div></div>		<div></div>			
	Region C	<div></div>		<div></div>	<div></div>	<div></div>		
	Region D			<div></div>		<div></div>		
	Region E	<div></div>			<div></div>	<div></div>		<div></div>

Figure 8. The global ocean governance structure comprising vertical ‘global-to-regional issue-based networks’ of arrangements and complementary horizontal ‘crosscutting regional intersectoral networks’ of arrangements (five hypothetical regions A-E are shown for illustration). The solid circles indicate that the issue covered by the global-regional network is reflected in the arrangements comprising the regional complex.

The RSN first met in 2007 (FAO 2007) and has met twice since. Since 2011, it has produced a regular newsletter. The RSN meetings, held in parallel with the FAO Committee on Fisheries (COFI) are not formal FAO meetings but provide the opportunity for exchange of experiences and best practices among RFBs. The 2007 meeting was attended by 18 marine RFBs as well as a number of RFBs for inland waters and several other related organisations such as the Southeast Asian Fisheries Development Center (SEAFDEC) and The International Council for Exploration of the Seas (ICES). The 2011 meeting issued a statement emphasising the important role that the RSN was playing in strengthening RFBs. In parallel with this, FAO has been promoting a series of performance reviews of RFBs with a view to developing guidelines for best practices (Ceo et al. 2012). It is evident from the above that there is in place a mechanism that could be used for networking regional fisheries bodies and linking them with the major global arrangements, but with a focus on fisheries. This mechanism could also link these regional and global arrangements with fisheries related NGOs and research entities, but to achieve this, the meetings would have to be opened up to these organisations. An assessment of the performance of this mechanism is beyond the scope of this study.

The International Maritime Organisation (IMO) is home to another cluster of arrangements pertaining largely to pollution. It provides the secretariat for six global operational arrangements relating to marine based pollution and one relating to biodiversity - the Ballast

Water Management Convention (BWMC)¹⁹. Given that these relate to global shipping, there is less imperative for them to be reflected in regional level arrangements. The IMO itself promotes implementation of these agreements at the regional level through IMO Regional Presence initiatives²⁰. The promotion and implementation of IMO arrangements is also often facilitated at the regional level through Regional Seas Programme protocols relating to: ship generated waste (5), oil spills (3), disposal of hazardous waste at sea (3), dumping at sea (1), and contamination from exploration (1).

The Regional Seas Programme of UNEP, which began in 1974, is the most extensive initiative promoting implementation of global arrangements. There are 18 Regional Seas areas of which 17 are indirectly or directly connected to ABNJ (Table 7) and are included in the database. Of these, five are administered by UNEP, seven were constituted under UNEP but are managed by other organisations and four are entirely independent. However, all with secretariats take part in UNEP organised regional seas activities, such as the series of 15 global level meetings of Regional Seas Conventions and Action Plans (RSCAP) which began in 1998. The mandate of all but four of the Regional Seas Agreements is limited to waters within national jurisdiction.

One of the most prominent activities across Regional Seas areas is implementation of the 1995 Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA) (UNEP/GPA, 2006). This is approached through regional protocols (11) addressing land-based sources of pollution and activities (LBSA) (Table 7). However, this is not the only global level agreement for which regional level implementation is pursued under the Regional Seas Programme and its conventions. As indicated above, several IMO based global agreements are reflected in Regional Seas protocols. Regional level implementation of the marine aspects of the major global biodiversity arrangements - Convention on Biological Diversity (CBD), Ramsar Convention, Convention on International Trade in Endangered Species (CITES), and Convention on Migratory Species (CMS) - is also pursued via Regional Seas protocols.

The dates in Table 7 show that in most cases the protocols relating to biodiversity are more recent than those for pollution. Thus, there has been gradual expansion and update of many of the regional seas agreements to include biodiversity. **However, few Regional Seas conventions or programmes directly address biodiversity in areas beyond national jurisdiction (Pacific Island Region, the Southern Ocean, Northeast Atlantic, Mediterranean).** The Lima Convention for the South-east Pacific does address pollution in adjacent ABNJ. Protocols and annexes relating to biodiversity are mainly focused on species and habitats in areas of national jurisdiction, usually through the establishment of protected areas. While these protected areas may at times protect straddling or highly migratory species such as sea turtles and sea birds, the respective protocols are not considered to be substantially related to ABNJ biodiversity conservation.

While the networks described above help to make global level fisheries and pollution arrangements applicable at the regional level, there is no comparable network or institutional arrangement for place-based biodiversity conservation in ABNJ. As indicated above, several important biodiversity arrangements may be facilitated at the regional level by Regional Seas Secretariats but these are almost entirely within areas under national jurisdiction. The 2008 effort under the CBD to address this gap is focused on describing Ecologically or Biologically Significant Areas (EBSAs) and is aimed at providing scientific information and advice for place-based biodiversity conservation in AONJ and ABNJ. However, there is still a lack of a complete global level policy process for ABNJ that can make decisions about which areas

¹⁹ It is due to the biodiversity focus of this arrangement that it is not included under MARPOL as an annex (Jose Matheickal, pers comm. February 2014)

²⁰ One Regional Maritime Adviser for the Caribbean, based in Trinidad and Tobago, and four Regional Coordinators based in: Côte d'Ivoire for West and Central Africa (Francophone), Ghana for West and Central Africa (Anglophone), Kenya for Eastern and Southern Africa and the Philippines for East Asia.

should be protected, and the regional institutional arrangements needed for implementation (Druel et al. 2013). This will be further discussed in a later section on science policy interfaces.

Table 7. The UNEP Regional Seas Programme, conventions and protocols/annexes

Region		Year in force								
		Convention	Protocols/annexes							
			LBS	Ship waste	Oil spills	Emergency	Exploration/offshore activity	Dumping	Protected areas/biodiversity	Hazardous waste transport
Wider Caribbean Region - Cartagena Convention	UNEP	1986	NYIF		1986				2000	
East Asian Seas - No convention										
Eastern Africa - Nairobi Convention ²¹		1996	NYIF			1996			1996	
Mediterranean - Barcelona Convention		1976 2004	1983			2004	NYIF	1978 ²²	1982, 1995	NYIF
North-West Pacific - No convention										
Western Africa - Abidjan Convention		1984				1984				
Black Sea - Bucharest Convention	Other agency hosting	1994	NYIF			1994		1994	NYIF	
North-East Pacific - Antigua Convention										
Red Sea/Gulf of Aden -Jeddah Convention		1985	NYIF			1985			NYIF	
ROPME Sea Area - Kuwait Convention		1979	1993			1979	1990			NYIF
South Asian Seas - No convention										
South-East Pacific - Lima Convention		1986	1986			1987			1984	1995
Pacific - Noumea Convention		1990				1990		1990		
Arctic - No convention	Independent									
Antarctic - The Antarctic Treaty		1961								1998
Baltic Sea - Helsinki Convention		1980 2000	2000	2000		2000	2000	2000		
North-East Atlantic - OSPAR Convention		1972 1998	1998				1998	1998	1998	

²¹ Amended Convention Not Yet In Force (NYIF)

²² Currently being amended – NYIF

Climate change, the fourth issue to be addressed, is in some ways qualitatively different from the other three. Its effects will be experienced in all regions and ecosystems of the planet. Thus far, discussions about mitigation have taken place in global level arenas and do not seem to have a regional implementation component with an ocean focus. Adaptation on the other hand will need to be implemented at regional, national and local levels. Only three regional arrangements could be found that made reference to addressing climate change adaptation or vulnerability in ABNJ - the Antarctic Treaty System, the Arctic Council, and the Pacific Islands Forum - of which the latter two are coordinating arrangements. It is not clear from the arrangements examined how climate change will be dealt with at the regional level. It is likely that it will be dealt with largely as a crosscutting issue in sectoral agreements.

With regard to pollution, it should be noted that there are global level arrangements that cannot be considered as part of the IMO cluster. The Vienna Convention/Montréal Protocol, and the Stockholm Convention function independently²³. Likewise, for biodiversity, CITES (trade in endangered species) is independent of the CBD.

Global-to-regional issue-based networks play an important role in facilitating lateral linkages among regional organisations and connecting them with the global level arrangements. **However, they are largely sector or issue specific, leaving the question as to how integration across issues and sectors is structured for ocean governance at the global level.** It can be argued that there is a need for integration at both global and regional levels.

4.1.2 Coordination/integration of the global-to-regional issue-based networks

The need to integrate across marine related issue areas within the UN system was highlighted in 1992 at UNCED. In 1993, the UN agencies dealing with ocean and coastal issues formed the Sub-committee on Oceans and Coastal Areas of the UN Administrative Committee on Coordination (ACC SOCA) to coordinate activities relating to Chapter 17 of Agenda 21. In 2003, it was decided to establish a separate Oceans and Coastal Areas Network (subsequently renamed UN-Oceans) to provide effective, transparent and regular inter-agency coordination on ocean and coastal issues within the United Nations system. UNESCO-IOC hosted the first meeting of UN-Oceans in 2005. Altogether, there are 15 bodies with membership in UN-Oceans (Departments of the UN Secretariat, UN Programmes and Funds, UN Specialized Agencies, related organisations and conventions).

Thus far, UN-Oceans has had no dedicated staff. The Coordinator and Deputy Coordinator were elected from one of the member bodies for a period of two years. The Secretariat also rotated and was at the coordinator's organisation. An evaluation of UN-Oceans concluded that due to its ad hoc structure and lack of dedicated human and financial resources, it was ineffective, and unlikely to be able to achieve its objectives (Zahran and Inomata. 2012). The review recommended that UN-Oceans be provided with a Secretariat and that it be institutionalised with clear procedures for program development and decision-making. The review also recommended that countries should have oceans focal points with which UN-Oceans would interact directly.

New Terms of Reference for UN-Oceans were approved by the UNGA in 2013 (UNGA resolution 68/70) and will be further reviewed in 2014. These ToRs indicate that the UN Division for Ocean Affairs and Law of the Sea (UN-DOALOS) will be the permanent focal point for UN-Oceans. They also outline procedures for meetings, development of a work programme and reporting. What is not clear is the extent to which the mechanism will be provided with the resources needed to be effective. The increased prominence of oceans at Rio +20 suggested that coordination of UN activities in relation to oceans would be likely to receive increased attention from the UN in the coming years (UN Secretary General 2012). But the poor reception of the Oceans Compact has raised questions about this optimistic assessment.

²³ The arrangements for the newly created Minamata Convention on Mercury remain to be determined.

There is a substantial literature on inter-relations (or as it is referred to in the governance literature, interplay) among international institutions upon which a strengthened UN-Oceans could draw (e.g. Stokke 2001, Young 2002, Oberthur and Gehring 2006, Oberthur 2009, Stokke, et al. 2011). Oberthur (2009) presents a typology of interplay among international institutions and discusses approaches to managing interplay. One of the key areas of emphasis for enhancement is systematic promotion of inter-institutional learning. This can be pursued by explicitly recognising the importance of institutional process and memory both within and between arrangements, such that process promotes learning, and knowledge and experience are retained in a form that is shareable. Attention to policy cycles and in particular science policy interfaces that are documented is critical for building learning institutions, and learning-enabled networks. But questions about limited mandates, rigid hierarchies and varying priorities (a lack of a common purpose and shared set of principles) leave the future of constructive interplay unsure absent a strong call for enabling mechanisms for cooperation from the UNGA or via a new international agreement.

4.2 Regional clusters for EBM

At the regional level, there appear to be several regions in the world where arrangements pertaining to ABNJ issues (and others pertaining to ocean issues in general) overlap and interact. These 'regional intersectoral clusters/networks' of arrangements may provide arenas for regional or 'place-based'²⁴ implementation of global arrangements together with independent regional arrangements. The governance literature recognises the occurrence of such clusters of arrangements and, when the clusters exhibit certain characteristics, refers to them as regime complexes (Orsini et al. 2013). According to Orsini et al. (2013), to be considered a regime complex, there should be three or more arrangements, they should not be interrelated in a hierarchical way and they should be interacting based on a common purpose and set of principles.

Among the arrangements in the database, 16 regional clusters have been identified based on visual inspection of spatial overlaps (Figure 9). In this section, these clusters are examined to determine if they do indeed form entities for which the whole is greater than the sum of the parts. If so, these could provide an entry point for assessment of governance architecture at the regional level. **The existence of these regional clusters also raises the question as to whether global ocean governance can be enhanced by strengthening them and promoting integration among them.** This would be done in parallel with strengthening the global-to-regional issue-based networks discussed in the previous section, which together with the regional clusters can be seen as forming a single global ocean governance architecture.

A full examination of the connectivity among arrangements within the regional clusters would require considerable information on their interplay. **Interplay may comprise several aspects, ranging from data sharing to full collaboration in decision-making and implementation. Information at this level of detail is not available directly from the documentation for the regional clusters identified and would require more intensive enquiry.** Therefore, this study can only undertake a preliminary evaluation of regional clusters for ocean governance, and the interrelations of the arrangements that comprise them based on statements regarding formal interactions found in the documentation for the organisations. Undoubtedly, there are many interactions that are not explicitly stated in the material reviewed for the arrangements. For example, organizational representatives may attend meetings of other organizations in the cluster even when there is no formal interaction between the arrangements.

The 16 regional clusters shown in Figure 9 are described in the following sections. For each, the description begins with a diagram showing the types of arrangements and the issues that

²⁴ The term 'place-based' is used broadly here in the sense of Young et al. (2007) to encompass scales from regional down to much smaller specific areas which may be identified as in need of management.

they cover. The diagram also shows the documented interactions among the arrangements in the cluster. Some of the diagrams include key regional arrangements that are not in the arrangements database because they do not pertain to ABNJ. The shapes for these are shaded. They are included to show that the regional clusters are much richer than just the arrangements pertaining to ABNJ. These regional arrangements may represent a potential for the regional cluster to be expanded to include responsibility for ABNJ in that area.

Each diagram is followed by a table showing the spatial overlaps of the main arrangements in the regional cluster. These are based on the GIS shape-files for the arrangements. The overlaps shown are asymmetrical, for example ICCAT overlaps the entire Mediterranean, but the Mediterranean only overlaps a small part of the area covered by ICCAT. Finally, there is a tabular overview of the regional cluster that covers (i) the spatial extent of the regional cluster, (ii) the extent to which there appears to be overarching integration, (iii-vi) what is in place for each of the four issues (fisheries, pollution, biodiversity, climate change), and (vii) the relevance of the regional cluster to ABNJ.

It should be noted that the areas covered by the regional clusters are loosely defined and flexible. They are identified primarily as regions where there are several overlapping arrangements aimed at various aspects of ocean governance. As consideration of these clusters continues, it is to be expected that they may be subdivided, combined, and or networked if the interplay required for integrated EBM is to be achieved.

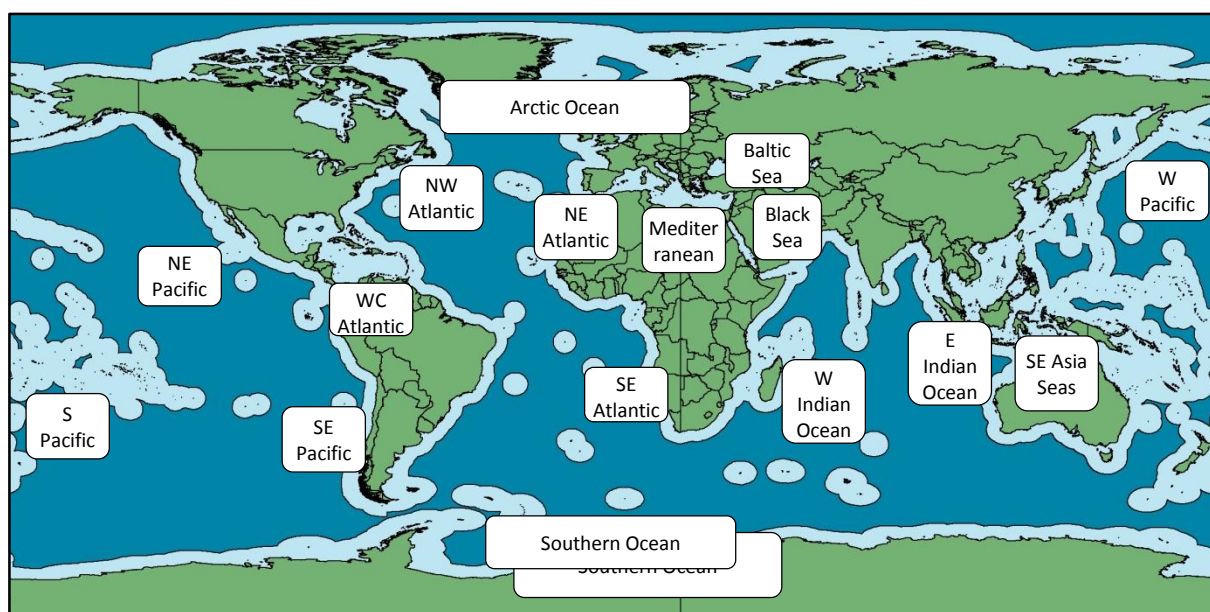


Figure 9. The 16 regional clusters identified.

4.2.1 Northeast Atlantic

The arrangements comprising the Northeast Atlantic regional cluster are depicted in Figure 10. The spatial overlaps among the key arrangements are shown in Table 8, and the regional cluster is summarized in Table 9.

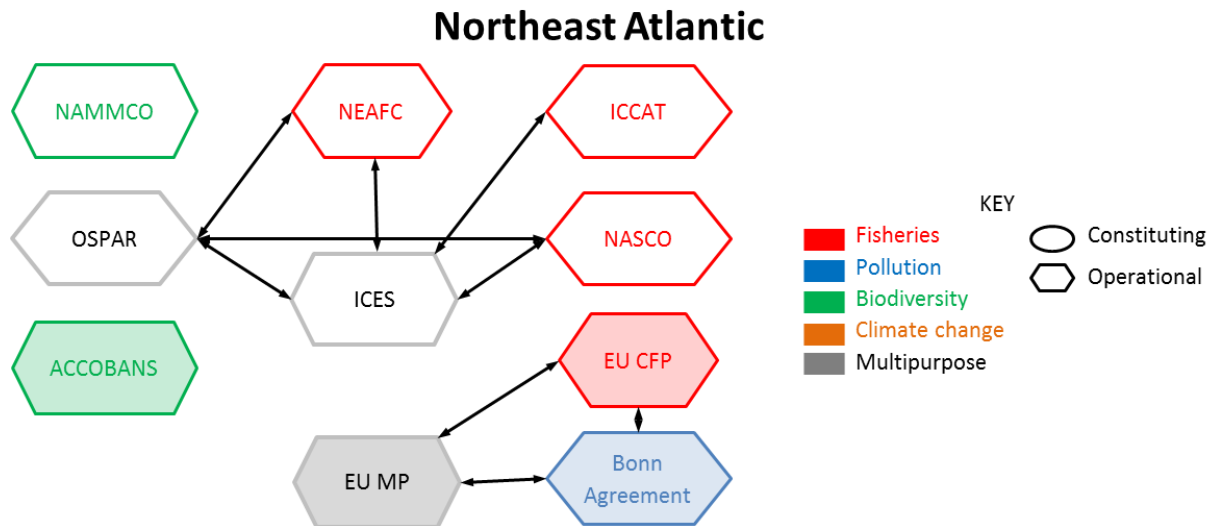


Figure 10. The arrangements comprising the Northeast Atlantic regional cluster

Table 8. Areas (million km²) covered by the key arrangements in the Northeast Atlantic regional cluster and the percentage overlap of the arrangements

	ICCAT	ICES	NAMMCO	NASCO	NEAFC	OSPAR
Area	97.4	14.5	20.8	20.2	13.6	13.8
ICCAT		100	100	100	100	100
ICES	15		70	72	100	99
NAMMCO	21	100		100	100	99
NASCO	21	100	97		100	99
NEAFC	14	94	65	67		98
OSPAR	14	94	66	68	100	

Table 9. Characteristics of the Northeast Atlantic regional cluster

Spatial extent	The arrangements comprising this regional cluster have a high degree of spatial coherence with NEAFC, OSPAR and ICES corresponding closely in space, NAMMCO and NASCO extending across to the Northwest Atlantic. In contrast ICCAT covers the entire Atlantic Ocean and adjacent seas.
Integration	In this region there appears to be minimal integration between the implementing organizations. MOUs exist between OSPAR and both NEAFC and NASCO, however, aside from that, the main link between all of the organizations (with the exception of NAMMCO) is that they are all advised by ICES.
Fisheries	Fisheries management is the prime regulatory focus of this regional cluster. Every arrangement involved in the Northeast Atlantic region other than OSPAR has at least a portion of its mandate dedicated to fisheries, and in most cases that is the sole focus of the agreement. Even NAMMCO, which is in theory related to biodiversity, makes a point of mentioning fisheries (hunting of marine mammals) as a priority.

