



A STRATEGIC ACTION PROGRAMME

For

Sustainable Management of the Western Indian
Ocean Large Marine Ecosystems

*Building a partnership to promote the sustainable management and
shared governance of WIO ecosystems for present and future
generations*

Statement of Endorsement

The countries bordering and within the Western Indian Ocean are cognisant of the fact that the welfare and livelihoods of their peoples are intimately linked to the goods and services provided by the Large Marine Ecosystems (LMEs) of the region, which includes the Agulhas Current LME, the Somali Current LME and the Mascarene LME. The livelihoods of over 56 million people in the ASCLME region depend upon marine and coastal resources. The ASCLME region supports 4 million tons of fish catches annually which constitute US\$943m in annual fisheries revenues. Tourism is important throughout the region and is clearly linked to healthy marine environments, accounting for approximately 30-50% of GDP in island states such as Mauritius and Seychelles. Overall species composition is enormously rich, exceeding 11,000 species of plants and animals, 60-70% of which are found only in the Indo-Pacific ocean region.

Food security is an urgent issue that is dependent on the sustainability and effective management of living marine resources in these ecosystems. Incomes and livelihoods associated with both fisheries and coastal tourism rely on the maintenance and preservation of coastal and offshore habitats, associated biological communities and water quality.

The potential impacts of climate variability and change along with the threats from marine and land-based pollution, ocean acidification, invasive species, etc. constitute a very real and imminent concern for coastal communities and the overall socioeconomic sustainability of all of the countries of the region. Many of these concerns are recognised through the Millennium Development Goals (MDGs), particularly those that address the eradication of extreme poverty and hunger, ensuring environmental sustainability and addressing the special needs of Least Developed Countries and Small Island Developing States.

Therefore, in recognition of the importance and urgency of an effective management strategy within these LMEs, the countries of the Western Indian Ocean adopt the following Declaration of Intent:

Desiring to maintain the integrity of the Large Marine Ecosystems of the Western Indian Ocean region along with the well-being, the livelihoods and the development of human communities that depend on these ecosystems and their goods and function;

Recognising the existing commitment from the countries to the various Regional Conventions, Protocols and Commitments as well as associated Regional Economic Communities and associated Regional Fisheries Bodies and Management Organisations;

Further Recognising the existing commitment from the countries to various international Instruments (Treaties, Conventions and Agreements) relating to environment, fisheries, biodiversity, marine protected areas, tourism, marine shipping, marine pollution, wildlife and heritage (amongst others) and including various voluntary schemes of a similar nature;

Noting the considerable efforts already undertaken at the national level by the countries in order to meet their commitments to the aforementioned national, regional and international agreements and treaties;

Appreciating the significant progress already made in terms of achieving a more sustainably-managed marine ecosystem through the close interaction among the countries and the various secretariats responsible for these regional and international agreements,

including the intergovernmental organisations (IGOs) and the non-governmental organisations (NGOs) of the region;

Recognising that the countries of the region have expressed the intent of reforming the South West Indian Ocean Fisheries Commission from an Advisory body (FAO Article VI) to a full Management body (under FAO Article XIV), including the identification of appropriate financial mechanisms (approved unanimously by the Commission members during the Special Meeting of the Commission held in Dar-Es-Salaam, United Republic of Tanzania, from 27th to 28th February 2013);

Further recognising that the Western Indian Ocean countries are in the process of incorporating the ecosystem approach to fisheries into their national fisheries management plans and intend to harmonise their national fisheries legislations;

Welcoming the support that has been provided to the region through the Global Environment Facility and the various United Nations programmes and agencies, as well as through various national, regional and international partnerships;

Further welcoming the continued support and resources from donors and other funding sources to assist in the development and support of such mechanisms and institutional arrangements;

Recognising the potential impacts and threats that may arise from the expansion of exploratory and extractive processes related to the oil and gas industry and possible mining activities in the region;

Noting the growing involvement and interest demonstrated by the private sector and marine industry in cooperating with the countries and with the partners to develop a sustainable approach to management of the goods and services associated with the Western Indian Ocean Large Marine ecosystems;