Pollution	OSPAR is the main body in this region for the monitoring and management of marine pollution.
Biodiversity	OSPAR is the most far reaching agreement in this regional cluster in relation to biodiversity. It is a pioneering body at the global level with regard to the establishment of high seas marine protected areas but has no regulatory authority over sectoral activities such as fishing, shipping or seabed mining that can impact biodiversity
Climate change	Both OSPAR and ICES have bodies that conduct research on climate change. While ICES is an advisory body, it provides advice to various contracting parties through the ICES-PICES Strategic Initiative on Climate Change Impacts on Marine Ecosystems (SICCME). OSPAR also states that it considers the impacts of climate change within the development of its strategies.
Relevance to ABNJ	This regional cluster has strong connections to ABNJ through fisheries arrangements that are largely focused on HMS, straddling and discrete FS and through the establishment of high seas marine protected areas under the auspices of OSPAR. However, the major impact on these areas, fisheries, is not subject to OSPAR's control, or managed in a coordinated way.

4.2.2 Northwest Atlantic

The arrangements comprising the Northwest Atlantic regional cluster are depicted in Figure 11. The spatial overlaps among the key arrangements are shown in Table 10, and the regional cluster is summarized in Table 11.

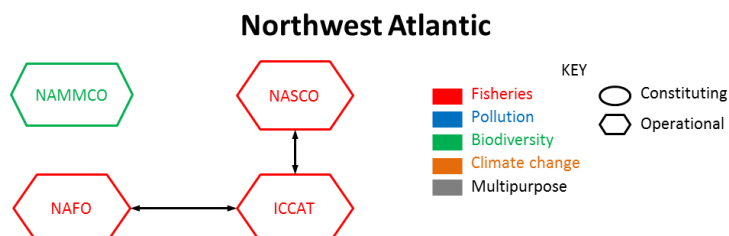


Figure 11. The arrangements comprising the Northwest Atlantic regional cluster

Table 10. Areas (million km²) covered by the key arrangements in the Northwest Atlantic regional cluster and the percentage overlap of the arrangements

	ICCAT	NAFO	NAMMCO	NASCO
Area	97.4	6.3	20.8	20.2
ICCAT		100	100	100
NAFO	6		30	28
NAMMCO	21	100		100
NASCO	21	90	97	

Table 11. Characteristics of the Northwest Atlantic regional cluster

Spatial extent	Three of the arrangements comprising this regional cluster extend beyond in the Northwest Atlantic (NAMMCO, NASCO and ICCAT). Only NAFO is truly focused on the Northwest Atlantic.
Integration	In this region, integration is minimal among the operational organizations and there is no institution that has responsibility for overarching coordination for the area.
Fisheries	Fisheries management in this area is the dominant issue. ICCAT has an Atlantic ocean-wide mandate for tuna and tuna-like fisheries, while NAFO, NASCO specific mandates for the management of fisheries in the area.
Pollution	There is no regional seas programme for this maritime area. Pollution issues are therefore covered by global arrangements or at the national level or not at all.
Biodiversity	NAMMCO manages hunting for marine mammals but some specific ecosystem-focused biodiversity issues. Further, NAFO's management includes provisions that minimize the harmful impact of deep sea fishing activities on "vulnerable marine ecosystems", and requirements to preserve marine biodiversity.
Climate Change	Climate change is addressed only within the context of the arrangements for the above three issues.
Relevance to ABNJ	This regional cluster has some connections to ABNJ through arrangements that are largely focused on fisheries management.

4.2.3 Baltic Sea

The arrangements comprising the Baltic Sea cluster are depicted in Figure 12. The spatial overlaps among the key arrangements are shown in Table 12, and the regional cluster is summarized in Table 13.

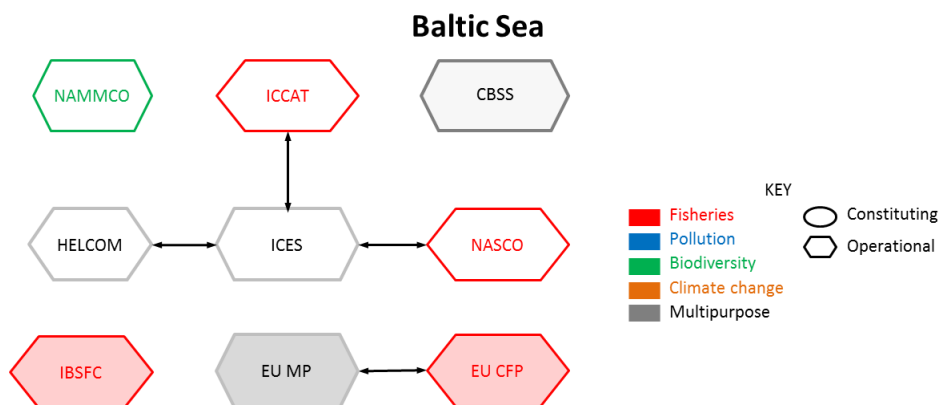


Figure 12. The arrangements comprising the Baltic Sea regional cluster

Table 12. Areas (million km²) covered by the key arrangements in the Baltic Sea regional cluster and the percentage overlap of the arrangements

	ICCAT	ICES	NAMMCO	NASCO	NEAFC	Helsinki
Area	97.4	14.5	20.8	20.2	13.6	0.4
ICCAT		100	100	100	100	100
ICES	15		70	72	100	100
NAMMCO	21	100		100	100	100
NASCO	21	100	97		100	100
NEAFC	14	94	65	67		-
Helsinki	<1	3	2	2	-	

Table 13. Characteristics of the Baltic Sea regional cluster

Spatial extent	The arrangements comprising this regional cluster range in spatial coverage from the Baltic Sea specifically and internal waters of member states (HELCOM), through of those covering of the north-east Atlantic (NEAFC, ICES), and the entire North Atlantic (NAMMCO), to the entire Atlantic Ocean (ICCAT).
Integration	Aside from the fact that all of the arrangements in this area are advised by ICES (with the exception of NAMMCO) there is no significant formalized integration between operational arrangements in this region.
Fisheries	Most arrangements involved in the Baltic region have at least a portion of their mandate dedicated to fisheries (other than HELCOM), and in most cases that is the sole focus of the agreement. NAMMCO is focused largely on hunting of marine mammals from an ecosystem-based perspective, ICES serves as the advisory institution for all of the operational arrangements in this cluster.
Pollution	The Helsinki convention is the primary arrangement for pollution regulation in the Baltic area, it is advised by ICES.
Biodiversity	The Helsinki convention is the most far reaching arrangement in this cluster in relation to biodiversity
Climate change	Both the Helsinki Convention and ICES have bodies that conduct research on climate change. ICES is an advisory body that provides advice to various contracting parties through the ICES-PICES Strategic Initiative on Climate Change Impacts on Marine Ecosystems (SICCME). While HELCOM does not specifically mention climate change in its mandate it has conducted climate change assessments.
Relevance to ABNJ	This regional cluster is not connected to ABNJ; the only tangential connection being in regard to LBS of pollution but there is very little exchange between the Baltic Sea and Atlantic waters. All the region itself is within EEZs, so more emphasis is placed on near shore and internal waters.

4.2.4 Mediterranean Sea

The arrangements comprising the Mediterranean Sea cluster are depicted in Figure 13. The spatial overlaps among the key arrangements are shown in Table 14, and the regional cluster is summarized in Table 15.

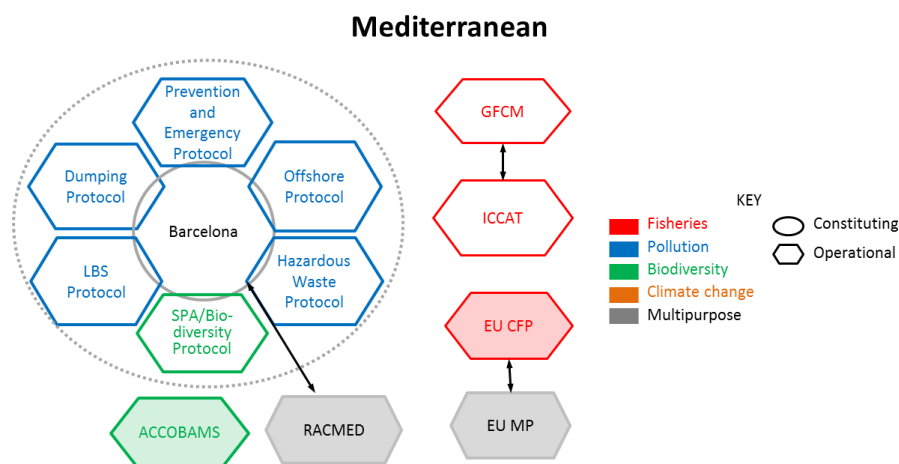


Figure 13. The arrangements comprising the Mediterranean Sea regional cluster

Table 14. Areas (million km²) covered by the key arrangements in the Mediterranean Sea regional cluster and the percentage overlap of the arrangements

	GFCM	ICCAT	Barcelona
Area	3.0	97.4	2.5
GFCM		3	100
ICCAT	100		100
Barcelona	84	3	

Table 15. Characteristics of the Mediterranean regional cluster

Spatial extent	The three arrangements comprising this regional cluster cover the entire Mediterranean Sea, from the Straits of Gibraltar to Straits of the Dardanelles. One, the GFCM also extends to the Black Sea, and another, ICCAT, to the entire Atlantic.
Integration	In this region, linkages between the two major issues – pollution and fisheries – appear weak or absent. The linkage of fisheries with biodiversity also appears weak but there are some efforts to improve this.
Fisheries	The GFCM is instrumental in managing fisheries in this region, based on its authority to adopt binding recommendations for fisheries conservation and management. ICCAT is responsible for HMS in these areas.
Pollution	In this maritime area, the Barcelona Convention, as the constituting arrangement, (along with its five protocols) is the arrangement responsible for protection of the marine environment against pollution.
Biodiversity	The SPA and Biodiversity Protocol explicitly deals with ABNJ issues. ACCOBAMS also deals specifically with marine mammals in ABNJ as well as EEZs

Climate Change	There are no agreements in this regional cluster that deal with climate change at the regional level.
Relevance to ABNJ	This regional cluster's connection to ABNJ is evident through arrangements dealing with fisheries management, pollution and biodiversity; however fisheries and biodiversity are not well integrated. Currently, the area is largely high seas as most Mediterranean coastal states either have not declared a 200 nm EEZ, or they do not enforce them. Hence, the high seas extends seaward of the territorial waters (12 nm, except Greece and Turkey with 6 nm) (UNEP-MAP-RAC/SPA 2011).

4.2.5 Black Sea

The arrangements comprising the Black Sea cluster are depicted in Figure 14. The spatial overlaps among the key arrangements are shown in Table 16, and the regional cluster is summarized in Table 17.

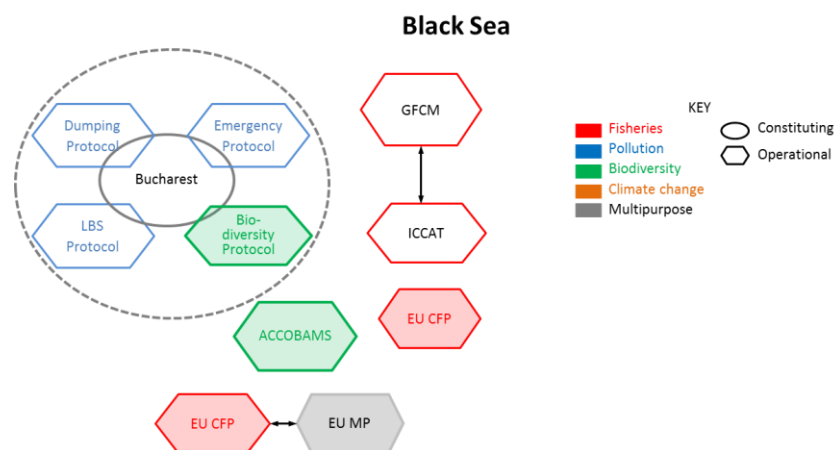


Figure 14. The arrangements comprising the Black Sea regional cluster

Table 16. Areas (million km²) covered by the key arrangements in the Black Sea regional cluster and the percentage overlap of the arrangements

	GFCM	ICCAT	Bucharest
Area	3.0	97.4	0.5
GFCM		3	100
ICCAT	100		100
Bucharest	16	<1	

Table 17. Characteristics of the Black Sea regional cluster

Spatial extent	The arrangements within this region cover the jurisdictional waters of the states around the Black Sea, as well as the Mediterranean.
Integration	On a regional scale, there is no formal integration amongst the two relevant arrangements. While they have participated in workshops together such as the Joint GFCM BSC Workshop on IUU Fishing in the Black Sea (Feb. 2013), currently no MoUs exist between the two
Fisheries	The responsibility for fisheries management falls primarily to the GFCM. It is their responsibility to promote to promote the effective conservation, management and development of the living marine resources.
Pollution	Pollution is governed through the Bucharest Convention and its associated protocols. The protocols address pollution from LBS, dumping, and emergency offload of hazardous substances.
Biodiversity	Biodiversity is addressed on a regional level by a protocol of Bucharest Convention.
Climate change	Climate change is not addressed on a regional level for in this area.
Relevance to ABNJ	The main relevance of the agreements in place in the Black Sea is in regard to pollution that could affect ABNJ ecosystems via outflow into the Mediterranean and on into the Atlantic.

4.2.6 Western Central Atlantic

The arrangements comprising the Western Central Atlantic cluster are depicted in Figure 15. The spatial overlaps among the key arrangements are shown in Table 18, and the regional cluster is summarized in Table 19.

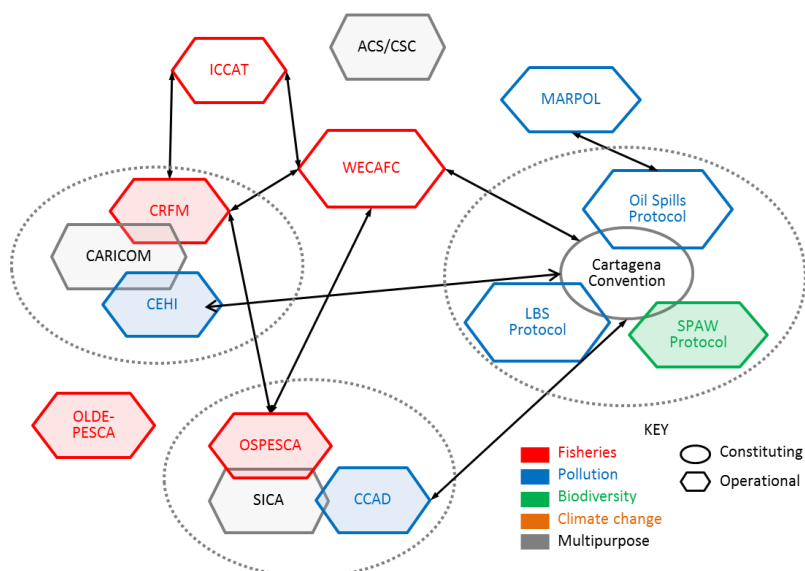


Figure 15. The arrangements comprising the Western Central Atlantic regional cluster

Table 18. Areas (million km²) covered by the key arrangements in the Western Central Atlantic regional cluster and the percentage overlap of the arrangements

	CRFM	ICCAT	OLDEPESCA	OSPESCA	WECAFC	Cartagena
Area	2.0	97.4	6.9	2.1	18.2	6.6
CRFM		2	9	3	11	30
ICCAT	100		42	37	100	100
OLDEPESCA	32	3		59	16	43
OSPESCA	3	1	18		4	12
WECAFC	100	19	42	37		100
Cartagena	99	7	42	37	36	

Table 19. Characteristics of the Western Central Atlantic regional cluster

Spatial extent	The arrangements comprising this regional cluster are largely focused on the actual area of the Western Central Atlantic, with the exception being ICCAT which has Atlantic Ocean-wide mandate
Integration	While there are several linkages among arrangements, there is no body with an overarching mandate for coordination.
Fisheries	There are several bodies with responsibility for fisheries in this region. The FAO RFB (WECAFC) covers the entire region, while others such as CRFM and OSPESCA are part of subregional integration organizations. OSPESCA and OLDEPESCA also have mandates outside the region, in the Pacific, but have no mandate for ABNJ.
Pollution	The Cartagena Convention's Oil Spills and LBS Protocols are the main arrangements for pollution
Biodiversity	The Cartagena Convention's Specially Protected Areas and Wildlife (SPAW) Protocol addresses biodiversity only within EEZs in the region and is not included in the database.
Climate Change	There are no climate change arrangements within the region that specifically address ABNJ.
Relevance to ABNJ	As with the other semi enclosed seas, the relevance of the Western Central Atlantic Region is larger with regard to possible impacts of regional level pollution on ABNJ. However, in this region linkages with fisheries for HMS are perhaps more important than for most of the semi enclosed sea.

4.2.7 Eastern Central and South Atlantic

The arrangements comprising the Eastern Central and South Atlantic cluster are depicted in Figure 16. The spatial overlaps among the key arrangements are shown in Table 20, and the regional cluster is summarized in Table 21.

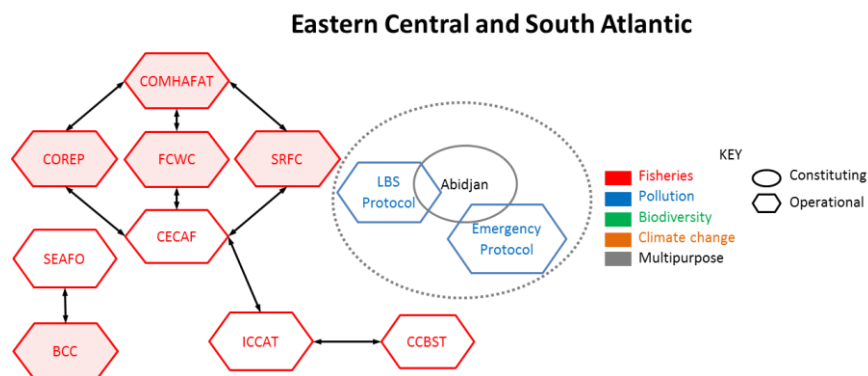


Figure 16. The arrangements comprising the Eastern Central and South Atlantic regional cluster

Table 20. Areas (million km²) covered by the key arrangements in the Eastern Central and South Atlantic regional cluster and the percentage overlap of the arrangements

	CCSBT	CECAF	COMHAFAT	COREP	ICCAT	SEAFO	SRFC	Abidjan
Area	77.0	14.1	23.3	0.4	97.4	16.3	1.5	4.6
CCSBT		-	16	-	24	71	-	21
CECAF	-		61	97	14	4	100	63
COMHAFAT	5	100		100	24	49	100	92
COREP	-	3	2		<1	-	-	8
ICCAT	30	100	100	100		93	100	100
SEAFO	15	5	34	-	16		-	6
SRFC	-	11	7	-	2	-		31
Abidjan	1	21	18	100	5	2	93	

Table 21. Characteristics of the Eastern Central and South Atlantic regional cluster

Spatial extent	The arrangements comprising this regional cluster cover the Eastern Atlantic from the Straits of Gibraltar South to the Antarctic. It should perhaps be treated as two regions, but there are linkages within the area which indicate that it should be treated as a single region.
Integration	Integration is seen among the fisheries mechanisms largely under the aegis of FAO. It may be noted that COMHAFAT at the policy level and the SRFC, FCWC and COREP, at the management level, aim to promote cooperation among states. However, the two bodies for HMS (CCSBT and ICCAT) are not well integrated. The Abidjan Convention also seeks to integrate pollution and biodiversity issues within the region, but does not appear well integrated with fisheries.
Fisheries	CECAF and SEAFO are the FAO bodies responsible for the proper management and development of the fisheries and fishing operations. They are complemented by the indigenous COMHAFAT, SRFC, FCWC and COREP to the north, and the newly established Benguela Current Commission

	(BCC) to the south. ICCAT and the CCBST overlap the area in their responsibility for HMS.
Pollution	The Abidjan Convention and its two protocols are geared towards protecting the area against pollution, more specifically combatting pollution in cases of emergency and LBS and activities on their territories or emanating from other LBS including atmosphere.
Biodiversity	There are no specific arrangements in this regional cluster that deal with biodiversity at the regional level.
Climate Change	There are no agreements in this regional cluster that deal with climate change.
Relevance to ABNJ	This regional cluster has connections to ABNJ through arrangements that are focused on pollution and management of HMS.

4.2.8 Northeast Pacific

The arrangements comprising the Northeast Pacific cluster are depicted in Figure 17. The spatial overlaps among the key arrangements are shown in Table 22, and the regional cluster is summarised in Table 23.

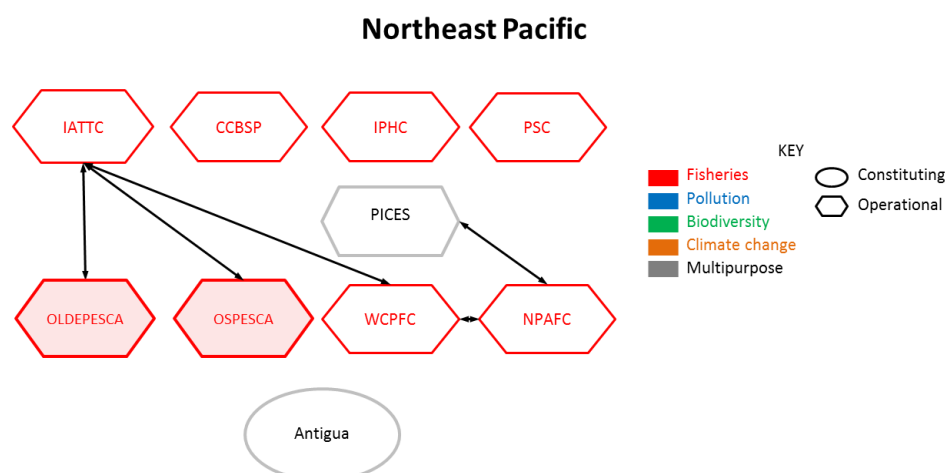


Figure 17. The arrangements comprising the Northeast Pacific regional cluster

Table 22. Areas (million km²) covered by the key arrangements in the Northeast Pacific regional cluster and the percentage overlap of the arrangements

	CCBSP	IATTC	IPHC	NPAFC	OLDEPESCA	OSPESCA	PICES	PSC	WCPFC	Antigua
Area	0.1	67.4	7.7	13.4	6.9	2.1	26.8	0.8	106.2	2.8
CCBSP	-	-	-	1	-	-	<1	-	-	-
IATTC	-	-	30	26	58	63	20	35	10	100
IPHC	-	3	-	34	-	-	29	100	3	-
NPAFC	100	5	60	-	-	50	1	9	-	-
OLDEPESCA	-	6	-	-	-	59	1	-	-	76
OSPESCA	-	2	-	-	18	-	-	-	-	14
PICES	100	8	100	100	2	-	-	100	17	7
PSC	-	<1	11	<1	-	-	3	-	-	-
WCPFC	-	16	41	70	-	-	66	-	-	-
Antigua	-	4	-	-	30	18	1	-	-	-

Table 23. Characteristics of the Northeast Pacific regional cluster

Spatial extent	This area extends from Central America (Panama) north to the Arctic Circle. Some arrangements extend further south (OLDEPESCA, IATTC).
Integration	Integration is relatively weak in this area, aside from the WCPFC which has connections to both the IATTC and the NPAFC. There does appear to be extensive unofficial collaboration. For example, staff of NPAFC are members of PICES, however, no official MOU exists. Similarly, OLDEPESCA attends the COPs of numerous organizations in the region despite a lack of formal partnerships
Fisheries	Fisheries management is the prime regulatory focus of this regional cluster. Every arrangement involved in the Northeast Pacific has at least a portion of its mandate dedicated to fisheries, and in most cases that is the sole focus of the agreement.
Pollution	Aside from the global agreements, only the Antigua Convention has any real focus on pollution, and it is not yet in force. Other agreements in the regional cluster only look at pollution as it relates to their specific fishery. PICES does some research on the effects of pollution, but it has little connection with most of the other arrangements in this regional cluster.
Biodiversity	Aside from the global agreements only the Antigua Convention has any real focus on biodiversity, and it is not yet in force. Other agreements in the regional cluster only look at biodiversity as it relates to their specific fishery. PICES does research on biodiversity, but it has limited connection with most of the other arrangements in this cluster.
Climate change	PICES conducts climate change research although only in an advisory capacity. In this region, the emphasis tends to be on dealing with the effects of climate change rather than the causes.
Relevance to ABNJ	This regional cluster has connections to ABNJ through fisheries arrangements that are largely focused on HMS and the high seas.

4.2.9 Northwest Pacific

The arrangements comprising the Northwest Pacific cluster are depicted in Figure 18. The spatial overlaps among the key arrangements are shown in Table 24, and the regional cluster is summarized in Table 25.

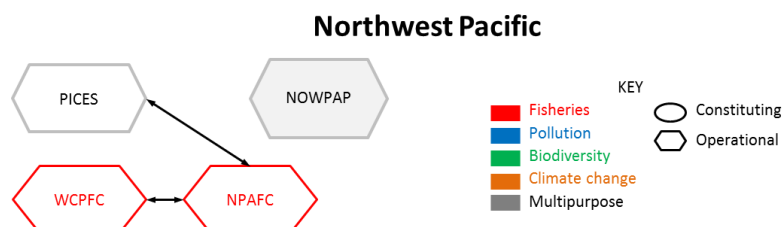


Figure 18. The arrangements comprising the Northwest Pacific regional cluster

Table 24. Areas (million km²) covered by the key arrangements in the Northwest Pacific regional cluster and the percentage overlap of the arrangements

	NPAFC	PICES	WCPFC
Area	13.4	26.8	106.2
NPAFC		50	9
PICES	100		17
WCPFC	70	66	

Table 25. Characteristics of the Northwest Pacific regional cluster

Spatial extent	This area extends from Southeast Asia north to the Arctic Circle.
Integration	Integration is relatively weak in this area, aside from the WCPFC which has connections the NPAFC. There does appear to be extensive unofficial collaboration. For example, staff of NPAFC are members of PICES, however, no official MOU exists. NOWPAP and its activity centers appear to be a source of integration for pollution and biodiversity issues albeit with limited scope.
Fisheries	Fisheries management is the prime regulatory focus of this regional cluster. Every arrangement involved in the Northwest Pacific has at least a portion of its mandate dedicated to fisheries, and in most cases that is the sole focus of the agreement.
Pollution	Aside from the global agreements, only the Regional Seas Northwest Pacific Action Plan (NOWPAP) has any real focus on pollution, and is not a convention. PICES does some research on the effects of pollution in collaboration with NOWPAP.
Biodiversity	NOWPAP has some focus on biodiversity and PICES does some research on biodiversity.

Climate change	PICES conducts climate change research although only in an advisory capacity.
Relevance to ABNJ	This regional cluster has connections to ABNJ through fisheries arrangements that are largely focused on HMS and the high seas.

4.2.10 Southeast Pacific

The arrangements comprising the Southeast Pacific cluster are depicted in Figure 19. The spatial overlaps among the key arrangements are shown in Table 26, and the regional cluster is summarized in Table 27.

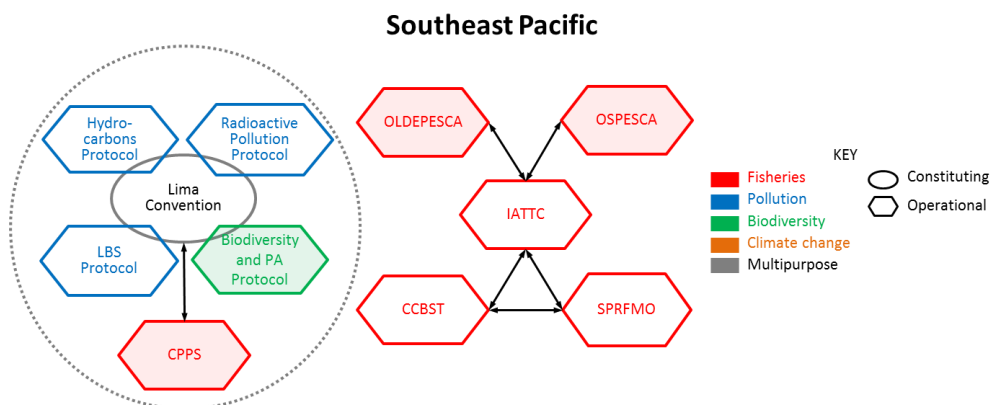


Figure 19. The arrangements comprising the Southeast Pacific regional cluster

Table 26. Areas (million km²) covered by the key arrangements in the Southeast Pacific regional cluster and the percentage overlap of the arrangements.

	CCSBT	CPPS	IATTC	OLDEPESCA	OSPESCA	SPRFMO	Lima
Area	77.0	9.2	67.4	6.9	2.1	59.0	6.6
CCSBT		3	-	-	-	14	1
CPPS	<1		12	23	24	4	84
IATTC	-	90		58	63	58	94
OLDEPESCA	-	17	6		59	-	28
OSPESCA	-	6	2	18		<1	12
SPRFMO	11	29	51	-	<1		18
Lima	<1	60	9	27	37	2	

Table 27. Characteristics of the Southeast Pacific regional cluster

Spatial extent	This area covers the Pacific Ocean off the west coast of South America, from Colombia South to the Antarctic.
Integration	There is a framework for inter-agency cooperation among the Permanent Commission for the South Pacific (CPPS), UNEP (Lima Convention and its protocols) and some two dozen agencies, programmes and Convention Secretariats.
Fisheries	The CPPS, SPRFMO, IATTC and CCSBT have responsibility for conservation and sustainable use of fishery resources. These RFBs are further supplemented by the indigenous bodies Central American Fisheries and Aquaculture Organization (OSPESCA) and the Latin American Organization for Fisheries Development (OLDEPESCA).
Pollution	The Lima Convention and its protocols are focused on protecting the marine environment and coastal zones of the South-East Pacific from hydrocarbon and other harmful substances including those from land-based and radioactive sources. The area of influence of the Lima Convention is stated as extending as far into ABNJ as pollution might reach.
Biodiversity	The Protocol for the Conservation and Management of Protected Marine and Coastal Areas of the South-East Pacific deals with biodiversity, but its focus is within EEZs.
Climate Change	There are no arrangements in this regional cluster that deal with climate change at the regional level.
Relevance to ABNJ	This regional cluster has connection to ABNJ through arrangements that are largely focused on the conservation and sustainable use of fishery resources; and to a lesser extent, also includes measures to protect the marine environment and coastal zones of the South-East Pacific.

4.2.11 Pacific Islands Region

The arrangements comprising the Pacific Islands Region cluster are depicted in Figure 20. The spatial overlaps among the key arrangements are shown in Table 28, and the regional cluster is summarized in Table 29.

Table 28. Areas (million km²) covered by the key arrangements in the Pacific Islands Region regional cluster and the percentage overlap of the arrangements

	PIF	FFA	SPC	WCPFC	SPRFMO	Noumea
Area	26.1	63.7	31.7	590.2	1,097.0	42.2
PIF		34	68	25	<1	63
FFA	80		63	38	56	71
SPC	69	32		5	29	68
WCPFC	100	35	10		23	6
SPRFMO	<1	96	100	43		98
Noumea	99	47	90	4	38	

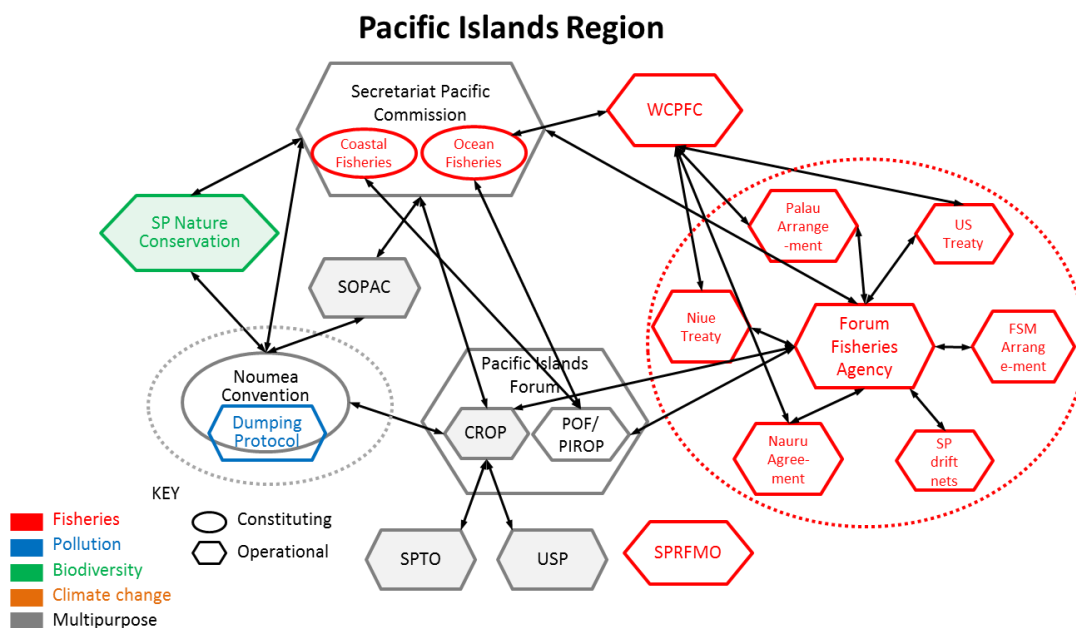


Figure 20. The arrangements comprising the Pacific Islands Region regional cluster

Table 29. Characteristics of the Pacific Islands Region regional cluster

Spatial extent	The arrangements comprising this regional cluster range in spatial extent from the entire Pacific Island Region in the case of the fisheries arrangement for highly migratory tunas (WCPFC) to the EEZs of a subset of Pacific Island Region countries in the case of The Pacific Islands Forum (PIF).
Integration	In this region significant emphasis has been placed on institutional arrangements for regional cooperation. The Pacific Islands Forum (PIF), with 16 member countries provides overarching policy formulation for oceans in the form of the Pacific Oceanscape Framework (POF), successor to the Pacific Islands Regional Oceans Policy (PIROP). The PIF Council of Regional Organizations of the Pacific (CROP) was established to facilitate intersectoral integration in the region (Wright et al. 2006).
Fisheries	Implementation of ABNJ fisheries aspect of Pacific Ocean Policy is primarily the responsibility of the Forum Fisheries Agency which oversees a suite of operational agreements. The Ocean Fisheries Programme (OFP) of the Secretariat of the Pacific Commission (SPC) is a primary source of technical input to both the Western Central Pacific Fisheries Commission and the Forum Fisheries Agency. It is not yet clear how the new (2012) South Pacific Regional Fisheries Management Organization (SPRFMO), which spans the entire South Pacific, from South America to Asia, will relate to these other fisheries agencies.
Pollution	Pollution is addressed primarily by the Secretariat of the Noumea Convention (SPREP).
Biodiversity	The Noumea Convention is one of the few Regional Seas conventions which indicate the intention to address biodiversity in ABNJ. However, this intention refers only to the ABNJ lacunae within the entire set of Pacific Island Region EEZs. This leaves a considerable area of Pacific Island Region ABNJ without an organization responsible for biodiversity.

Climate change	The POF addresses climate change as a crosscutting issue.
Relevance to ABNJ	This regional cluster has strong connections to ABNJ through fisheries arrangements that are largely focused on Highly Migratory Fish Stocks and the newly established SPRFMO for straddling and discrete high seas fish stocks. Promotion of the EAF in these arrangements may increase the attention to biodiversity and ecosystem issues in ABNJ. Despite the stated intention of the Noumea Convention to address ABNJ biodiversity, this regional cluster remains focused on coastal biodiversity in this area particularly with regard to demersal biodiversity.

4.2.12 Southeast Asia

The arrangements comprising the Southeast Asia cluster are depicted in Figure 21. The spatial overlaps among the key arrangements are shown in Table 30, and the regional cluster is summarized in Table 31.

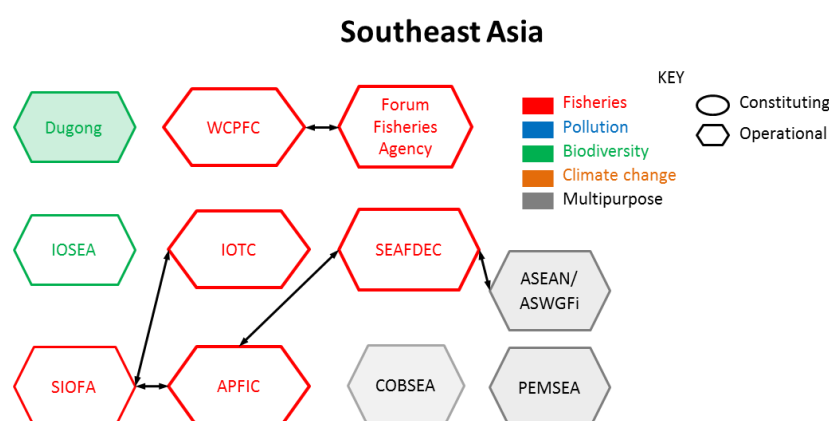


Figure 21. The arrangements comprising the Southeast Asia regional cluster

Table 30. Areas (million km²) covered by the key arrangements in the Southeast Asia regional cluster and the percentage overlap of the arrangements.