Understanding the importance of engaging with the communities of the region, many of which are dependent on the goods and services derived from the coastal and marine environment and the LMEs, and recognising the necessity for these communities to take a meaningful and active role in the monitoring and sustainable management of these economically and socially essential resources, while further recognising the need for regional efforts to protect the welfare and livelihoods of such dependent and subsistent communities;

Acknowledging the activities undertaken specifically through the Nairobi Convention (through the support of GEF and the implementation of UNEP) in relation to the development of a specific Strategic Action Programme for the protection of the western Indian Ocean from Land-Based Sources and Activities, along with the associated new Protocol to the Nairobi Convention concerning Land-Based Sources and Activities;

Aware of the importance of implementing Africa's Integrated Maritime Strategy (AIMS) which provides a broad framework for the protection and sustainable exploitation of Africa's Maritime Domain (AMD) for wealth creation;

Recognising the synergies that exist between the aims and objectives of the Global Ocean Partnership and the Strategic Action Programme for the sustainable management of the

Western Indian Ocean Large Marine Ecosystems, particularly in relation to governance, fisheries, wealth accounting and marine protected areas;

Conscious of the need for further cooperative efforts, through the combined actions of the countries, NGOs, IGOs, donor agencies and other partners in order to address any gaps and shortfalls in priority actions that are necessary for the integrity of the LMEs and the well-being of the dependent and associated communities of the region;

Specifically Conscious of the need for further research and studies related to areas and issues of critical significance to the region related to climate variability, poverty, food security, livelihoods, the Millennium Development Goals and Rio Plus 20 Objectives as well as the World Summit on Sustainable Development's Plan of Implementation in general;

Desirous that donors and funding agencies also recognise the importance of such research and studies and continue to support the region in prioritising such studies and research, including long-term monitoring of ecosystem-related indicators and ocean-climate observations;

Aware of the security concerns related to coastal and offshore activities and operations in the region and the need to coordinate and address these concerns and to ensure the safety of those persons engaged in all lawful activities at sea;

Convinced of the value and importance of strengthening multi-sectoral collaboration and coordination within and between the countries and with the various IGOs, NGOs and other organisation, entities and programmes to address transboundary threats and concerns within the Western Indian Ocean Large Marine Ecosystems;

Committed to the need to monitor carefully any changes in the status of the region's marine ecosystems, the effects and impacts of those changes on the socioeconomic welfare of the countries, and mitigating or adapting to those effects and impacts through adaptive management and policy realignment as considered appropriate by the countries, for the countries and the region;

Further Committed to the need to strengthen the human and institutional capacities of the countries to respond to the requirements and priorities for monitoring and management and to encourage the support for further training of urgent and necessary skills in the region;

Realising that an ecosystem-based management approach will also need to take into account activities, threats and impacts (actual and potential) within the high seas and areas beyond national jurisdiction;

Acknowledging the significant contribution already made through the activities and results of the national Marine Ecosystem Diagnostic Analyses and the Transboundary Diagnostic Analyses undertaken by the ASCLME and SWIOF Projects, and reviewed and adopted by the countries which have provided the foundation for this Strategic Action Programme;

Accepting that the countries have already committed to many of these agreements and undertakings and further understanding that the Strategic Action Programme both reaffirms these commitments and provides the necessary proposed institutional reforms and additional actions required to deliver more effectively on such commitments;

The countries of the Western Indian Ocean agree to:

Adopt and implement a Strategic Action Programme (SAP) for LME sustainable management and shared governance, while emphasising that its implementation is without prejudice to the sovereignty, territorial integrity, and sovereign rights of the signatory states, or the position of each state on the on-going delimitation of maritime boundaries;

Acknowledge that the SAP is a living document, to be reviewed and updated as necessary, and that its implementation takes into consideration and defers to the different settings and prevailing laws and policies of each country, and is subject to the level of existing capacities and available resources;

Endorse the principles and policies as defined within the attached Guidelines for Implementation of the SAP which may be revised and amended as necessary by an appropriate Regional Steering Committee established by the countries;

Further endorse the need to strengthen the value of cooperative and collaborative partnerships to achieve the aims and objectives of the Strategic Action Programme and welcome the development of such partnerships and alliances to achieve these aims and objectives;