	APFIC	CCSBT	IOTC	SEAFDEC	SIOFA
Area	13.5	77.0	61.6	20.6	27.2
APFIC		<1	6	50	-
CCSBT	3		56	15	79
IOTC	27	45		56	99
SEAFDEC	77	4	19		6
SIOFA	-	28	44	7	

Table 31. Characteristics of the Southeast Asia regional cluster

Spatial extent	This regional cluster comprises mainly the EEZs of countries in Southeast Asia.
Integration	There appear to be few formal linkages in this region, and no overarching integration body can be identified for ocean issues. Most integration appears to be at the level of coastal ecosystems which predominate in the region. Purely regional organisations mainly the Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) seek to play an integrative role at this level.
Fisheries	APFIC is the primary fisheries body for this region, supported by SEAFDEC. HMS are covered by IOTC, FFA, WCPFC and CCSBT which intersect in this region, but have only minor overlap with SE Asian countries. Similarly SIOFA has a minor overlap with SEAFDEC in the south. Even though SEAFDEC has a coordinating role, it is purely advisory and is not tied to any particular governance process.
Pollution	There is no Regional Seas convention that deals with pollution at the regional level. However, there is a Regional Seas Action Plan for the Protection and Development of the Marine Environment and Coastal Areas of the East Asian Seas Region (East Asian Seas Action Plan) of the Coordinating Body on the Seas of East Asia (COBSEA) which together with PEMSEA addresses coastal pollution in the region.
Biodiversity	As for pollution, biodiversity is addressed at a regional level by COBSEA and PEMSEA with sea turtles being covered by the Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA), but this is largely focuses on coastal waters.
Climate Change	There are no agreements in this regional cluster that deal with climate change.
Relevance to ABNJ	This regional cluster has limited connection to ABNJ other than through pollution, HMS fisheries arrangements centered on other regions and IOSEA for sea turtles.

4.2.13 Eastern Indian Ocean

The arrangements comprising the Eastern Indian Ocean cluster are depicted in Figure 22. The spatial overlaps among the key arrangements are shown in Table 32, and the regional cluster is summarized in Table 33.

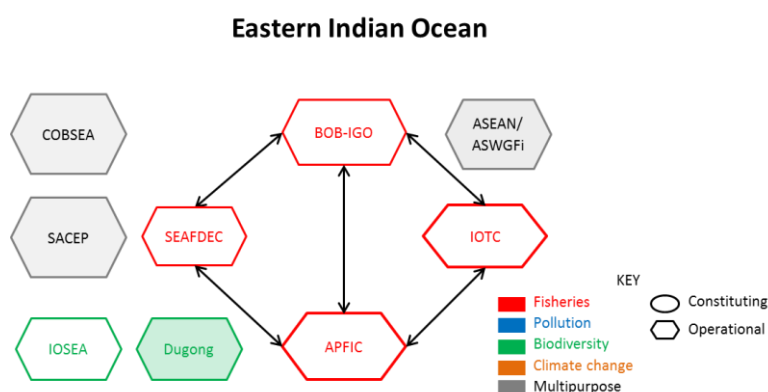


Figure 22. The arrangements comprising the Eastern Indian Ocean regional cluster

Table 32. Areas (million km²) covered by the key arrangements in the Eastern Indian Ocean regional cluster and the percentage overlap of the arrangements

	APFIC	BOBP-IGO	IOTC	SEAFDEC
Area	13.5	2.3	61.6	20.6
APFIC		100	6	50
BOBP-IGO	17		4	7
IOTC	27	100		56
SEAFDEC	77	61	19	

Table 33. Characteristics of the Eastern Indian Ocean regional cluster

Spatial extent	This area is the entire Indian Ocean east of a line from the southern tip of India passing west of the Maldives and continuing south to the Antarctic circle.
Integration	There is some cooperation among bodies responsible for fisheries in this region, but there does not appear to be an overarching integration mechanism for ocean issues.
Fisheries	Fisheries is the prime focus of this regional cluster with the BOB-IGO, APFIC, IOTC, SEAFDEC and APFIC being fisheries arrangements.
Pollution	There is no Regional Seas Convention for this region. The South Asia Co-operative Environment Programme (SACEP) is a related initiative that has an action plan, The South Asian Seas Action Plan (SASAP), similar to that of a Regional Seas Convention, that deals with pollution.
Biodiversity	The SASAP also addresses biodiversity within the SACEP region. Sea turtles are covered by the MOU on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA), but this is largely focuses on coastal waters, as does the dugong MOU.
Climate change	There are no agreements in this regional cluster that deal with climate change.
Relevance to ABNJ	This regional cluster has connections to ABNJ through fisheries arrangements that are largely focused on HMS, but also other High Seas resources.

4.2.14 Western Indian Ocean

The arrangements comprising the Western Indian Ocean cluster are depicted in Figure 23. The spatial overlaps among the key arrangements are shown in Table 34, and the regional cluster is summarized in Table 35.

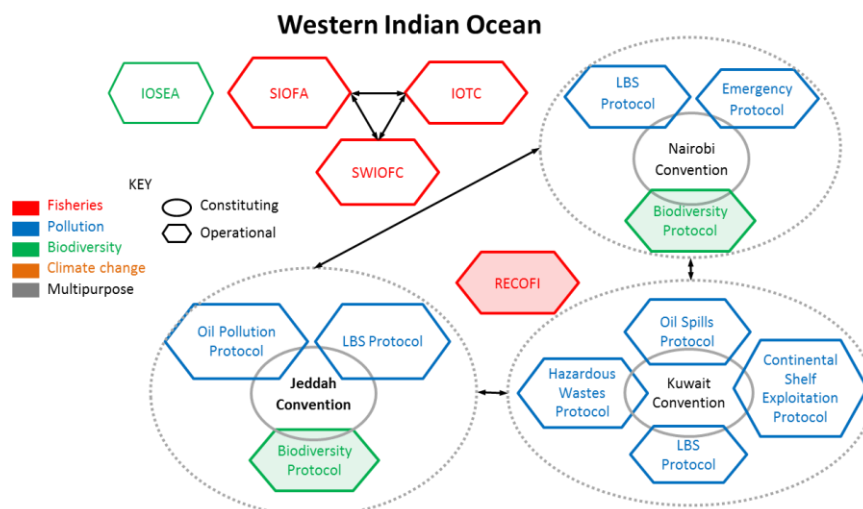


Figure 23. The arrangements comprising the Western Indian Ocean regional cluster

Table 34. Areas (million km²) covered by the key arrangements in the Western Indian Ocean regional cluster and the percentage overlap of the arrangements

	IOTC	SIOFA	SWIOFC	Jeddah	Kuwait	Nairobi
Area	61.6	27.2	8.5	1.1	0.7	6.3
IOTC		99	100	100	100	100
SIOFA	44		-	-	-	2
SWIOFC	14	-		-	-	92
Jeddah	2	-	-		<1	<1
Kuwait	1	-	-	<1		-
Nairobi	10	<1	68	<1	-	

Table 35: Characteristics of the Western Indian Ocean regional cluster

Spatial extent	This area is the entire Indian Ocean west of a line from the southern tip of India passing west of the Maldives and continuing south to the Antarctic circle.
Integration	In this region there is minimal integration among the operational organizations, and no apparent mechanism for overarching coordination. It could be argued that the Jeddah and Kuwait convention areas are sufficiently separate that they should not be included in this regional cluster. The emerging African Centre for Capacity-Building in Ocean Governance (AfriCOG) and Western Indian Ocean Sustainable Ecosystem Alliance (WIOSEA) (Vousden and Stapley, 2013) could be mechanisms for coordination.
Fisheries	Fisheries management is the mandate of the IOTC, SIOFA and the SWIOFC with responsibility for HMS, other fisheries in ABNJ and fisheries in EEZs respectively. RECOFI is responsible for fisheries within EEZs in the Persian Gulf
Pollution	There are three Regional Seas Conventions in this region. The Nairobi, Jeddah and Kuwait Conventions and their protocols are focused on pollution issues.

Biodiversity	A protocol of the Jeddah Convention (NYIF) also focuses on marine biodiversity, but only in coastal areas. SIOFA includes provisions for protecting marine biodiversity but is not yet functional in this area. Sea turtles are covered by the MOU on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA), but this is largely focuses on coastal waters.
Climate Change	There are no agreements in this regional cluster that deal with climate change.
Relevance to ABNJ	This regional cluster has strong connection to ABNJ though its mechanisms dealing with pollution and fisheries for HMS and in ABNJ.

4.2.15 Arctic

The arrangements comprising the Arctic Ocean cluster are depicted in Figure 24. The spatial overlaps among the key arrangements are shown in Table 36, and the regional cluster is summarized in Table 37.

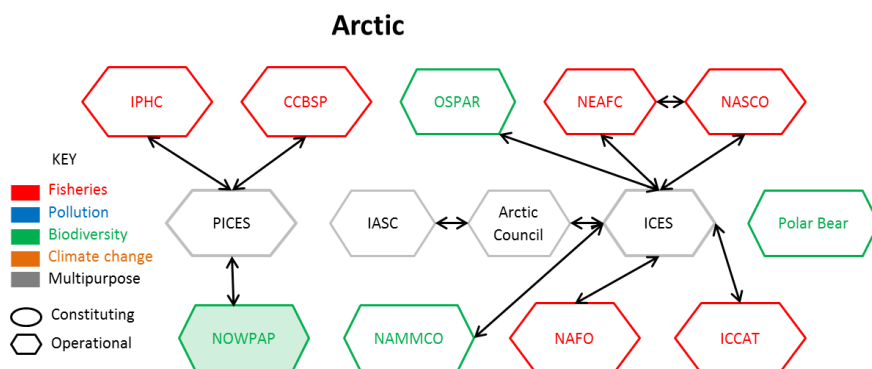


Figure 24. The arrangements comprising the Arctic Ocean regional cluster

Table 36. Areas (million km²) covered by the key arrangements in the Arctic Ocean regional cluster and the percentage overlap of the arrangements.

	CCBSP	ICCAT	ICES	IPHC	NAFO	NAMMCO	NASCO	NEAFC	PICES	Arctic Council	NOWPAP	OSPAR
Area	0.1	97.4	14.5	7.7	6.3	20.8	20.2	13.6	26.8	18.4	8.9	13.5
CCBSP		-	-	-	-	-	-	-	<1	1	<1	-
ICCAT	-		100	-	100	100	100	100	-	35	-	100
ICES	-	15		-	<1	70	72	100	-	26	-	100
IPHC	-	-	-		-	-	-	-	29	7	<1	-
NAFO	-	6	<1	-		30	28	<1	-	9	-	<1
NAMMCO	-	21	100	-	100		100	100	-	35	-	100
NASCO	-	21	100	-	90	97		100	-	35	-	100
NEAFC	-	14	94	-	<1	65	67		-	24	-	100
PICES	100	-	-	100	-	-	-	-		14	66	-
Arctic Council	100	7	33	16	25	31	32	32	10		7	32
NOWPAP	3	-	-	<1	-	-	-	-	22	4		-
OSPAR	-	14	93	-	<1	65	67	99	-	23	-	

Table 37. Characteristics of the Arctic regional cluster

Spatial extent	Strictly, the Arctic is the area north of the Arctic Circle. However, the Arctic Council has not defined a particular geographic area for its activities. In this study we use the area defined by the Working Group on Conservation of Arctic Flora and Fauna (CAFF). This overlaps with several arrangements that are primarily focused on areas to the south, in the north Atlantic and Pacific Oceans, or in the case of ICCAT the entire Atlantic Ocean.
Integration	Integration within the Arctic regional cluster is pursued through the Arctic Council which has working groups addressing several of the issue areas ²⁵ . While they may not be directly connected with each other (NASCO and NEAFC being the exception), through ICES as well as the coordinating bodies of the Arctic Council and NAMMCO most of the arrangements have at least some level of coordination between them. Connectivity among Atlantic Ocean arrangements and of those with the Arctic appears to be higher, as would be expected.
Fisheries	The most prominent fisheries arrangements are NEAFC, NASCO, NAFO, CCBSP and ICCAT. NAMMCO is a mechanism for cooperation in managing the conservation and hunting of marine mammals.
Pollution	Pollution measures are researched by ICES and coordinated through the Arctic Council.
Biodiversity	Biodiversity measures are researched by ICES and coordinated through NAMMCO and the Polar Bear Convention. The Arctic Council Working Group on Conservation of Arctic Flora and Fauna (CAFF) is active in circumpolar marine biodiversity assessment and monitoring that includes ABNJ.
Climate change	Climate change is addressed primarily by the Arctic Council and ICES
Relevance to ABNJ	This regional cluster has connections to ABNJ through fisheries arrangements and coordinating bodies that are largely focused on HMS, as well as agreements that are specifically focused on the high seas.

4.2.16 Southern Ocean

The arrangements comprising the Southern Ocean regional cluster are depicted in Figure 25. The spatial overlaps among the key arrangements are shown in Table 38, and the regional cluster is summarized in Table 39.

²⁵ Arctic Contaminants Action Program (ACAP), Arctic Monitoring and Assessment Programme (AMAP), Conservation of Arctic Flora and Fauna (CAFF), Emergency Prevention, Preparedness and Response (EPPR), Protection of the Arctic Marine Environment (PAME), Sustainable Development Working Group (SDWG).

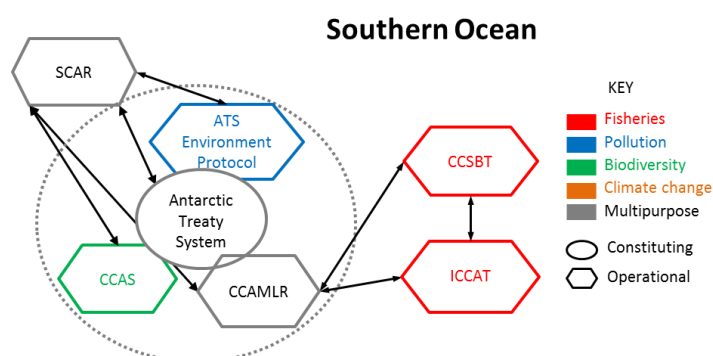


Figure 25. The arrangements comprising the Southern Ocean regional cluster

Table 38. Areas (million km²) covered by the key arrangements in the Southern Ocean regional cluster and the percentage overlap of the arrangements.

	CCAMLR	CCSBT	ICCAT	WCPFC	CCAS	ATS
Area	34.1	77.0	97.4	106.2	20.2	20.2
CCAMLR		18	11	1	100	100
CCSBT	40		24	11	-	-
ICCAT	31	30		-	27	27
WCPFC	2	15	-		3	3
CCAS	59	-	6	1		100
ATS	59	-	6	1	100	

Table 39: Characteristics of the Southern Ocean regional cluster

Spatial extent	This region includes the entire area south of 60°S as well as the area north of 60°S that is part of CCAMLR.
Integration	There is a significant integration of the arrangements in this region through the Antarctic Treaty System (ATS). CCAMLR, the major ocean related component of the ATS, embraces the 'ecosystem approach', which considers the whole Southern Ocean to be a suite of interlinked systems. The Scientific Committee for Antarctic Research (SCAR) has a cross-cutting role in providing technical advice.
Fisheries	CCAMLR has a mandate for fisheries (for non-mammal species) in this area. Its primary mission is conservation of Antarctic marine living resources, including birds, unlike other RFMOs whose focus is managing fisheries.
Pollution	An ATS Protocol focuses on issues related to environmental protection. It sets forth environmental principles to govern Antarctic activities, designates Antarctica as a natural reserve and prohibits all activities related to mineral resources other than scientific research.
Biodiversity	The ATS Protocol also has provisions for biodiversity conservation including in the marine environment. As developed in practice, the Parties to the ATS Protocol have agreed to not designate marine areas without the consent of CCAMLR. CCAMLR focuses on the conservation of Antarctic marine living resources and has a mandate to conserve the ecosystem. CCAS also promotes

	the protection, scientific study, and rational use of Antarctic seals, and to maintain a satisfactory balance within the ecological system of Antarctica. The Agreement on the Conservation of Albatrosses and Petrels (ACAP), while global, is particularly relevant in this region. Annexes to an ATS Protocol directly address biodiversity conservation.
Climate Change	Climate change issues are also addressed under the ATS.
Relevance to ABNJ	This regional cluster has strong connections to ABNJ through fisheries arrangements that are not just focused on the regulation of fishing, but also has a mandate to conserve the ecosystem.

4.2.17 Characteristics and potential role of regional clusters

The 16 regional clusters for ocean governance reflect a diversity of regional level approaches to pursuing (or not) intersectoral integration and ecosystem-based management for the ocean. The governance literature has recognised the existence of regime complexes in which several arrangements address a single issue (e.g. Raustiala and Victor 2004, Keohane and Victor 2011, Oberthür and Stokke 2011). However, the regional clusters appear to be different from regime complexes, being primarily spatially defined and with a broad focus (or potential focus) on marine EBM. Within the clusters identified, interaction appears highest among fisheries management arrangements. In many instances Regional Seas conventions and action plans are also active in integrating pollution and biodiversity aspects, although few include ABNJ.

Few of the clusters were found to have clearly identifiable overarching mechanisms for integrated policy development and coordination. The Pacific Islands Forum (PIF) and its Council of Regional Organisations of the Pacific (CROP) is the most prominent example of such a mechanism. Two other mechanisms developed with the express purpose of coordination are the Antarctic Treaty System and the Arctic Council. In the Mediterranean, coordination for sustainable development is approached through the establishment of the Mediterranean Commission on Sustainable Development (MCSD) in 1996, in association with the Barcelona Convention whose Secretariat supports the activities of the MCSD. In the southeast Pacific, the interaction between the FAO and CPPS, which also serves as the Secretariat for the Lima Convention, has the potential to promote EBM. In Southeast Asia, PEMSEA, a home-grown coordination body emerged as a bottom-up response to a perceived lack of regional policy/coordination capability. In other regions, an ocean specific mechanism for overarching policy development and coordination is either absent or is partially taken up by the Secretariat of the Regional Seas Conventions (or its counterpart). However, this may mean that linkages between the major issues of Regional Seas Conventions, such as pollution and environment/biodiversity, with other sectors, notably fisheries, shipping and tourism, remain weak or absent.

The observation that some clusters appear to be progressing towards becoming a structured system capable of promoting integrated ocean governance raises the question of the extent to regional clusters should be perceived as building blocks for global ocean governance system and should be the focus of initiatives to build and strengthen them. It would appear that despite their current deficiencies these clusters could have a potentially important role in implementation of EBM in their respective regions. In most clusters the FAO EAF and the UNFSA mandate to protect marine biodiversity would be an obvious starting point and would require linkages with Regional Seas and other non-fisheries arrangements in the cluster. One can envisage the strengthening of clusters to the level where the full range of ocean governance interests is engaged and integrated. To determine this, further work needs to be done on assessing their role. The following preliminary observations on the structuring characteristics of the clusters suggest possible areas for attention in terms of strengthening.

The extent to which the clusters form discrete spatial entities is also highly variable. The regional arrangements addressing the issues of concern were usually developed without reference to other regional arrangements operating in the same area and were designed to cover the specific issue of concern. Some arrangements, notably the RFMOs for HMS cover large ocean areas and appear in several clusters. ICCAT, for example, is included in each of the five Atlantic Ocean clusters. Ultimately, if regional clusters are to become a focus of ocean governance reform and strengthening, there will be the need for attention to their spatial scope.

In most clusters, provisions for technical advice appear to be largely by mechanisms that are internal to the individual arrangements that comprise them (see section 4.3). A few of the regional clusters appear to also have crosscutting arrangements for the provision of technical advice involving separate bodies, namely PICES in the North Pacific, ICES in the North Atlantic, the SCAR in the Antarctic and the IASC in the Arctic. Each of these technical advisory arrangements has a different history and relationship with the other arrangements in their cluster. They may provide some degree of integration across issues, but solely at the technical level. These crosscutting providers of technical advice may be a useful component of improved integration, particularly if they are mandated to take more proactive role in identifying interactions among issues that should be considered in policy making. This topic will be taken up further in the section below pertaining to science-policy interfaces.