Acknowledge also the need to develop and adopt appropriate management, scientific and technical mechanisms in support of the proposed actions and deliverables for the implementation of the SAP, including the establishment or designation of the regional and national institutional arrangements as defined in the SAP. Responsibility for implementation at the national level will be delegated to the appropriate national bodies and institutions as selected by the countries, recognising that appropriate national implementation mechanisms may vary from country to country, whilst maintaining the spirit and intent of the Strategic Action Programme itself;

Recognise that, notwithstanding the agreement by the respective countries to adopt and implement the SAP, responsibility for its overall implementation will rest with the Regional Policy Steering Committee which will report back to the Ministers of the respective countries periodically through appropriate channels and accredited regional organisations. Consequently, the Regional Steering Committee may make changes and amendments to improve and strengthen the Strategic Action Programme as they feel appropriate and within an adopted Terms of Reference;

Realise that the Strategic Action Programme would, in an event, be reviewed every 5 years to ensure its focus and appropriate delivery. Such a review would be preceded by a consideration and review of the Transboundary Diagnostic Analysis based on the long-term ecosystem monitoring programme (as referenced in the Strategic Action Programme). Consideration of any amendments or updates to the TDA would assist in advising the Regional Steering Committee of any necessary amendments or updates in the Strategic Action Programme and its objectives;

In recognition of the above, this **Statement of Endorsement** and the attached **Strategic Action Programme** have been adopted and signed by the following Ministers from the respective countries:

Signatories

Country

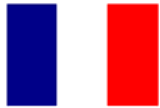
Name

Signature

Date



**Union of
Comoros**



France



Kenya



Madagascar



Mauritius



Mozambique



Seychelles



Somalia



South Africa



**United
Republic of
Tanzania**

The Strategic Action Programme for Sustainable Management of the Western Indian Ocean Large Marine Ecosystems

Table of Contents

Statement of Endorsement	1
Signatories.....	5
Table of Contents	6
List of Figures.....	6
List of Acronyms and Abbreviations	7
Chapter One.....	9
The Background to the Strategic Action Programme.....	9
Chapter Two.....	12
The Strategic Action Programme Management Boundary.....	12
Chapter Three.....	14
Challenges and Objectives for the Sustainability of Ecosystem Quality.....	14
Chapter Four	20
Proposed Cooperative Actions to Implement the Strategic Action Programme.....	20
Chapter Five.....	40
Proposed Cooperative Mechanisms and Institutional Arrangements	40
Chapter Six.....	51
Sustainability and Funding	51

List of Figures

Figure 1: The provisional management boundary for the LMEs of the WIO region. A detailed discussion of ocean currents is presented in the Transboundary Diagnostic Analysis	13
Figure 2: Schematic of TDA-SAP Process and Indicator Functions.....	21
Figure 3: Map of the WIO region showing areas recently identified to be of particular ecosystem importance.	24
Figure 5: Schematic Flow-Chart for a Science-Based Governance Mechanism	34
Figure 6: SAP Implementation Arrangements.....	49
Figure 7: SAP Implementation from Existing Structure	50

*NB: The TDA and its Annexes can be obtained from
<http://www.asclme.org/TDA/>*

List of Acronyms and Abbreviations

ACEP	African Coelacanth Ecosystem Programme (South Africa)
AIMS	Africa's Integrated Maritime Strategy (Africa Union)
AMD	Africa's Maritime Domain (African Union)
ASCLME	Agulhas and Somali Current Large Marine Ecosystems (Project)
BCLME	Benguela Current Large Marine Ecosystems (Project)
BOBLME	Bay of Bengal Large Marine Ecosystems (Project)
CAMFA	Conference for African Ministers, Fisheries and Agriculture
CBD	Convention on Biological Diversity
CCA	Causal Chain Analysis
COMESA	Common Market for Eastern and Southern Africa
DLIST	Distance Learning and Information Sharing Technologies
EAME	East African Marine Ecoregion (WWF)
EBSA	Ecologically and Biologically Significant Areas
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
ENSO	El Niño Southern Oscillation
EQO	Ecosystem Quality Objective
ESY	Economically Sustainable Yield
FAO	United Nations Food and Agricultural Organization
GEF	Global Environment Facility
ICZM	Integrated Coastal Zone Management
IGAD	Intergovernmental Authority on Development
IGO	Intergovernmental Organisation
IMC	Inter-Ministerial Committee
IMO	United Nations International Maritime Organisation
IOC	Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (UNESCO)
IOD	Indian Ocean Dipole
IOTC	Indian Ocean Tuna Commission
IPCC	Intergovernmental Panel on Climate Change
IRD	Institut de Recherche pour le Développement (France)
IUCN	International Union for Conservation of Nature
LED	Local Economic Development
LME	Large Marine Ecosystem
MDG	Millennium Development Goal(s)
MEDA	Marine Ecosystem Diagnostic Analysis
MPA	Marine Protected Area
MSP	Marine Spatial Planning
MSY	Maximum Sustainable Yield
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental organisation
OHMSCP	Oil and Hazardous Materials Spill Contingency Plans
PAC	Policy Advisory Committee
PEMSEA	Partnerships in Environmental Management for the Seas of East Asia
PCU	Project Coordination Unit
RFMO	Regional Fisheries Management Organisation
RSC	Regional Steering Committee
SADC	South African Development Community
SAP	Strategic Action Programme

SIODFA	Southern Indian Ocean Deep Fisher's Association
SIOFA	Southern Indian Ocean Fisheries Agreement
SPFIF	Strategic Partnership for Sustainable Fisheries Investment Fund
STAP	Scientific and technical Advisory Panel
SWIO	South West Indian Ocean
SWIOFC	South West Indian Ocean Fisheries Commission
SWIOFP	South West Indian Ocean Fisheries Project
TAC	Total Allowable Catch
TAE	Total Allowable Effort
TDA	Transboundary Diagnostic Analysis
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNEP	United Nations Environment Programme
WIO	Western Indian Ocean
WIO-C	Western Indian Ocean Consortium (of NGOs)
WIO-LaB	Western Indian Ocean Land Based Activities (Project)
WIOMER	Western Indian Ocean Marine Ecoregion (WWF)
WIOMSA	Western Indian Ocean Marine Science Association
WIOSEA	Western Indian Ocean Sustainable Ecosystem Alliance
WoE	"Weight-of-Evidence" (approach)
WWF	World Wide Fund for Nature
VME	Vulnerable Marine Ecosystem

Chapter One

The Background to the Strategic Action Programme

The Evolution of the Strategic Action Programme (SAP) Process:

Large Marine Ecosystems are regions of the world's oceans, encompassing coastal areas from river basins and estuaries to the seaward boundaries of continental shelves and the outer margins of the major ocean current systems. They are relatively large regions on the order of 200,000 km² or greater, characterised by distinct bathymetry, hydrography, productivity, and trophically dependent populations.

The LME-based management approach recognises that the world's coastal ocean waters are degraded by unsustainable fishing practices, habitat degradation, eutrophication, toxic pollution, invasive species, etc. and that realistic and effective attempts to mitigate these threats require coordinated actions by governments and civil society to recover depleted fish populations, restore degraded habitats, reduce coastal pollution, etc.

GEF and the UN implementing Agencies have adopted the Large Marine Ecosystem approach to management of coastal and offshore waters and have supported a “programme” of three projects within the Western Indian Ocean region in order to develop an effective management and governance strategy for the Western Indian Ocean Large Marine Ecosystems, their goods and services and the welfare of the peoples and communities in the region that depend on those goods and services. These include:

‘Addressing Land-Based Activities in the Western Indian Ocean’ (WIO-LaB), implemented by the United Nations Environment Programme. This Project (which has already completed its TDA-SAP phase) was addressing the impacts and related issues from land-based activities on the Western Indian Ocean Large Marine Ecosystems.

‘The Southwest Indian Ocean Fisheries Project’ (SWIOFP), implemented by the World Bank. This Project is dealing with the offshore and nearshore commercial fisheries issues related to the Western Indian Ocean Large Marine Ecosystems.

‘The Agulhas and Somali Current Large Marine Ecosystems Project’ (ASCLME), implemented by the United Nations Development Programme. This Project is addressing all other coastal and oceanic activities including offshore ecosystem assessment, coastal livelihoods and community engagement, coastal artisanal and subsistence fisheries, larval transport, marine pollution, marine invasive species, etc.

GEF has further pioneered the use of a Transboundary Diagnostic Analysis (TDA) to identify a set of formally-agreed actions, management reforms, governance realignments and institutional arrangements that constitute a Strategic Action Programme for addressing concerns within international waters.