Another facet of the regional clusters is the extent to which the arrangements are integrated with the broader regional political economies undertaken by bodies such as ASEAN, SADC, SAARC, MERCOSUR and CARICOM. Söderbaum and Granit (2014) argue that this connectivity is important if transboundary water issues are to achieve the desired prominence at the regional level and be mainstreamed into regional programmes. This is likely to become increasingly important in the future, if the trend of the past few decades towards regionalism continues (Klůvanková-Oravská and Chobotová 2012). The information collected in this study is insufficient for a comprehensive assessment of the extent to which these linkages occur or the opportunities for developing them. However, some preliminary observations are possible.

Only the coordinating mechanisms for the Pacific Island Region and the Mediterranean Sea appear to have strong linkages with regional multipurpose political organisations. Some connectivity is evident in the Western Central Atlantic where agencies associated with the two major regional integration organisations, the Caribbean Community and Common Market (CARICOM) and the Central American Economic Integration System (SICA) are part of the cluster despite the absence of an overall coordinating mechanism (Mahon et al. 2013). In the Bay of Bengal area in the Western Indian Ocean, there appears to be some connectivity between fisheries and the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC). In the South African Development Region (SADC) there is a Fisheries Protocol that provides some connectivity between fisheries arrangements and SADC. In the Pacific, the Asia-Pacific Economic Cooperation body (APEC) has an Oceans and Fisheries Working Group (OFWG) that links the work of fisheries bodies with this multipurpose organisation. As indicated above, these are preliminary observations and will require further investigation.

The relationships among these regional clusters and their linkages to the global level (Figure 8) is another aspect of the overall structure for ocean governance to consider if the strengthening of regional clusters is identified as a valuable goal. The extent to which global arrangements are reflected in regional clusters should be investigated to determine gaps. Some global arrangements may have mechanisms for place-based application without being part of a regional cluster, for example, implementation by the International Seabed Authority. While the granting of licences for deep sea mining may have implications for ABNJ biodiversity, pollution and fisheries, this assessment found little explicit connection between the process identified for the granting of licences and the arrangements in place for the other sectoral issues.

The proposed perspective of regional clusters as governance units becomes critical if spatial nesting of arrangements is considered to be important for effective ocean governance. Nesting facilitates application of the principle of subsidiarity (Young 2013, p 107) while providing for higher level integration among nested arrangements. Ostrom (2010) points out advantages of pursuing governance through multiple units at diverse scales that cumulatively make a difference. There is also an ongoing discourse about how lessons learned from research on governing 'the commons' at smaller scales might inform approaches at regional and global levels (Dietz et al. 2003). Polycentric approaches such as regional clusters facilitate achieving benefits at multiple scales as well as experimentation and learning from experience with diverse policies.

If the regional clusters are seen as governance units that should be explicitly targeted for strengthening, there are several facets to strengthening their structure and functionality. Broadly, these are: the extent to which the arrangements that comprise them are geographically coherent (spatial overlap and fit); the extent to which the individual arrangements within the cluster reflect good governance structure (as per the assessments in this study) and practice; the extent to which there are functional linkages (interplay) among the arrangements comprising the cluster; and the extent to which they share a common purpose and set of principles and can deal with one another as equals.

4.3 Science-policy interfaces

The UNEP Foresight Process on Emerging Environmental Issues for the 21st century, concluded that the cross-cutting issue "Broken Bridges: Reconnecting Science and Policy" is the fourth most pressing one regarding efforts to achieve sustainable development (UNEP 2012). The panel noted that critical scientific knowledge is not being communicated effectively to audiences ranging from decision-makers to the general public. Many of the arrangements assessed state 'best use of scientific information available' as a foundational principle. To give effect to this principle, it is essential that there be clearly identifiable mechanisms for the transformation of available science into policy and management advice that can be used by decision-makers. These mechanisms are referred to here as science-policy interfaces.

Diverse factors can be identified as affecting the functionality of science-policy interfaces, ranging from a lack of confidence in the scientific information provided, through lack of mechanisms for access to scientific information, to failure on the part of scientists and advisors to formulate scientific advice in a manner that is understandable (Mitchell et al 2006, Holmes and Clark 2008). The GEF has recognised these and other shortcomings regarding the development of effective science-policy interfaces in its international waters projects and has identified approaches to addressing them (Mee and Adeel 2012).

The importance of the science-policy interface is a main reason for the policy cycle based approach in this assessment and more explicitly the inclusion of the policy cycle stages relating to development and provision of policy and management advice. While these fields provide insight into the science-policy mechanisms in place in arrangements, there are other important factors that determine their functionality. These include the extent to which quality information is available, and the extent to which there is a demand from the decision-makers for scientific information. Both of these factors are also reflected in the policy cycle, as the data and information and decision-making stages.

It is also important to look beyond the mechanisms within individual arrangements to determine if there are identifiable overarching science-policy interfaces within the global and regional networks. Therefore, in the remainder of this section we will look in turn at science-policy interfaces in: (1) the individual arrangements; (2) the regional clusters; and (3) the global regional issue-based networks.

4.3.1 Individual arrangements

A review of the arrangements in the database indicates that there are three distinct forms of science-policy interfaces: (i) scientific advice as an integral part of the arrangement; (ii) scientific advice coming from outside the arrangement; and, (iii) scientific advice coming from both inside and outside the arrangement. Based on the assessment of policy cycles associated with arrangements, the first of these appears to be by far the most common, as most arrangements seek to have their advisory needs built-in at the time of developing the arrangement.

The overall picture for individual arrangements is that policy advisory mechanisms are weak. Only 35% of constituting arrangements have science-policy interfaces that are clearly specified in the agreement (Table 41). For operational arrangements, the percentage is higher (61%), yet still the remaining 39% appears to be a high number of arrangements for which the science-policy interface is less than 'clearly specified' (Table 41). We recognise that there may be mechanisms in place that may be functioning and known to individual stakeholders that are not evident from the documented sources used in developing the database. Nonetheless, in a functional arrangement, one would expect the mechanism for formulation of advice to decision-makers to be laid out clearly in order to promote transparency and facilitate engagement of stakeholders who may have information to contribute.

Viewed from the perspective of the issues, fisheries arrangements have the highest percentage of instances where the science-policy interface is clearly specified (69%), biodiversity arrangements are next (50%) followed by pollution arrangements (45%) (Table 41). The strength of the fisheries arrangements in this regard is expected, given that fishery resources are dynamic and require regular review for effective management. It is consistent with the relatively high percentage of binding decision-making mechanisms for fisheries, which is 50% as compared to 33% for biodiversity and 19% for pollution. The relatively low percentage of binding decision-making for biodiversity seems inconsistent with the somewhat higher percentage of policy advisory mechanisms that are either identifiable or clearly specified (50%). This has implications for the uptake of scientific information related to biodiversity conservation, such as the CBD reports on areas of ecological or biological significance.

Table 41. The strength of the science-policy interface as indicated by the scores for provision of advice and decision-making and the criteria for assigning the score (CN = constituting, OP = operational, F = fisheries, P = pollution, B = biodiversity).

Strength of policy cycle stage		Percent of arrangements				
		Type		Issue		
Provision of policy advice		CN	OP	F	P	B
0	No transboundary science-policy mechanism, e.g. COP self-advises	6	4	4	5	
1	Science-policy interface mechanism unclear - irregular, unsupported by formal documentation	29	16	12	31	
2	Science-policy interface not specified in the agreement, but identifiable as a regular process	29	20	15	19	50
3	Science-policy interface clearly specified in the agreement	35	61	69	45	50
Policy decision-making						
0	No decision-making mechanism	0	8	8	2	33
1	Decisions are recommendations to countries	88	54	42	76	33
2	Decisions are binding with the possibility for countries to opt out of complying	6	0	0	2	0
3	Decisions are binding	6	38	50	19	33

Clearly, unravelling the interactions among the policy cycle stages will require further detailed analysis of the arrangements. At this stage, what can be said is that there is significant room for improvement in the majority of arrangements regarding the clear specification of advisory mechanisms. While this is best done in the agreement itself, it can be achieved through rules of procedure. There is also room for improvement regarding demand for information from the decision-makers, which is likely to accompany a mandate to make binding decisions that would require more substantive changes to the arrangements.

4.3.2 Regional clusters

Assessing the extent to which there are clear science-policy mechanisms within the regional clusters is a more difficult challenge than assessing individual arrangements comprising the cluster. Although each arrangement within the cluster may not have an internal means of access to scientific advice, if some of the arrangements do have access to science providers in other arrangements and there is interaction among them, there may be flows of information and advice between arrangements that compensate for deficiencies at the level of the weaker arrangements. The extent to which such regional level mechanisms are present may be largely related to the extent to which there are independent institutions in the region with the capacity for generation of information needed for advice, and for contributing to the formulation of the advice.

What is notable is that in some regions, specific science-policy mechanisms have been established with the scientific analysis and advice being provided by different organisations than the one in which decision-making takes place. For example, in the North East Atlantic, ICES plays a central role in generating scientific information and advice for several decision-making bodies (OSPAR, NEAFC, HELCOM). In playing this role, ICES interacts with a diversity of experts from universities, NGOs and government research institutes. A similar role is played by PICES in the North East Pacific, SCAR in the Southern Ocean, IASC in the Arctic, and the SPC in the Pacific Island Region. These organisations all have quite different geneses and relationships with the decision-making mechanism. Some are explicitly identified in the arrangement, and provide advice on a regular basis, while others are called upon as needed.

The regional science-policy arrangements above provide examples of where structured organisational interplay within a regional cluster could contribute to a complete policy process. One advantage of using a separate technical advisory body that provides advice to several decision-making processes is that it could, if so tasked, contribute to the intersectoral integration that is required for EBM. Science-policy interfaces that are isolated within individual arrangements may not have the broad purview required to see and consider interrelationships and trade-offs.

In terms of strengthening regional clusters, there may be regional organisations, or networks of organisations that can be called upon to make structured input to decision-making processes. This may require targeted investigation of the science-policy needs and processes within a region, such as was carried out in the Western Central Atlantic (McConney et al. 2012). It may further require proactive coordination of existing science providers and the establishment of an entity such as the Western Indian Ocean Sustainable Ecosystem Alliance (WIOSEA) (Vousden and Stapley 2013).

4.3.3 Global-to-regional issue-based networks

The science-policy interfaces within the global-to-regional issue-based networks might be expected to focus largely on policy which is then implemented at the regional level. However, this is not always the case, notably for biodiversity where regional level operational arrangements relevant to ABNJ are few. Indeed, there is a considerable diversity of arrangements within global regional issue-based networks.

For fisheries, where there are many regional operational arrangements, the major global level interface deals largely with policy. This is the case with FAO's Committee on Fisheries (COFI)

which meets annually to review fisheries and determine future directions for FAO, and by implication, the Regional Fisheries Bodies. As previously noted, the 'RFB Secretariats' Network' is one source of policy advice to COFI. It should be noted though that not all fisheries bodies are constituted under the FAO and those that are not are less obligated to pursue policies agreed-upon at COFI.

At the global level, the IMO provides an integrated system for pollution, with a well-defined science-policy interface. IMO's Marine Environmental Protection Committee (MEPC) is served by a variety of technical committees associated with various pollution agreements. The IMO also receives technical input from GESAMP, which is an independent body of experts that advises United Nations agencies on the scientific aspects of marine pollution and marine environmental protection (GESAMP 2005). GESAMP was established primarily to address the international policy requirement for a cross-sectoral, interdisciplinary, and science-based approach to marine environmental affairs. It is also intended to facilitate, technical coordination and cooperation among UN agencies for marine affairs. While GESAMP is supported by eight UN agencies (IMO, FAO, UNESCO-IOC, IMO, WHO, IAEA, UNHQ and UNEP), its activities are largely oriented towards pollution and the IMO.

Regarding biodiversity, there is an emerging global initiative to develop a science-policy interface for the CBD similar to that for climate change. The Intergovernmental Panel for Biodiversity and Ecosystem Services (IPBES) was established by a UN General Assembly resolution in 2011 and first met in 2013 (IISD 2013a). Its establishment was the culmination of a process originating in the Millennium Ecosystem Assessment in 2005. However, given its recent formation, it is not possible to assess the functioning of IPBES at this time or its ability to address marine biodiversity in AUNJ or ABNJ.

Despite progress with the IPBES, there is major concern that there are no global level arrangements for science or policy advice or decision-making with regard to the protection of biodiversity in ABNJ, whether through the declaration of protected areas, or the implementation of environmental impact assessment procedures for the High Seas (Warner 2012). These matters are being addressed through the UN Working Group on Marine Biodiversity beyond Areas of National Jurisdiction (BBNJ) (IISD 2013b). This Working Group is to make recommendations to the General Assembly in 2015 on whether to commence negotiations for an international instrument under UNCLOS on marine biodiversity conservation and sustainable use and is currently discussing the scope, parameters and feasibility of such an instrument (IISD 2014, Gjerde, et al. 2008a, Gjerde et al. 2008b, Hart 2008). If this is successful, it may lead to the development of a global level agreement that could encompass the entire policy cycle. A Conference of Parties to such an agreement could set up its own scientific and technical advisory body or utilise the services of an existing body such as the CBD or IPBES. From a policy perspective, this may be the most effective approach to achieving effective integration and coordination for ABNJ through the establishment of a common purpose and set of principles under which all organizations operate. This arrangement could complement efforts to expand the mandates of Regional Seas conventions to include biodiversity in adjacent ABNJ, as proposed by Ban et al. (2013). Even if the global level process is established, as noted above, regional bodies as components of regional clusters would likely have a significant potential role in achieving improved governance for biodiversity in ABNJ as also argued by Druel et al. (2012) and Rochette et al. (2014).

Climate change provides an example of a global science policy interface that has access to one of the most comprehensive and thorough sources of scientific and technical information - the Intergovernmental Panel on Climate Change (IPCC). The IPCC is a scientific body under the auspices of the United Nations (UN). Established in 1988 jointly by UNEP and the WMO and endorsed that same year by the UN, it reviews and assesses the most recent scientific, technical and socio-economic information produced worldwide relevant to the understanding of climate change. It does not conduct any research nor does it monitor climate related data or parameters.

To date, the IPCC has generated five reports on the current state of knowledge regarding global climate change. The scientific evidence brought up by the first IPCC Assessment Report of 1990 underlined the importance of climate change as a challenge requiring international cooperation to tackle its consequences. It therefore played a decisive role in leading to the creation of the United Nations Framework Convention on Climate Change (UNFCCC), the key international treaty to reduce global warming and cope with the consequences of climate change. The IPCC has also responded to the need for information on scientific and technical matters from the UNFCCC and has provided methodologies and guidelines to help Parties to the UNFCCC prepare their national greenhouse gas inventories.

The IPCC Second Assessment Report of 1995 provided important material drawn on by negotiators in the run-up to adoption of the Kyoto Protocol in 1997. The Third Assessment Report came out in 2001 and the Fourth came out in 2007. The Fourth Assessment Report paid greater attention to the integration of climate change with sustainable development policies and relationships between mitigation and adaptation. The Fifth Report was released in March 2014 underscoring the severity of the climate change situation and focusing on adaptation through the lens of vulnerability and risk. The IPCC has organised its work to provide the 'best available scientific information' on climate change matters. In strict terms, the UNFCCC Subsidiary Body for Scientific and Technological Advice (SBSTA) is responsible for provision of timely information and advice on scientific and technological matters. It plays the role of linking the advisory outputs of the IPCC with the policy input needs of the UNFCCC COP.

The UN Regular Process²⁶ for the marine environment is a global initiative to develop a review and advisory process for oceans as a whole that will provide its inputs to the UN General Assembly. It was first conceived at the 2002 UN World Summit on Sustainable Development and taken up by the UNGA in 2003 with the aim of establishing the process by 2004 (UNGA 2003). The initial assessment, based on a survey of existing assessments²⁷ was completed in 2007 (UNEP 2007). In 2009, the UNGA (UNGA 2010) endorsed the following overall objective:

"The regular process under the United Nations would be recognized as the global mechanism for reviewing the state of the marine environment, including socioeconomic aspects, on a continual and systematic basis by providing regular assessments at the global and supraregional levels and an integrated view of environmental, economic and social aspects.

Such assessments would support informed decision-making and thus contribute to managing in sustainable manner human activities that affect the oceans and seas, in accordance with international law, including the United Nations Convention on the Law of the Sea and other applicable international instruments and initiatives.

The regular process would facilitate the identification of trends and enable appropriate responses by States and competent regional and international organizations.

The regular process would promote and facilitate the full participation of developing countries in all of its activities. Ecosystem approaches would be recognized as a useful framework for conducting fully integrated assessments."

The first cycle of the Regular Process is from 2010 to 2014 and will produce the first World Ocean Assessment (WOA). It is being overseen by an Ad Hoc Working Group of the Whole and carried out a Group of Experts with the assistance of a much larger pool of experts. The Division for Ocean Affairs and the Law of the Sea, Office of Legal Affairs, United Nations, has been designated by the General Assembly to act as the secretariat of the Regular Process.

²⁶ A Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socio-economic Aspects.

²⁷ Commonly referred to as the Assessment of Assessments.

The assessment takes a systems approach based on the DPSIR (drivers-pressures-state-impact-response) based on ecosystem services consistent with the approach of the Millennium Ecosystem Assessment (MEA). Whereas, this is clearly an important step towards sustainable use of the oceans it remains to be seen what the quality of the WOA will be, and its impact on decision-making absent a common purpose and set of operating principles shared by the relevant organizations and States

4.3.4 Overall observations on science-policy interfaces

This study can only illustrate the extent to which the suite of science-policy interfaces required for ‘use of best available scientific information’ in ocean governance exists or not, and the many forms it takes. Science-policy interfaces are required at the level of individual arrangements for effective adaptation of the arrangements to changing circumstances, as well as for management decision-making aimed at bringing about changes in behaviours and practices leading to ecosystems stresses. They are also required at the level of regional clusters, where it may be possible to take advantage of economies of scale, and add integration value, by developing advisory mechanisms that serve multiple decision-making mechanisms. Finally, they are required at the level of global-to-regional, issue-based networks within which sectoral policy is made.

The categorisation of science-policy interfaces for ocean governance, the extent to which they are functioning effectively and the factors that affect their functioning, will require targeted analysis. This should be aimed at the development and sharing of best practices (Holmes and Lock 2010, Runhaar and van Nieuwaal, 2010). There is a substantial body of literature and expertise in the area of science-policy interfaces, both in environmental arrangements and in other subject areas that could be brought to bear on this subject (e.g. van den Hove 2007, 2014, Carden 2009, Bauer and Stringer 2009, Kropp and Wagner 2010).

The findings suggest that some of the issues requiring further investigation could include:

- The extent to which the advisory mechanism is independent of the decision-making and implementation mechanisms;
- The extent to which policy advice tends to come from the same body that is providing technical/management advice;
- The extent to which science-policy interface processes are adaptable with regard to being able to change the questions that are being put to advice providers.

4.4 Linkages between ABNJ and regional architecture

As indicated in the introduction, UNCLOS notes that ‘the problems of ocean space are closely interrelated and need to be considered as a whole’. The questions to be addressed in this section are (1) whether the emerging governance architecture for marine areas under national jurisdiction and ABNJ indicates that there are two separate identifiable structures, and (2) whether such a dichotomy is thought to be desirable. Regarding the first question, the set of arrangements in the database reveals clearly that there is a substantial overlap between arrangements for AWNJ and those for ABNJ. This is the case also for the regional clusters, of which most include a variety of arrangements, some having mandates for AWNJ, others for ABNJ, and others with mandates for both. Considering, the large spatial scale of marine ecosystems and the openness of ecosystem boundaries in the sea, there does not appear to be a dichotomy. Notably, Large Marine Ecosystems (LMEs), which are considered to be large scale biophysically defined spatial units for marine EBM often include significant areas of ABNJ (Fanning et al. in press). Therefore, regional level management that takes LMEs into account must be able to deal with both areas within national jurisdiction and ABNJ.