The WIO-LaB Project received full country endorsement before the other two projects and was able to move ahead and complete its TDA in 2009 and finalise and adopt its SAP (through country signature) by 2010. Since then the requirements and agreements formally adopted by the countries through the SAP have been translated and captured into a formal Protocol on Land-Based Sources and Activities in support of the Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region and a further Protocol is currently under negotiation that will focus on Integrated Coastal Zone Management for the region.

Although the ASCLME Project started ahead of the SWIOF Project, once SWIOFP activities were underway, it was possible to harmonise the delivery of the two Projects. In 2010, GEF called for a Stocktaking Meeting in Nairobi to discuss progress and the way forward in terms of the LME Programme that it was funding in the Western Indian Ocean. At that Stocktaking Meeting it was agreed that ASCLME and SWIOFP would address their coastal and offshore commitments through a single TDA and SAP process. As a result, this current Strategic Action Programme is the product of joint activities undertaken by the two Projects and addresses all of those issues pertinent to the coastal and offshore areas of the LMEs that have not fallen under the output of the WIO-LaB project TDA and SAP. For a comprehensive LME management approach (watershed to outer offshore boundaries) these two SAPs (the previous WIO-LaB SAP and the current joint ASCLME/SWIOFP SAP) need to be implemented in collaboration through a cooperative understanding, whilst recognising and respecting the mandates of the various management bodies and institutions.

The Objectives of the SAP:

A Strategic Action Programme is a negotiated policy document that should be endorsed at the highest level of all relevant sectors of government. The SAP should provide a political consensus on the way forward to achieve the necessary policy and legal reforms, investments and capacity building requirements required to address the key impacts and options for mitigation and removal of root causes as identified in the TDA. The SAP should also provide a road-map for institutional improvements/development and responsibilities in support of its implementation.

To this effect, the current SAP aims to reflect the findings of the TDA in terms of the major transboundary issues (including shared concerns throughout the region); their root causes (which are frequently embedded at the management and/or institutional level); to confirm the Ecosystem Quality Objectives (EQOs - intended status of LME quality that needs to be maintained/achieved); to define the necessary cooperative actions that need to be taken within the region to address the issues and achieve the EQOs; and to agree on the appropriate institutional and collaborative mechanisms that are necessary to deliver those actions and to effectively implement the aims and objectives of the SAP.

Thus, the SAP serves as a formal agreement by the countries regarding the actions that they intend to address LME issues, threats and impacts (including monitoring of any future changes); how an understanding of those threats and impacts can be captured as part of an adaptive management and policy realignment process in order to protect the livelihoods and well-being of dependent communities; and the actual institutional arrangements that will need to be put in place to make this happen as well as a mechanism for monitoring, evaluation and fine-tuning the entire process.

The purpose of the SAP also extends to providing support and management for the promotion of the sustainable development of economic sectors (fisheries, aquaculture, transport, tourism, etc) within the concept of a sustainable ecosystem approach so as to provide enhanced societal benefits from LME goods and services.

In adopting the SAP, the countries also recognise the advantages of cooperation and communication at the Trans-LME level with bordering LMEs and their own SAPs (e.g. Benguela Current LME; Bay of Bengal LME; Red Sea LME).

Chapter Two

The Strategic Action Programme Management Boundary

For the purposes of effective ecosystem management and governance of any natural system, certain management boundaries must be agreed. The objective of the definition of a boundary is to motivate for the management of a whole system using an ecosystem approach. In the case of a relatively open ocean system, these boundaries can be defined on the basis of bathymetric features, patterns of biodiversity, patterns of ocean currents and productivity, temperature of chlorophyll fronts, movement and dependencies of migratory species, or socio-economic, governance or cultural features of the human population.

Since at least 2008, the source region of the Agulhas Current, including the islands of Mauritius, La Réunion (France), Seychelles and Comoros, has been included in the greater Agulhas Current LME (Heileman *et al.* 2008). Even so, this boundary is not discrete, with the seasonal South Equatorial Counter Current introducing connectivity from mainland East Africa and the Somali Current LME to the Seychelles Islands. The boundaries of the existing governance structures in place for the management of the oceans and associated living marine resources, including the Nairobi Convention, IOTC, SWIOFC and SIOFA must also be taken into account. LMEs are traditionally defined biophysically, but people must be included as part of the ecosystem, and thus existing management and governance boundaries should be acknowledged.

In the joint ASCLME-SWIOFP SAP, as explained and justified fully in the TDA, the area under consideration will be as shown in Figure 1 to include:

- 1) The major surface currents directly associated with the Agulhas and Somali Currents,
- 2) The defining bathymetric features (ocean basins) of the region, bounded by the Carlsberg Ridge, Central Indian Ocean Ridge and Southwest Indian Ocean Ridge, and
- 3) The culturally diverse yet historically connected peoples of Southern and Eastern Africa as well as the Indian Ocean Islands.

Landward (western) boundary

Discharges from major rivers do have an impact on the ASCLME region, and particularly on the quality of its inshore waters. Major cities in mainland Africa have a significant polluting effect in the coastal zone. With this in mind, land based influences have been considered in this TDA and in the SAP in order to ensure a comprehensive ecosystem approach to problem analysis, but it is acknowledged that land-based issues are being addressed by the WIO-LaB TDA and SAP, so information provided in this document will be used to validate / complement the WIO-LaB products and the Land-Based Sources and Activities Protocol.

Eastern boundary

Approximately 67 degrees East to include the EEZs of all the major western Indian Ocean island states, the South Equatorial Current and the Central Indian Ridge.

Southern boundary

Approximately 42 degrees South and approximately 20 degrees East to include the Agulhas Current region, as well as the Agulhas Return Current. The important seamounts of the SWIO are included, but not the EEZs of South Africa and France in the Southern Ocean.

Northern Boundary

10 degrees north, to include the Somali current, offshore upwelling and great whirl, but excludes the EEZ of Yemen.

The southern boundary is dynamic, changing with the Agulhas retroflection and leakage of Indian Ocean water into the South Atlantic. 27 degrees East was taken as the BCLME boundary, and although there is an overlap with the stated ASCLME boundary here, this is to be expected given the exchange of water and biota between the systems.

Although these boundaries are chosen to facilitate a pragmatic ecosystem approach to management in the region, connections in surface and deep ocean circulation exist to the East, with the eastern Indian Ocean, to the southwest with the Atlantic Ocean (BCLME), to the North with the Arabian Sea and to the north-east with the Bay of Bengal (BOBLME).