With regard to the second question, given the connectivity and linkages among ocean issues, it could be most appropriate to perceive ocean governance arrangements globally as comprising a single set of nested multi-level arrangements structured as described in section 4 on ‘The emerging global structure of ABNJ governance’. This structure comprises a set of

global-to-regional issue-based networks complemented by regional clusters to facilitate regional level implementation needed to achieve EBM and to facilitate engagement with the regional political economies (Figure 8). This structure could reflect what is needed to address governance in both AWNJ and ABNJ. The key point to be made regarding the structure is that it is more advanced for areas within national jurisdiction, and weak for areas beyond national jurisdiction, particularly with regard to biodiversity.

From this perspective, the emphasis should then be on strengthening the existing set of global/regional arrangements to address deficiencies and fill gaps. This includes:

- Strengthening regional clusters (both mandate and capacity) to address issues in adjacent ABNJ.
- Strengthening the global level constituting and operational arrangements for biodiversity.
- Paying attention to structure that will facilitate processes needed to improve adaptive capacity.
- Exploring ways of strengthening lateral linkages among regional clusters.
- Subscribing to a general emerging set of principles, in particular conservation in addition to sustainable use, as well as the ecosystem and precautionary approaches, that cuts across AWNJ and ABNJ.

5 Discussion

This study has focused on the governance arrangements and architecture for ABNJ. It has taken a structural approach looking at the many arrangements that relate to governance of ABNJ and the way that they appear to be interrelated, globally and regionally. It has looked at the individual arrangements from the perspective of whether they appear to be established in such a way as to be able to carry out the full policy process thought to be needed for good governance. The study has also looked for any emerging organisational structure among arrangements at global and regional levels that may relate to governance functioning and that may also make it easier to understand and interact with global ocean governance. In this regard, particular attention was paid to science-policy interfaces, and the extent to which there appeared to be separate sets of governance arrangements for AWNJ and ABNJ. Finally, attention will be focused on the extent to which the perceived structure provides an opportunity for monitoring global ocean governance architecture.

5.1 Architecture and ‘good’ governance versus effectiveness

One of the key challenges in this study was to deal with governance arrangements and architecture, without venturing into the area of assessing governance effectiveness. This limitation was necessary because assessing governance effectiveness would require evaluation of outcomes and impacts that require substantial amount of physical, ecological, social and economic information in the indicator categories shown in Figure 2, over appropriate periods of time. Given the time and resources available for this study, this was not feasible. In this study, architecture is considered to provide the arena that facilitates the processes that are needed to achieve outcomes and impacts. There is also thought to be sufficient experience with architecture and process to support ideas of what characteristics they should reflect in order to facilitate ‘good governance’. Several of these characteristics are based on values and principles reflected in many multilateral agreements, including principles such as transparency, accountability, and inclusivity.

Much of what was assessed in the policy cycle scoring process can be considered as determining whether provisions for ‘good governance’ practices are in place. For example, having clearly specified processes and mechanisms across the seven policy cycle stages is seen as likely to improve transparency, accountability, and ease with which stakeholders can engage with the process. It is also likely to increase the potential for uptake of science in decision-making by providing the arena for iterative science-policy process. Ultimately, these characteristics may produce better governance results, and are often cited as being desirable

characteristics of governance processes, of value in their own right (Lemos and Agrawal 2006, Lockwood et al. 2010). However, the state of governance research is such that it is not possible to conclude clearly that these characteristics are necessary for governance to be effective. The degree to which good governance characteristics are correlated with effective governance remains an emerging area of research in the field of international governance.

It is likely that governance arrangements will be sufficiently context specific that it would be unwise to propose a definite link between 'good governance' and effectiveness (UNDP 2014). Therefore, monitoring the policy cycle stage scores, and overall completeness for the arrangements pertaining to ABNJ should be perceived only as monitoring the extent to which practices considered to reflect 'good governance' are in place. Indeed, the scores considered desirable for policy cycle stages may differ among individual arrangements such that each needs to set its own target level for monitoring. Over time, as variables relating to outcomes of governance are monitored, the extent to which 'good governance' and effectiveness are related will become better understood. Empirical studies to explore the connection between architecture, good governance, and effectiveness are much needed.

5.2 The global architecture for ocean governance

This study takes a holistic perspective in defining global architecture for ocean governance as comprising the entire set of arrangements and their interrelations. Laying out what is perceived as the structure is just a start in this regard. The global architecture to which we refer comprises complementary sets of global-to-regional, issue-based networks and regional clusters described previously. This structure may be seen as emerging but far from complete and with much dysfunctionality. It is essentially operating largely on one pillar of sustainable development, economic use, and missing much of the other pillars of environmental sustainability (with respect to biodiversity conservation) and social sustainability (at both intra- and intergenerational scales).

The perspective on global ocean governance architecture in this paper may have value for several groups of stakeholders. For those practitioners actively engaged in ocean governance at the global level, this architecture may already appear evident. However, articulating it in a form where it can be referred to, discussed, revised and further elaborated seems to have substantial potential to contribute to the discourse on ocean governance. For many practitioners operating within parts of the system there may not be the time or resources to avail themselves of the entire global picture. The perspective developed in this paper is expected to help build a global view on ocean governance by allowing practitioners in all parts of the system to see where their part fits in, how it compares to other parts, and where they may seek to build linkages that will strengthen their part and the whole system.

The third group that may benefit from the perspective in this paper, is those outside the system, or at its margins. These may be people from organisations with global perspectives on related issues such as finance and trade, who do not have the time to make sense of what may, from the outside, appear to be a very complex, disordered and fragmented set of arrangements for the ocean (Freestone 2010, Rothwell and Stephens 2010, Töpfer et al. 2014). They may also be donors or stakeholders seeking to engage with ocean governance but lacking a full understanding of its complexity.

It is hoped that the perspective provided here can move the global-regional ocean governance community towards a better understanding of what has been achieved over the past several decades, where the major gaps are, and what the critical next steps may be to address these gaps and strengthen the entire system. The ideas relating to networks, nesting of arrangements, the importance of scale and interplay among arrangements that inform this assessment are prominent in conceptual discourse on governance (Young 2002, Kooiman et al. 2005, Sorensen and Torfing 2007). These ideas are not totally abstract or academic, and many of the concepts underlying the perspective developed in this paper have been derived from scholars' analyses of global and regional regimes and regime clusters (Miles et al. 2002, Biermann et al. 2009, Biermann and Pattberg 2012). However, much of this thinking has failed

to gain traction in the world of practitioners and institution builders for global environmental governance. It is hoped that this study can make a contribution towards bringing those working at the conceptual level together with those responsible for making regimes work in practice.

The perspective of regional clusters is central to the overall structure as developed in this study. Their importance has also been highlighted recently by Gjerde et al. (2013) and Rochette et al. (2014). They are given special attention here, because the global-to-regional, issue-based networks have been the primary focus of global ocean governance thus far. The findings from this assessment on ocean governance architecture strongly suggest that there is the need to focus additional attention on the regional clusters in order for them to develop the functionality for good governance. Our findings suggest that these clusters may be essential, if scale appropriate EBM is to be achieved for the oceans. The regional clusters can be viewed as arenas for the interactions required for EBM. They could be seen as governance units that should be promoted and assessed as units. There are many facets to the structure and functionality of regional clusters. These include: the extent to which the arrangements that comprise them are geographically coherent (spatial overlap and fit); the functionality of the individual arrangements within the cluster (as per the assessments in the database); and linkages (interplay) among the arrangements comprising the cluster (including shared principles, etc.) These all need to become the focus of increased attention that seeks to build regional clusters within which there are shared values and principles, such as conservation of biodiversity, accountability, transparency, efficiency thought to be essential for “good governance”.

5.3 Assessment of current status – gaps and overlaps

The set of arrangements for ABNJ, the evaluation of the strengths of the policy processes, and the overall global structure elaborated in this report constitute an assessment of what is currently in place. This could be considered to be a baseline assessment of ocean governance architecture. There are, however, other aspects of governance architecture that could be pursued in order to develop a more comprehensive baseline. These include:

- Analysis of the spatial fit of arrangements and regional clusters to the spatial issues, for example the extent to which the multiple spatial aspects of biodiversity are covered at the global and regional levels in ABNJ;
- The extent to which there is spatial coherence among arrangements within a regional cluster.
- The extent of engagement of countries in arrangements, regional clusters and global networks as indicated by at least the signing of the arrangements, but additionally, by their engagement in processes;
- The extent to which there is progress within arrangements in moving towards EBM such as the adoption of EBM as a principle and/or establishment of EBM Working Groups.
- The extent to which there is a mechanism specified for integrating policy and management across issues within regional clusters and at the global level.
- The linkages among arrangements, or clusters of arrangements;

A spatial analysis of the fit of arrangements and clusters to the issues requires additional information on the distribution of ecosystems, resources, and sources of negative impacts. For fisheries, the distribution of fishery resources is well known, at least for ABNJ fisheries since these are largely commercial. Mapping these against the arrangements developed for their governance should be a relatively straightforward task. Spatial coverage of fisheries in ABNJ has been discussed by Molenaar (2005), Freestone (2012) and others. Coverage for HMS is essentially complete, provided by five well-established RFMOs (ICCAT, IATTC, IOTC, WCPFC, CCSBT). In contrast coverage for demersal fishery resources is much less complete, with the majority of the South Atlantic and North Pacific having no coverage, as well as smaller but significant areas in other oceans. Furthermore, RFMOs with responsibility for demersal resources in ABNJ are relatively recent.

The situation for ecosystems and biodiversity in ABNJ is much more complex and less advanced (Druel et al. 2012). Information on the distribution of marine ecosystems and the development of classification systems for them, and is at a relatively early stage in development. It was only in 2007 that classification of coastal and shelf regions into marine eco-regions appeared (Spalding, et al. 2007). Equivalents for ABNJ have only recently been developed (UNESCO 2009, Harris and Whiteway 2009, Rice et al. 2011, Spalding et al. 2012, Watling et al. 2013). The alternative to a comprehensive, zoning, approach to ecosystems and biodiversity in ABNJ, has been to encourage competent international organizations to apply the information available on EBSAs to design management measures capable of avoiding significant adverse impacts, but this approach has not gained traction as there is as yet no mechanism to encourage cooperation on biodiversity. For this reason, many governments, scientists and NGOs are proposing a new agreement under UNCLOS which would provide for a global level coordinating mechanism, establish common objectives and principles including ecosystem-based management, systems of marine protected areas, and procedures for environmental impact assessment, as well as to provide funding to incentivize cooperation and enhance the capacity of developing countries (Hart 2008, Druel and Gjerde 2014).

A spatial perspective on coverage of biodiversity in ABNJ, and indeed the ocean overall would provide a biased picture. While there are several global and regional arrangements with wide geographical coverage, they may be narrow in terms of the coverage of species or ecosystems, for example, the Agreement on the Conservation of Albatrosses and Petrels (ACAP), which is global but applies only to these species, the two sea turtle agreements for the Americas and Indian Ocean/Southeast Asia region or the polar bear agreement. The Ballast Water Convention is also global but provides coverage for a very specific issue; introduction of alien invasive species by ballast water discharge.

Gaps in pollution coverage of LBS and MBS at the regional level can be related to the extent to which Regional Seas conventions and their pollution related protocols are in place to address pollution within areas under national jurisdiction that can in most cases ultimately be transported into ABNJ. As can be seen from Table 7 and Figure 26 there are numerous significant gaps in coverage, many of them in areas of high coastal population and extensive marine activity.

The input of chemical pollutants to the ocean via atmospheric transport is a major area of concern (GESAMP 2012). The 1979 Convention on Long-range Transboundary Air Pollution which entered into force in 1983 addresses this issue for a limited number of countries globally, mainly those of Europe. This convention was not included in the analysis as it is much broader in scope than oceans. It still has only 51 parties, and several large countries with significant emissions have yet to join. The numbers of parties to the seven²⁸ protocols giving further effect to this convention range from 25 to 35. Engagement with and implementation of this convention and its protocols is a gap area for ocean pollution.

²⁸ The eighth protocol pertains to financing monitoring and has 46 parties.

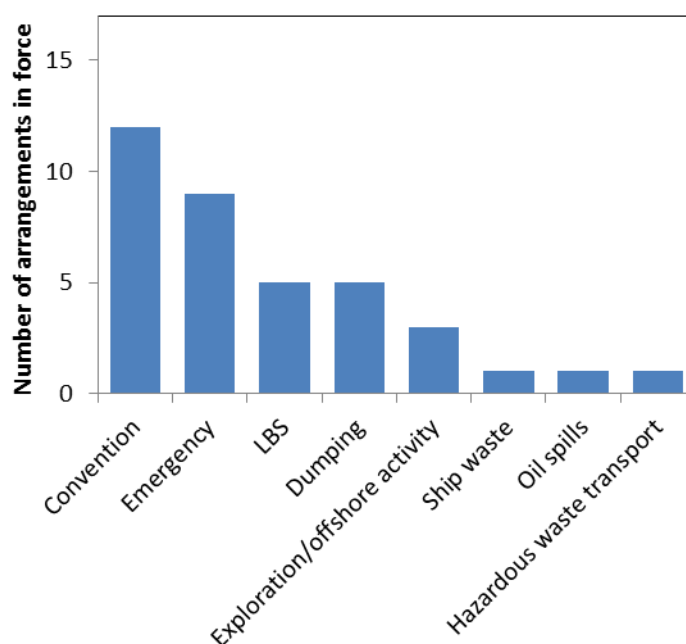


Figure 26. The numbers of Regional Seas Conventions and associated protocols for pollution in place for the 17 Regional Seas regions globally.

A comprehensive baseline for ocean governance architecture will also require considerably more detail on the structural aspects of the global framework for ocean governance described in this report. For example, the extent and nature of vertical and lateral interplay among arrangements is an important aspect of architecture that could not be adequately explored in this assessment. While the identification of networks and regional clusters is based on inferred linkages, a baseline that would provide a basis for monitoring change should include information on actual linkages. This requires a substantial investigation using approaches such as social network analysis.

5.4 Monitoring system

The two main purposes of the TWAP are to:

- (1) Develop a baseline for assessment of conditions in the five IW water categories
- (2) Put in place a system for monitoring these conditions at regular intervals.

The analysis presented in this report is considered to provide a minimal baseline against which to monitor the development and strengthening of the global architecture for ocean governance.

Ideally, a monitoring system will track the progress in a desired direction or towards a desired state, if this can be determined. In this case, it is more feasible to identify the desired direction for the various parts of ocean governance architecture, than to define a desired state. Changes that would be thought to reflect improvements in various parts of the overall architecture can be specified. The criteria for scoring the stages of the policy cycle provide indicators for individual arrangements. Desirable characteristics for regional clusters can be developed, as can those for the global-to-regional, issue-based networks. However, although general guidelines for improvement can be developed for these various parts of the architecture, explicit conclusions about the desired state for each part are likely to be context specific. Ideally, these should be developed through collaboration between governance experts and practitioners involved in that particular part of the governance system. Thus, the target

conditions that monitoring should track progress towards may differ widely among arrangements, regional clusters, and issue-based networks.

Whereas monitoring governance architecture can provide valuable information on the evolving context for governance processes, there is also the need to assess governance effectiveness. As already discussed, and illustrated in figure 2, effectiveness can only be evaluated on the basis of achieved outcomes such as reduced stresses, improved ecosystems, socially just solutions to problems, and improved human well-being.

6 Key conclusions and recommendations

The key conclusions of the study are:

- Normative characteristics representing ‘good governance’ can be assessed in ocean governance arrangements as a basis for targeting interventions and monitored improvements, but ‘good governance’ may be context specific.
- There are significant gaps in coverage of the issues for ABNJ particularly for biodiversity, but also to a lesser extent for pollution and fisheries for straddling and demersal stocks.
- The entire set of governance arrangements for ABNJ and areas within national jurisdiction may be best approached as a single global ocean governance structure.
- The perspective of the single global ocean governance structure as comprising ‘global-regional issue-based networks’ and ‘regional clusters’ provides a framework that may help to improve understanding of the very complex, disordered and fragmented set of arrangements for the ocean.

Based on the analysis conducted for this study, recommendations can be made in three areas:

- (1) Individual arrangements
- (2) Regional clusters
- (3) Global-to-regional issue-based networks.

At the level of individual arrangements, there is the need to support monitoring of the extent to which ‘good governance’ practices are observed and to link them with an understanding of how they relate to governance effectiveness. Monitoring of good governance should be arrangement context specific, but nevertheless based on a common set of criteria. The refinement of ‘good governance’ criteria at the arrangement level will be an iterative process.

Strengthening regional clusters of agreements, particularly so that they can undertake EBM in offshore waters and ABNJ, is seen as a critical component of strengthening ABNJ governance. This will include promotion of integration mechanisms, improvement of interplay among arrangements within clusters, as well as building new linkages with regional multipurpose organisations to increase political understanding of and support for ocean governance. Clearly this will also strengthen governance in AWNJ.

A focus on vertical interplay between regional and global processes and the capacity to integrate at the global policy level is also required. However, the proposal for an UNCLOS Implementing Agreement, if it sets forth the conditions necessary for effective interplay, i.e. non-hierarchical organizations operating in sync based on a common purpose and set of principles, could improve vertical as well as regional horizontal interplay for the key issue of biodiversity (Druel and Gjerde 2014).

Three key recommendations from ‘A blueprint for ocean and coastal sustainability’ (UNESCO-IOC, IMO, FAO, UNDP, 2011) are:

- Create and implement an institutional and legal framework to protect, conserve and sustainably manage ecosystems and biodiversity beyond national jurisdiction
- Reform Regional Fisheries Management Organisations

- Enhance coordination, coherence and effectiveness of the UN System on oceans issues

The findings and conclusions of this report are consistent with these recommendations but this report goes further in identifying a global ocean governance framework within which these recommendations can be pursued to achieve all three pillars of sustainable development.