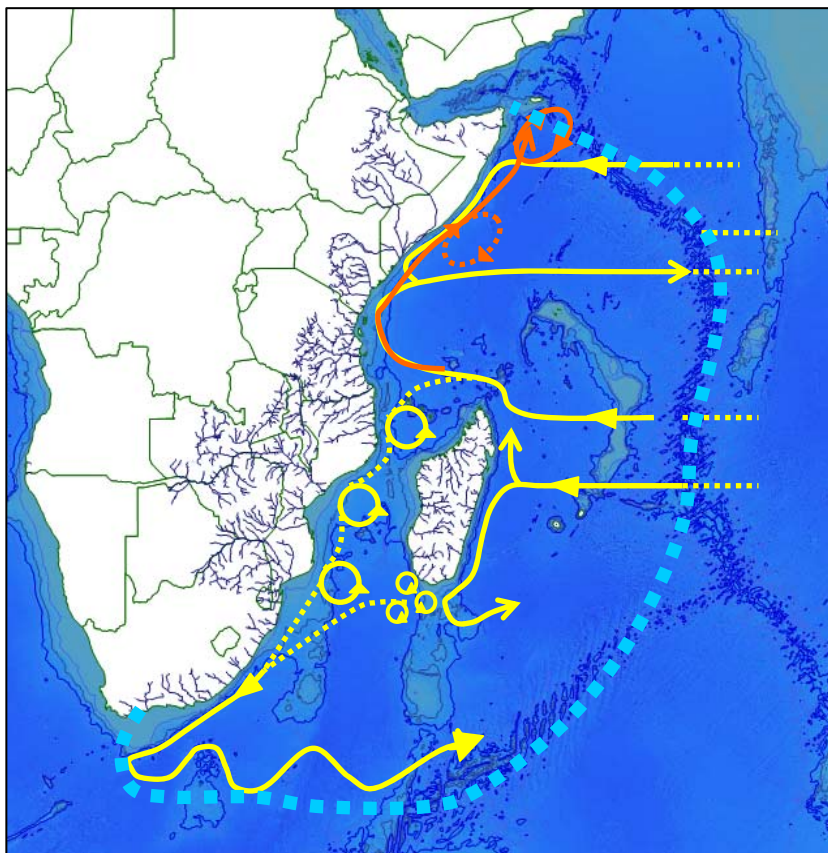


Figure 1: The provisional management boundary for the LMEs of the WIO region. A detailed discussion of ocean currents is presented in the Transboundary Diagnostic Analysis

It should be noted that this boundary does not represent any LME boundary but, in fact, defines the management area for several LMEs within the Western Indian Ocean that will be managed under a single Strategic Action Programme approach which relates more appropriately to existing and working geopolitical agreements and partnerships.

Chapter Three

Challenges and Objectives for the Sustainability of Ecosystem Quality

Global Challenges for LMEs

Around the world, Large Marine Ecosystems are already showing signs of anthropogenic impacts including those from climate change. These include:

- Range shifts, with species moving both polewards and to deeper waters
- Changes in water column stratification and significant de-oxygenation
- Increased frequency of harmful algal blooms
- Shifts in species composition in phyto/zooplankton communities (mainly large to small individuals) and changes in diversity and species richness of fishes
- Species acting as ‘invasives’ creating negative ecosystem impacts
- Regions with naturally high environmental variability appear to be equally vulnerable to change and are not necessarily pre-adapted
- Changes in fisheries distribution and associated fleet structure and operations
- Management implications for harvesting of ‘shifting biomass’, especially across jurisdictional boundaries
- Synergistic effects such as increased frequency of extreme events and temperature changes may prevent biomass rebuilding after a reduction in fishing effort

Main Areas of Concern for the Western Indian Ocean LMEs

Within the Western Indian Ocean itself, the specific impacts and changes that are becoming obvious from recent studies and research have been identified by participating countries to the ASCLME and SWIOF Projects.

The joint ASCLME-SWIOFP Transboundary Diagnostic Analysis (TDA) identified four main areas of transboundary concern to the countries and people of the Western Indian Ocean (WIO) and identified the Ecosystem Quality Objectives which would be most appropriate and desirable as a WIO LME management target.

The four Main Areas of Concern are:

- 1. Water Quality Degradation**
- 2. Habitat and Community Modification**
- 3. Declines in Living Marine Resources**
- 4. Environmental Variability and Extreme Events**

Within each main area of concern, several specific issues were identified and analysed by the countries and prioritised in light of the need for regional action by countries. The intensive process of regional issue identification and prioritisation is presented in detail in the ASCLME-SWIOFP TDA. A high-level summary is presented below.

Ecosystem Quality Objectives were subsequently developed, to guide the implementation of the SAP. The proposed Ecosystem Quality Objectives and the actions that would be taken to achieve them are ultimately aiming to secure socioeconomic stability and

community welfare in line with the Millennium Development Goals, the World Summit on Sustainable Development's Plan of Implementation, and the conclusions and objectives from the Rio Plus 20 Conference.

The proposed 5-year and 20-year Targets, along with the proposed Actions required to meet the Ecosystem Quality Objectives relative to each of the Main Areas of Concern are highlighted in Appendix 4 of the TDA [\[LINK\]](#). These Targets and Actions were developed and discussed by the countries during the TDA development and finalisation stages (particularly at the ASCLME-SWIOFP Joint TDA Development Meeting in Mauritius in July 2012) and further reviewed and agreed along with proposed indicators by the SAP Monitoring and Indicators Panel Meeting in Johannesburg in September 2012.

The Actions as identified from the TDA have been further consolidated and summarised for the future guidance of the SAP under each of the components listed in Chapter 4 'The Proposed Cooperative Actions to Implement the Strategic Action Programme'.

Water Quality Degradation

Water quality within the WIO is being degraded by a combination of factors associated with changes in the quality, quantity and timing of river flows, and due to contamination of ground, surface (coastal lakes and estuaries), coastal and marine waters. Impacts are from a variety of sources, ranging from catchment management and agricultural practices, to effluent and sewerage management (land-based sources) as well as marine-based sources such as shipping or fisheries activities that cause litter and oil pollution.