7 References

- Baldwin, K. and R. Mahon. 2014. Spatial analysis of ocean governance at the global level: Spatial data availability, accuracy, coordinate systems and considerations for practice. Centre for Resource Management and Environmental Studies, The University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 74: 18pp.
- Ban, N. C., N. J. Bax, K. M. Gjerde, R. Devillers, D. C. Dunn, P. K. Dunstan, A. J. Hobday, S. M. Maxwell, D. M. Kaplan, R. L. Pressey, J. A. Ardron, E. T. Game and P. N. Halpin. 2014. Systematic conservation planning: A better recipe for managing the high seas for biodiversity conservation and sustainable use. *Conservation Letters*, 7: 41–54.
- Bauer, S. and L. C. Stringer. 2009. The role of science in the global governance of desertification. *The Journal of Environment and Development*, 18: 248-267
- Biermann, F. 2007. 'Earth system governance' as a crosscutting theme of global change research. *Global Environmental Change*. 17: 326-337.
- Biermann, F. and P. Pattberg [eds]. 2012. *Global environmental governance reconsidered*. MIT Press, Cambridge.
- Biermann, F., O. Davies and N. van der Grijp. 2009. Environmental policy integration and the architecture of global environmental governance. *International Environmental Agreements* 9: 351–369
- Breitmeier, H., O. R. Young and M. Zurn 2006. *Analysing international environmental regimes: from case study to database*. MIT Press, London, 321 pp.
- Carden, F. 2009. *Knowledge to policy: making the most of development research*. International Development Research Centre, Ottawa, Canada
- Ceo, M., S. Fagnani, J. Swan, K. Tamada, and H. Watanabe. 2012. Performance reviews by Regional Fishery Bodies: Introduction, summaries, synthesis and best practices, Volume I: CCAMLR, CCSBT, ICCAT, IOTC, NAFO, NASCO, NEAFC. *FAO Fisheries and Aquaculture Circular*. No.1072. Rome, FAO. 2012. 92 pp.
- Crowder, L. B., G. Osherenko, O. R. Young, S. Aïramé, E. A. Norse, N. Baron, J. C. Day, F. Douvère, C. N. Ehler, B. S. Halpern, S. J. Langdon, K. L. McLeod, J. C. Ogden, R. E. Peach, A. A. Rosenberg and J. A. Wilson. 2006. Resolving mismatches in U.S. ocean governance. *Science* 213: 617-618.
- Dietz, T., E. Ostrom, and P. C. Stern. 2003. The Struggle to Govern the Commons, *Science*, 2003, 302 (5652), 1907-1912.
- Druel, E. 2012. Ecologically or Biologically Significant Marine Areas (EBSAs): the identification process under the Convention on Biological Diversity (CBD) and possible ways forward, Working Paper N°17 /12, IDDRI, Paris, France, 24 pp.
- Druell, E. and K. Gjerde. 2014. Sustaining marine life beyond boundaries: Options for an implementing agreement for marine biodiversity beyond national jurisdiction under the United Nations Convention on the Law of the Sea. *Marine Policy* 49: 90–97.
- Druel, E., Rochette, J., Billé, R., Chiarolla, C. 2012. A long and winding road. International discussions on the governance of marine biodiversity in areas beyond national jurisdiction, *Studies* N°07/13, IDDRI, Paris, France, 42 pp.

- Duda, A. 2002. Monitoring and Evaluation Indicators for GEF International Waters Projects. Global Environment Facility Monitoring and Evaluation Working Paper 10: 11 pp.
- Duda, A. and A. C.Hume. 2013. A new imperative to harness sound science in the GEF International Waters focal area. *Environmental Development* 7: 102-108.
- Fanning, L., R. Mahon, K. Baldwin and S. Douglas. In press. Transboundary Waters Assessment Programme (TWAP) Assessment of Governance Arrangements for the Ocean: Vol 1 – Transboundary Large Marine Ecosystems. IOC Technical Series 115.
- Fanning, L., R. Mahon, P. McConney, J. Angulo, F. Burrows, B. Chakalall, D. Gil, M. Haughton, S. Heileman, S. Martinez, L. Ostine, A. Oviedo, S. Parsons, T. Phillips, C. Santizo Arroya, B. Simmons, C. Toro. 2007. A large marine ecosystem governance framework. *Marine Policy* 31: 434–443.
- FAO. 1999. Report of the meeting of FAO and non-FAO regional fishery bodies or arrangements. Rome, 11-12 February 1999. FAO Fisheries Report. No.597. Rome, FAO. 1999. 53pp.
- FAO. 2007. Report of the First Meeting of Regional Fishery Body Secretariats Network. Rome, 12–13 March 2007. FAO Fisheries Report. No. 837. Rome, FAO. 2007. 38pp.
- FAO. 2013. What is COFI? See <http://www.fao.org/fishery/about/cofi/en>. Accessed December 15, 2013.
- Freestone, D. 2010. Problems of High Seas governance. Pp 99-124, In: The world ocean in globalisation. D. Vidas and P. J. Schei [Eds]. Martinus Nijhoff,
- Freestone, D. 2011. Fisheries commissions and organisations. Max Planck Encyclopedia of Public International Law [MPEPIL]
- Garibaldi, L. and L. Limongelli. 2003. Trends in oceanic captures and clustering of large marine ecosystems: two studies based on the FAO capture database. Fisheries Technical paper 435, Rome, Italy, 2003.
- GESAMP. 2001. The state of the marine environment. Group of experts on the scientific aspects of marine pollution. Regional Seas Reports and Studies, Nairobi, UNEP.
- GESAMP. 2005. The new GESAMP: Science for Sustainable Oceans: A strategic vision for the IM0/FA0/UNESCO-IOC/WM0/WH0/IAEA/UN/ UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection. London, IM0. 21pp.
- GESAMP. 2012. The Atmospheric Input of Chemicals to the Ocean. Rep. Stud. GESAMP No. 84/GAW Report No. 203. 69 pp.
- Gjerde K. M, D. Currie, K. Wowk, K. Sack. 2013. Ocean in peril: Reforming the management of global ocean living resources in areas beyond national jurisdiction. *Marine Pollution Bulletin* 74: 540–551.
- Gjerde K. M., H. Dotinga, S. Hart, E. J. Molenaar, R. Rayfuse and R. Warner. 2008a. Regulatory and governance gaps in the international regime for the conservation and sustainable use of marine biodiversity in Areas beyond National Jurisdiction. IUCN, Gland, Switzerland. x + 70.
- Gjerde K. M., H. Dotinga, S. Hart, E. J. Molenaar, R. Rayfuse and R. Warner. 2008b. Options for addressing regulatory and governance gaps in the international regime for the conservation and sustainable use of marine biodiversity in Areas Beyond National Jurisdiction. IUCN, Gland, Switzerland. x + 20.
- Global Ocean Commission. 2013. Modernising ocean governance. Policy Options Paper # 10, 10 pp.

- Harris, P. T. and T. Whiteway. 2009. High seas marine protected areas: Benthic environmental conservation priorities from a GIS analysis of global ocean biophysical data. *Ocean & Coastal Management* 52 (2009) 22–38.
- Hart, S. 2008. Elements of a possible implementation agreement to UNCLOS for the conservation and sustainable use of marine biodiversity in Areas beyond National Jurisdiction. IUCN, Gland, Switzerland. x + 21
- Holmes, J., and R. Clark. 2008. Enhancing the use of science in environmental policy-making and regulation. *Environmental Science and Policy* 11:702–711.
- Holmes J. and J. Lock. 2010. Generating the evidence for marine fisheries policy and management. *Marine Policy* 34:29-35.
- IISD 2013a. Summary of the sixth meeting of the Working Group on Marine Biodiversity beyond Areas of National Jurisdiction: 19-23 august 2013. IISD Briefing Note on the WG on Marine Biodiversity. International Institute for Sustainable Development , New York, New York. 4 pp.
- IISD. 2013b. Summary of the first plenary meeting of the Intergovernmental Platform on Biodiversity and Ecosystem Services: 21-26 January 2013. *Earth Negotiations Bulletin*, 31 (6): 1-14.
- IPCC. 2014. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Draft Report.
- Jeftic, L., P. Glennie, L. Talaue-McManus and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, Nairobi, 61 pp.
- Klúvanková-Oravská, T. and V. Chobotová. 2012. Regional governance arrangements. Pp 219-235. In: F.Biermann and P. Pattberg. [eds]. *Global environmental governance reconsidered*. MIT press, Cambridge
- Koehler, H. 2013. Promoting Compliance in Tuna RFMOs: A Comprehensive Baseline Survey of the Current Mechanics of Reviewing, Assessing and Addressing Compliance with RFMO Obligations and Measures. ISSF Technical Report 2013-02. International Seafood Sustainability Foundation, McLean, Virginia, USA. 53 pp.
- Kropp, C. and J. Wagner. 2010. Knowledge on stage: scientific policy advice. *Science, Technology, & Human Values* 35(6) 812-838.
- Lemos, M. C., and A. Agrawal. 2006. Environmental governance. *Annual Review of Environment and Resources* 31:297–325.
- Levy, M. A. O R. Young and M. Zürn. 1995. The study of international regimes. *European Journal of International Relations* 1: 267-330.
- Lockwood, M., J. Davidson, A. Curtis, E. Stratford and R. Griffith. 2010. Governance principles for natural resource management. *Society and Natural Resources*, 23:1–16
- Mahon, R, L. Fanning and P. McConney. 2011a. Observations on governance in the Global Environment Facility (GEF) International Waters (IW) Programme. CERMES Technical Report No. 45, 36 p. (www.cavehill.uwi.edu/cermes)
- Mahon, R., L. Fanning, and P. McConney. 2011b. TWAP common governance assessment. Pp. 55-61. In: L. Jeftic, P. Glennie, L. Talaue-McManus, and J. A. Thornton (Eds.). Volume 1. Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme, United Nations Environment Programme, Nairobi, 61 pp.
- Mahon, R., A. Cooke, L. Fanning and P. McConney. 2013. Governance arrangements for marine ecosystems of the Wider Caribbean Region. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados. CERMES Technical Report No 60. 99pp.

- McConney, P., L. Fanning, R. Mahon and B. Simmons. 2012. Survey of the regional science-policy interface for ocean governance in the Wider Caribbean Region. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados, CERMES Technical Report No 51. 46pp.
- Mee, L. and Z. Adeel. 2012. Science-policy bridges over troubled waters – making science deliver greater impacts in shared water systems. United Nations University Institute for water, Environment and Health, Hamilton, Canada. 48 pp.
- Miles, E. L., A. Undrdal, S. Andresen, J. Wettestad, J. B. Skjaereth and E. M. Carlin. 2002. Environmental regime effectiveness: confronting theory with evidence. MIT Press, Cambridge.
- Mitchell, R. B., W. C. Clark, D. W. Cash and N. M. Dickson [Eds]. 2006. Global Environmental Assessments: Information and Influence. MIT Press, Cambridge, 352 pp.
- Molenaar, E. J. 2005. Addressing regulatory gaps in high seas fisheries. *The International Journal of Marine and Coastal Law*, 20, (3–4): 533-570.
- Murillas-Maza, A., J. Virto, M. C. Gallastegui, P. González, J. Fernández-Macho. 2011. The value of open ocean ecosystems: A case study for the Spanish exclusive economic zone. *Natural Resources Forum*, 35: 122–133.
- Oberthur, S. 2009. Interplay management: enhancing environmental policy integration among international institutions. *International Environmental Agreements* 9:371–391
- Oberthur, S. and T. Gehring. [Eds] 2006. Institutional interaction in global environmental governance. MIT Press, Cambridge, 405 pp.
- Orsini, A., J.-F. Morin and O. Young. 2013. Regime complexes: a buzz, a boom, or a boost for global governance? *Global Governance* 19: 27–39.
- Ostrom, E. 2010. Polycentric systems for coping with collective action and global environmental change. *Global Environmental Change* 20 (2010) 550–557.
- Rice, J., K. M. Gjerde, J. Ardron, S. Aricod, I. Cresswell, E. Escobar, S. Grant and M. Vierro. 2011. Policy relevance of biogeographic classification for conservation and management of marine biodiversity beyond national jurisdiction, and the GOODS biogeographic classification. *Ocean & Coastal Management* 54 (2011) 110-122.
- Rochette J., S. Unger, D. Herr, D. Johnson, T. Nakamura, T. Packeiser, A. Proelss, M. Visbeck, A. Wright and D. Cebrian. 2014. The regional approach to the conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction. *Marine Policy* 49: 109–117.
- Rothwell, D. R. and T. Stephens. 2010. *The international law of the sea*. Hart Publishing, Oxford, 499 pp.
- Runhaar, H. and K. van Nieuwaal. 2010. Understanding the use of science in decision-making on cockle fisheries and gas mining in the Dutch Wadden Sea: Putting the science-policy interface in a wider perspective. *Environmental Science and Policy* 13: 239–248
- Sherman, K. and A.M. Duda. 1999. An ecosystem approach to global assessment and management of coastal waters. *Marine Ecology Progress Series* 190: 271–87.
- Söderbaum, F. and J. Granit. 2014. The political economy of regionalism: The relevance for International Waters and the Global Environment Facility: A STAP Issues Paper. Global Environment Facility, Washington, D.C.
- Sorensen, E. and J. Torfing. 2007. *Theories of democratic network governance*. Palgrave Macmillan, New York, 356 pp.
- Spalding, M. D. et al. 2007. Marine Ecoregions of the World: A Bioregionalization of Coastal and Shelf Areas. *BioScience* 57 (7): 573-583.

- Spalding, M. D., V. N. Agostini, J. Rice, S. M. Grant. 2012. Pelagic provinces of the world: A biogeographic classification of the world's surface pelagic waters. *Ocean & Coastal Management*, 60: 19-30.
- Stokke, O. S. [Ed]. 2001. *Governing high seas fisheries: The interplay of global and regional regimes*. Oxford: Oxford University Press.
- Stokke, S., O. Schram and S. Oberthur. [Eds]. 2011. *Managing institutional complexity: Regime interplay and global environmental change*. MIT Press, Cambridge, 405 pp.
- Swan, J. 2004. Decision-making in regional fishery bodies or arrangements: the evolving role of RFBs and international agreement on decision-making processes. *FAO Fisheries Circular*. No. 995. Rome, FAO. 82pp.
- Töpfer, K., L. Tubiana, S. Unger and J. Rochette. 2014. Charting pragmatic courses for global ocean governance. *Marine Policy* 49 (2014) 85–86.
- UN Secretary General. 2012. *The Oceans Compact: Healthy oceans for prosperity*. United Nations, New York, 8 pp.
- UNDP, 2014. *Governance for Sustainable Development: Integrating Governance in the Post-2015 Development Framework*. United Nations Development Programme, New York, 14pp.
- UNEP. 2012. *21 Issues for the 21st Century: Result of the UNEP Foresight Process on Emerging Environmental Issues*. United Nations Environment Programme (UNEP), Nairobi, Kenya, 56pp.
- UNEP. 2010. *Modalities for advancing cross-sectoral cooperation in managing marine areas beyond national jurisdiction*. Discussion paper, 12th Global Meeting of the Regional Seas Conventions and Action Plans, Bergen, Norway, 20th – 22nd September 2010. UNEP (DEPI)/RS.12 /8, 27 pp.
- UNEP. 2007. *Global Marine Assessments: A survey of global and regional assessments and related activities of the marine environment*. UNEP/UNESCO-IOC/UNEP-WCMC.
- UNEP. 2006. *Marine and coastal ecosystems and human wellbeing: A synthesis report based on the findings of the Millennium Ecosystem Assessment*. UNEP. 76 pp.
- UNEP/GPA. 2006. *Implementation of the GPA at regional level: The role of regional seas conventions and their protocols*. UNEP/GPA, The Hague: 31 pp.
- UNEP-MAP-RAC/SPA. 2011. *Note on the establishment of marine protected areas beyond national jurisdiction or in areas where the limits of national sovereignty or jurisdiction have not yet been defined in the Mediterranean Sea*. RAC/SPA, Tunis: 54pp.
- UNESCO. 2009. *Global Open Oceans and Deep Seabed (goods) – biogeographic classification*, Paris, UNESCO-IOC. (IOC Technical Series, 84.) Vierros, M., Cresswell. I., Escobar Briones, E., Rice, J., Ardron, J. (Eds). Submitted to 25th Session of the IOC Assembly, June 2009, 96 pp.
- UNESCO-IOC, 2011a. *Methodology for the GEF Transboundary Waters Assessment Programme. Volume 5. Methodology for the Assessment of Large Marine Ecosystems*, United Nations Environment Programme, Nairobi, viii + 115 pp.
- UNESCO-IOC, 2011b. *Methodology for the GEF Transboundary Waters Assessment Programme. Volume 6. Methodology for the Assessment of the Open Ocean*, United Nations Environment Programme, Nairobi, vi + 71 pp.
- UNESCO-IOC, IMO, FAO, UNDP. 2011. *A blueprint for ocean and coastal sustainability*. UNESCO-IOC, Paris, 42 pp.
- UNGA. 2010. *Resolution 64/71 - Oceans and the law of the sea*. United Nations General Assembly RES 64/71: 53 pp.

- UNGA. 2003. Resolution 57/141 - Oceans and the law of the sea. United Nations General Assembly RES/57/141: 13 pp.
- United Nations. 2012. The Future We Want: Outcome document adopted at Rio+20. 49 pp.
- UNDP. 2014. Governance for Sustainable Development: Integrating Governance in the Post-2015 Development Framework. United Nations Development Programme, New York, 14pp.
- van den Hove, S. 2007. A rationale for science–policy interfaces. *Futures* 39: 807–826
- Vidas, D. and M. Markovcic Kostelac. 2011. Ballast water and alien species: regulating global transfers and regional consequences. Pp 373392. In: *The world ocean in globalisation*. D. Vidas and P. J. Schei [Eds]. Martinus Nijhoff,
- Vousden, D. and J. Stapley. 2013. Evolving new governance approaches for the Agulhas and Somali Current Large Marine Ecosystems through dynamic management strategies and partnerships. *Environmental Development* 7: 32–45.
- Warner, R. 2012. Oceans beyond Boundaries: Environmental Assessment Frameworks. *The International Journal of Marine and Coastal Law* 27: 481–499.
- Watling, L., J. Guinotte, M. R. Clark, C. R. Smith. 2013. A proposed biogeography of the deep ocean floor. *Progress in Oceanography* 111: 91–112.
- World Bank. 2014. Global Oceans Action Summit for Food Security and Blue Growth: Chair's Summary. The World bank, Washington DC. 51 pp.
- Wright, A., N. Stacey and P. Holland. 2006. The cooperative framework for ocean and coastal management in the Pacific Islands: Effectiveness, constraints and future direction. *Ocean & Coastal Management* 49, 739-763.
- Young, O. R. 2013. Effectiveness of international environmental regimes: Existing knowledge, cutting-edge themes, and research strategies. *Proceedings of the National Academy of Sciences*.
- Young, O. R. 2002. *The institutional dimensions of environmental change: fit interplay and scale*. MIT Press, Cambridge, MA, 221 pp.
- Young O. R. [Ed]. 1999. *The effectiveness of international environmental regimes: causal connections and behavioural mechanisms*. MIT Press, Cambridge, MA.
- Young, O. R., G. Osherenko, J. Ekstrom, L. B. Crowder, J. Ogden, J. A. Wilson, J. C. Day, F. Douvère, C. N. Ehler, K. L. McLeod, B. S. Halpern and R. Peach. 2007. Solving the crisis in ocean governance: place-based management of marine ecosystems. *Environment*, 49 (4): 20–32.
- Zahran, M. M., and T. Inomata. 2012. Evaluation of UN-Oceans. Joint Inspection Unit, United Nations, Geneva, JIU/REP/2012/3: 34 pp.

Appendix 1. List of arrangements included in the database

(CN = constituting, OP = operational, P = pollution, F = Fisheries, B = biodiversity, C = climate change.

Acronym/Short name	Full name	Type	Issues
Abidjan Convention	Abidjan Convention for Co-operation in the protection and Development of the Marine and Coastal Environment of the West and Central African Region	CN	P
Abidjan Convention - Emergency Protocol	Protocol on Cooperation in Combating Pollution in Cases of Emergency and the associated Action Plan for the Protection and Development of the Marine Environment and Coastal Areas of the West and Central African Region	OP	P
Abidjan Convention - LBS Protocol	Protocol concerning Cooperation in the Protection and Development of the Marine and Coastal Environment from land-Based Sources and the Activities	OP	P
ACAP	Agreement on the Conservation of Albatrosses and Petrels	OP	B
Anti-fouling convention	The International Convention on the Control of Harmful Anti-fouling Systems on Ships	OP	P
Antigua Convention	Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific	CN	FPB
APFIC	Asia Pacific Fisheries Commission	OP	F
Arctic Council	Arctic Council	OP	FPBC
ATS	Antarctic Treaty System	CN	FP
ATS Environment Protocol	Protocol on Environmental Protection to The Antarctic Treaty	OP	P
Barcelona Convention	Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean	CN	P
Barcelona Convention - Dumping Protocol	Protocol for the Prevention of Pollution in the Mediterranean Sea by Dumping from Ships and Aircraft	OP	P
Barcelona Convention - Hazardous Wastes Protocol	Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal	OP	P
Barcelona Convention - LBS Protocol	Protocol on the Protection of the Mediterranean Sea against Pollution from Land-Based Sources	OP	P
Barcelona Convention - Offshore Protocol	Protocol for the Protection of the Mediterranean Sea against Pollution Resulting from Exploration and Exploitation of the Continental Shelf and the Seabed and its Subsoil	OP	P

Acronym/Short name	Full name	Type	Issues
Barcelona Convention - Prevention and Emergency Protocol	Protocol Concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea	OP	P
Barcelona Convention - SPA and Biodiversity Protocol	Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean	OP	B
BOBP-IGO Agreement	Agreement on the Institutionalisation of the Bay of Bengal Programme as an Inter-Governmental Organisation	OP	F
Bucharest Convention	Convention on the Protection of the Black Sea against Pollution	CN	P
Bucharest Convention - Dumping protocol	Protocol on dumping of waste	OP	P
Bucharest Convention - Emergency Protocol	Protocol on joint action in the case of accidents (such as oil spills)	OP	P
Bucharest Convention - LBS Protocol	Protocol on the control of land-based sources of pollution	OP	P
BWMC	International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Management Convention)	OP	P
Cartagena Convention	Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention)	CN	P
Cartagena Convention - LBS Protocol	Cartagena Convention Protocol Concerning Pollution from Land-Based Sources and Activities	OP	P
Cartagena Convention – Oil Spills Protocol	Cartagena Convention Protocol Concerning Co-operation in Combating Oil Spills	OP	P
CBD	Convention on Biological Diversity	CN	B
CCAMLR	Convention for the Conservation of Antarctic Marine Living Resources	OP	FB
CCAS	Convention for the Conservation of Antarctic Seals	OP	B
CCBSP	Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea	OP	F
CCSBT	Convention for the Conservation of the Southern Bluefin Tuna	OP	F
CECAF	Fishery Committee for the Eastern Central Atlantic	OP	F
CITES	Convention on International Trade in Endangered Species	OP	FB
CMS	Convention on Migratory Species	CN	FB

Acronym/Short name	Full name	Type	Issues
COMHAFAT	Ministerial Conference on Fisheries Cooperation among African States Bordering the Atlantic (COMHAFAT or ATLAFCO)	OP	F
FAO Compliance Convention	The Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas - 1993	OP	F
FFAC	Pacific Islands Forum Fisheries Agency/South Pacific Forum Fisheries Agency Convention	OP	F
GFCM Agreement	Agreement for the establishment of the General Fisheries Commission for the Mediterranean	OP	F
GPA	Global Programme of Action for the Protection of the Marine Environment from Land-based Activities	CN	P
HELCON	Convention on the Protection of the Marine Environment of the Baltic Sea Area - Helsinki Convention	OP	PB
Hong Kong Convention	Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships	OP	P
HSDN	United Nations Resolution on High Seas Drift Netting	OP	F
IAC	Inter-American Convention for the Protection and Conservation of Sea Turtles	OP	B
IATTC	Convention for the Strengthening of the Inter-American Tropical Tuna Commission	OP	F
ICCAT	International Convention for the Conservation of Atlantic Tunas	OP	F
ICES	International Council for the Exploration of the Sea	OP	FPBC
IOTC	Agreement for the establishment of the Indian Ocean Tuna Commission	OP	F
IPHC	International Pacific Halibut Commission (IPHC)/Convention for the Preservation of the Halibut Fishery	OP	F
IWC	International Convention for the Regulation of Whaling	OP	F
Jeddah Convention	Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment	CN	P
Jeddah LBS Protocol	Protocol Concerning the Protection of the Marine Environment from Land-Based Activities in the Red Sea and Gulf of Aden	OP	P
Jeddah Oil Pollution Protocol	Protocol concerning Regional Cooperation in Combating Pollution by Oil and Other Harmful Substances in cases of Emergency	OP	P
Kuwait Continental Shelf Exploitation Protocol	Protocol Concerning Marine Pollution Resulting from Exploration and Exploitation of the Continental Shelf	OP	P
Kuwait Convention	Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution – Kuwait Convention	CN	P

Acronym/Short name	Full name	Type	Issues
Kuwait Convention - Hazardous Wastes Protocol	Protocol on the Control of Marine transboundary movements and disposal of hazardous wastes and other wastes, 1998	OP	P
Kuwait Convention - LBS Protocol	Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution – Kuwait Convention	OP	P
Kuwait Convention - Oil Spills Protocol	Protocol concerning regional cooperation in combating pollution by oil and other harmful substances in cases of emergency, 1978	OP	P
Lima Convention	Convention for the Protection of the Marine Environment and Coastal Areas of the South-East Pacific	CN	P
Lima Convention - Hydrocarbons Protocol	Lima Agreement on Regional Cooperation in Combating Pollution in the South East Pacific by Hydrocarbons and other Harmful Substances in cases of Emergency	OP	P
Lima Convention - LBS Protocol	Lima Protocol for the Protection of the South East Pacific Against Pollution from Land- Based Sources	OP	P
Lima Convention - Radioactive Pollution Protocol	Lima Protocol for the Protection of the South East Pacific from Radioactive Pollution	OP	P
London Convention	London Convention (1975)	OP	P
London Convention - Protocol	London Convention Protocol (2006)	OP	PC
MARPOL	International Convention for the Prevention of Pollution from Ships (MARPOL) Annexes I - VI	OP	P
Montreal Protocol	The Montreal Protocol on Substances that Deplete the Ozone Layer	OP	P
NAFO	Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries	OP	F
Nairobi Convention	Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment of the West Indian Ocean	CN	P
Nairobi Convention - Emergency Protocol	Protocol Concerning Co-operation in Combating Marine Pollution in Cases of Emergency in the Eastern African Region	OP	P
Nairobi Convention - LBS Protocol	Protocol for the Protection of the Marine and Coastal Environment of the Western Indian Ocean from Land-Based Sources and Activities	OP	P
NAMMCO	Agreement on Cooperation in Research, Conservation and Management of Marine Mammals in the North Atlantic	OP	FB

Acronym/Short name	Full name	Type	Issues
NASCO	Convention for the Conservation of Salmon in the North Atlantic Ocean	OP	F
NEAFC	North-East Atlantic Fisheries Commission	OP	F
Niue Treaty/NTSA	Niue Treaty on Cooperation in Fisheries Surveillance and Law Enforcement in the South Pacific Region and Multilateral NTSA Agreement on Strengthening Implementation of the Niue Treaty	OP	F
Noumea Convention	Convention for the Protection of the Natural Resources and Environment of the South Pacific	CN	PBC
Noumea Convention - Dumping Protocol	Protocol for the Prevention of Pollution of the South Pacific Region by Dumping	OP	P
Noumea Convention - Emergency Protocol	Protocol Concerning Co-operation in Combating Pollution Emergencies in the South Pacific Region	OP	P
NPAFC	Convention for the Conservation of Anadromous Stocks in The North Pacific Ocean	OP	F
OPRC 90	International Convention on Oil Pollution Preparedness, Response and Co-operation 1990	OP	P
OSPAR Convention	Convention for the Protection of the Marine Environment of the North-East Atlantic	OP	BP
PICES	The North Pacific Marine Science Organization	OP	FPBC
PIF/POF/PIROP	Pacific Islands Forum/Pacific Oceanspace Framework/Pacific Islands Regional Oceans Policy	OP	FPBC
PNA	Nauru Agreement Concerning Cooperation in the Management of Fisheries of Common Interest	OP	F
Polar Bear	Agreement on the Conservation of Polar Bears	OP	B
PSC	Treaty Between the Government of the United States of America and the Government of Canada concerning Pacific Salmon	OP	F
SCAR	Scientific Committee on Antarctic Research	OP	FPBC
SEAFDEC	South East Asian Fisheries Development Center	OP	F
SEAFO	The Convention on the Conservation and Management of Fishery Resources in the South East Atlantic Ocean	OP	FB
SIOFA	South Indian Ocean Fisheries Agreement	OP	FB
SPC	Secretariat of the Pacific Community (initially South Pacific Commission)	OP	F
SPRFMO	Convention on the Conservation and Management of High Seas Fishery Resources in the South Pacific Ocean	OP	F
Stockholm Convention	Stockholm Convention on Persistent Organic Pollutants	OP	P
UNCLOS	United Nations Convention on the Law of the Sea	CN	FPB
UNCLOS - Seabed Agreement	Agreement relating to the implementation of Part XI of the United Nations Convention on the Law of the Sea.	OP	PB

Acronym/Short name	Full name	Type	Issues
UNFCC	United Nations Framework Convention on Climate Change	CN	C
UNFCC - Kyoto Protocol	Kyoto Protocol to the United Nations Framework Convention on Climate Change	OP	C
UNFSA	UN Fish Stocks Agreement	CN	FB
Vienna Convention	The Vienna Convention for the Protection of the Ozone Layer	CN	P
WCPFC	Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean	OP	F
WECAFC	Western Central Atlantic Fisheries Commission	OP	FB
Wellington Convention (SP Drift Nets)	Convention for the Prohibition of Fishing with Long Drift Nets in the South Pacific	OP	F

Appendix 2: Acronyms for other organisations and regional agreements

Acronym/Short name	Full name
ASCOBANS	Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas
ACCOBAMS	Agreement on the Conservation of Cetaceans in the Black Sea Mediterranean Sea and Contiguous Atlantic Area
APEC-OFWG	Asia-Pacific Economic Cooperation (APEC) Oceans and Fisheries Working Group (OFWG)
ASEAN	Association of Southeast Asian Nations
ASEAN/ASWGF	Association of Southeast Asian Nations
BBNJ	UN Working Group on Marine Biodiversity beyond Areas of National Jurisdiction
BCC	Benguela Current Commission
BIMSTEC	Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) Working Committee on Fisheries
CARICOM	Caribbean Community and Common Market
CARPHA	Caribbean Public Health Agency
CBSS	Council of the Baltic Sea States
CCAD	La Comisión Centroamericana de Ambiente y Desarrollo
COBSEA	Coordinating Body on the Seas of East Asia
COFI	FAO Committee on Fisheries
COREP	Convention Concerning the Regional Development of Fisheries in the Gulf of Guinea and the Regional Fisheries Committee for the Gulf of Guinea (COREP)
CPPS	Permanent Commission of the South Pacific
CRFM	Caribbean Regional Fisheries Mechanism
CRFM	Agreement establishing the Caribbean Regional Fisheries Mechanism (CRFM)
CROP	Council of Regional Organisations of the Pacific
CROP	Council of Regional Organisations of the Pacific
DPSIR	Drivers-pressures-state-impact-response
Dugong MOU	Memorandum of Understanding on the Conservation and Management of Dugongs and their Habitats throughout their Range
EU Maritime Policy	European Union Integrated Maritime Policy
EU-CFP	European Union Common Fisheries Policy
FAO	Food and Agriculture Organisation of the UN
FCWC	Convention for the establishment of Fishery Committee of the West Central Gulf of Guinea
GESAMP	Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection
HELCOM	Baltic Marine Environment Protection Commission
IAEA	International Atomic Energy Agency

Acronym/Short name	Full name
IASC	International Arctic Science Committee
IMO	International maritime Organisation
IOSEA	The Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia
IPBES	Intergovernmental Panel for Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
LME	Large Marine Ecosystems
MEA	Millennium Ecosystem Assessment
MEPC	IMO Marine Environmental Protection Committee
NOWPAP	North West Pacific Action Plan
NOWPAP	Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific Region
OECS	Organisation of Eastern Caribbean States
OLDEPESCA	Agreement instituting the Latin American Organization for Fisheries Development
OSPESCA	Central America Fisheries and Aquaculture Organization
PEMSEA	Partnerships in Environmental Management for the Seas of East Asia
PIF	Pacific Islands Forum
PRCM	Regional Marine and Coastal Conservation Programme for West Africa
RACMED	Regional Advisory Council for the Mediterranean
RECOFI	Agreement for the establishment of the Regional Commission for Fisheries
SAARC	South Asian Association for Regional Cooperation
SACEP	South Asian Cooperative Environment Programme
SADC	South African Development Community
SBSTA	UNFCCC Subsidiary Body for Scientific and Technological Advice
SICA	Sistema de la Integración Centroamericana
SOPAC	Pacific Islands Applied GeoScience Commission
SPAW Protocol	Specially Protected Areas and Wildlife Protocol, Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region
SPTO	South Pacific Tourism Organisation
SRFC	Sub-Regional Fisheries Commission
UNEP	United Nations Environment Programme
UNESCO-IOC	Intergovernmental Oceanographic Commission of UNESCO
USP	University of the South Pacific
WHO	World Health Organisation
WIOSEA	Western Indian Ocean Sustainable Ecosystem Alliance
WOA	World Ocean Assessment

Appendix 3. The distribution of principles in arrangements by issue and through time

Principles	Overall																Fisheries																
	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90	90-95	95-00	00-05	05-10	10-15	NYIF	Total	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90	90-95	95-00	00-05	05-10	10-15	NYIF	Total	
Conservation	1				1		6	5	2	12	5	6	2	2		42	1					1		1	3	1	3	3	4		1		18
Cooperation			1		1	1	5	1	5	7	5	1	1	3		31						1		1	1			1					5
Sustainability	2	1			1		1	2	4	4	10	1	2	3		31	2	1				1		1	1	2	3				1		12
Precaution	1					1		3	2	1	4	5	4	4	1	26	1							2		1		2			1		7
Ecosystem approach		1				1		2		1	5	1		3		14		1						1							1		3
Equity							1		2	2	3	1				9									1								1
Participation									1	4						5																	0
Prevention of pollution	1						1	1			1		1			5	1										1						2
Best available scientific evidence								1		1		2		1		5														1			1
Coordination							2			2						4																	0
Polluter pays											1	1	1	1		4																	0
Transparency			1											2		3														1			1
Effective MCS/ Effective Management										1		1		1		3										1		1					2
Adaptiveness										1			1			2																	0
Ecosystem-based management							1		1							2							1										1
Integration										1	1					2																	0
Optimum utilisation							1					1				2							1					1					2
Responsibility											1	1				2																	
Best practice											1	1				2																	
Poverty alleviation									1							1																	
Attention to small-scale fisheries						1										1																	
Environmental Impact Assessment											1					1																	
Principle of commercialisation											1					1																	
Multi-scale											1					1																	
Good governance									1							1																	

Principles	Pollution															Biodiversity																	
	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90	90-95	95-00	00-05	05-10	10-15	NYIF	Total	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90	90-95	95-00	00-05	05-10	10-15	NYIF	Total	
Conservation							2	1	1	6	1					11							2		8	0	0	1					3
Cooperation							2		4	4	5			2		17							1										1
Sustainability								1	3		3		2	1		10											1						1
Precaution									2		2		3	2	1	10											1	1					2
Ecosystem approach											3			1		4											1						1
Equity									1		1					2						1				1							2
Participation									1	4						5																	0
Prevention of pollution							1	1								2																	0
Best available scientific evidence																0												1					1
Coordination							2			2						4																	0
Polluter pays														1		1																	0
Transparency																																	0
Effective MCS/ Management																																	0
Adaptiveness																																	0
Ecosystem-based management									1							1																	0
Integration											1					1																	0
Optimum utilisation																																	0
Responsibility																											1						1
Best practice																																	0
Poverty alleviation									1							1																	0
Attention to small-scale fisheries																																	0
Environmental Impact Assessment																																	0
Principles of commercialisation																																	0
Multi-scale											1					1																	0
Good governance									1							1																	0

Principles	Climate change	Mixed
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IOC Technical Series

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93.	Exercise CARIBE WAVE 11 / LANTEX 11—A Caribbean Tsunami Warning Exercise, 23 March 2011	
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	Supplement: Bulletins from the Regional Tsunami Service Providers	
	Vol. 2 Exercise Report. 2013	
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101.	Exercise Caribe Wave/Lantex 13. A Caribbean Tsunami Warning Exercise, 20 March 2013. Volume 1: Participant Handbook. 2012	E only
102.	Tsunami Early Warning and Mitigation System in the North-Eastern Atlantic, the Mediterranean and Connected Seas — Second Enlarged Communication Test Exercise (CTE2), 22 May 2012.	E only
	Vol. 1 Exercise Manual. 2012	
	Vol. 2 Evaluation Report. 2014	
103.	Exercise NEAMWAVE 12. A Tsunami Warning and Communication Exercise for the North-eastern Atlantic, the Mediterranean, and Connected Seas Region, 27–28 November 2012.	E only
	Vol. 1: Exercise Manual. 2012	
	Vol. 2: Evaluation Report. 2013	
104.	Seísmo y tsunami del 27 de agosto de 2012 en la costa del Pacífico frente a El Salvador, y seísmo del 5 de septiembre de 2012 en la costa del Pacífico frente a Costa Rica. Evaluación subsiguiente sobre el funcionamiento del Sistema de Alerta contra los Tsunamis y Atenuación de sus Efectos en el Pacífico. 2012	Español solamente (resumen en inglés y francés)
105.	Users Guide for the Pacific Tsunami Warning Center Enhanced Products for the Pacific Tsunami Warning System, August 2014. Revised Edition. 2014	E, S

106.	Exercise Pacific Wave 13. A Pacific-wide Tsunami Warning and Enhanced Products Exercise, 1–14 May 2013. Vol. 1 Exercise Manual. 2013 Vol. 2 Summary Report. 2013	E only
107.	Tsunami Public Awareness and Education Strategy for the Caribbean and Adjacent Regions. 2013	E only
108.	Pacific Tsunami Warning and Mitigation System (PTWS) Medium-Term Strategy, 2014–2021. 2013	E only
109.	Exercise Caribe Wave/Lantex 14. A Caribbean and Northwestern Atlantic Tsunami Warning Exercise, 26 March 2014. Vol. 1 Participant Handbook. 2014	E/S
110.	Directory of atmospheric, hydrographic and biological datasets for the Canary Current Large Marine Ecosystem. 2014	E only
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113.	Exercise Indian Ocean Wave 2014: An Indian Ocean-wide Tsunami Warning and Communication Exercise.	E only
114.	Exercise NEAMWAVE 14. A Tsunami Warning and Communication Exercise for the North-Eastern Atlantic, the Mediterranean, and Connected Seas Region, 28–30 October 2014 Vol. 1 Manual Vol. 2 Evaluation Report – Supplement: Evaluation by Message Providers and Civil Protection Authorities	E only
115.	Oceanographic and Biological Features in the Canary Current Large Marine Ecosystem. 2015	E only
116.	Tsunami Early Warning and Mitigation System in the North-Eastern Atlantic, the Mediterranean and Connected Seas. Third Enlarged Communication Test Exercise (CTE3), 1st October 2013. Vol. 1 Exercise Manual Vol. 2 Evaluation Report	E only
117.	Exercise Pacific Wave 15. A Pacific-wide Tsunami Warning and Enhanced Products Exercise, 2–6 February 2015 Vol. 1: Exercise Manual; Vol. 2: Summary Report	E only
118.	Exercise Caribe Wave/Lantex 15. A Caribbean and Northwestern Atlantic Tsunami Warning Exercise, 25 March 2015 (SW Caribbean Scenario) Vol. 1: Participant Handbook	E only
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