Specific issues of concern

- Alteration of natural river flow and changes in freshwater input and sediment load
- Degradation of ground and surface water quality
 - Microbiological contamination from land-based and marine sources
 - Solid wastes / marine debris from shipping and land-based-sources
 - Oil spills (drilling, exploitation, transport, processing, storage, shipping).

Proposed Ecosystem Quality Objectives

- Environmental flow requirements are taken into account for future development planning.
- Restore ground and surface water quality and prevent further degradation occurring in the future
- Reduce microbiological contamination in coastal waters.
- Reduce solid waste (marine debris) from shipping and land based sources in coastal water
- Develop the capacity to prevent and mitigate the effects of oil spills at regional and national level.

Habitat and Community Modification

The WIO hosts a huge diversity and complex array of different coastal and marine habitats including some of the world's critical habitats (seagrass beds, coral reefs and mangroves), that are important not only for the biodiversity that they support, but also for carbon sequestration, food production and natural shoreline protection. Coastal and marine habitats are under increasing pressure from the intensification of human activities in the coastal and marine environment. As coastal populations continue to increase, and as people move to the

coast to seek to improve their livelihoods, these pressures will continue to grow, causing further risk to food security, income and livelihoods, protection of coastlines, tourism, recreation and cultural values.

We are only just starting to understand the important role of the eddy systems around the Mozambique Channel and around Madagascar and South Africa on productivity and fisheries within those areas. Changes in the drivers of these eddy systems (primarily climate and weather-related current movements) could alter the levels of productivity throughout this region with unknown consequences to dependent human communities.

Inadequately or completely unplanned coastal developments, destructive fishing techniques, and the expansion of the extractive industries will continue to contribute towards the degradation, disturbance, fragmentation, or complete destruction of habitats. The loss of these natural habitats will affect the flora and fauna that depend on them for different life stages as well as disrupting the socioeconomic benefits obtained from their goods and services and functions.

The joint TDA process has identified that Indian Ocean is experiencing some of the strongest warming globally (an increase of up to 1° C since 1950) and the WIO region is generally warming faster relative to the global mean (i.e. it is a recognised global ‘hotspot’ of climate change). Sea-level rise around some of the vulnerable islands in the Indian Ocean is seen to have a trend of 10 mm per year, higher than the average global trend of 3.5 mm.

Specific issues of concern

- Shoreline change, due to modification, land reclamation and coastal erosion
 - Disturbance, damage and loss of upland / watershed habitats (>10 m elevation)
 - Disturbance, damage and loss of coastal vegetation and flood plain habitats (to 10 m elevation)
 - Disturbance, damage and loss of mangrove habitats
 - Disturbance, damage and loss of coral reef habitats
 - Disturbance, damage and loss of seagrass habitats
- Disturbance, damage and degradation of pelagic habitats (nearshore <30 m, 30-200 m an oceanic > 200 m depth)
- Introduction of exotic non-native species, invasives and nuisance species

Proposed Ecosystem Quality Objectives

- Effective mitigation and management of shoreline change.
- Watershed ecosystems protected, rehabilitated, ecosystem function restored, and sustainably managed
- Mangrove habitats sustainably managed and their health and ecosystem services protected
- Corals reef health and ecosystem services protected and sustainably managed
- Status and ecosystem services of coastal habitats protected and effectively managed.
- Seagrass habitats sustainably managed and the health and ecosystem services protected
- Health and ecosystem services of deep water habitats protected and effectively managed
- Eliminate or minimize the risk of the introduction or spread of exotic non-native species, invasive and nuisance species.

Declines in Living Marine Resources

Globally, it is now well established that many marine wild capture fisheries are overexploited. The methods used to extract resources may impact on other non-target species, and contribute towards the loss or disturbance of natural habitats, further threatening the long-term sustainability of otherwise healthy ecosystems and of other species that are dependent upon these habitats for feeding, breeding or other critical life processes. Populations of many species, including the larger, more charismatic marine mammals, seabirds, marine turtles, as well as the more rare endemic species, are critically endangered or vulnerable. Excessive by-catch and discards have been identified as a problem. Fisheries data capture and consequent fisheries management have historically tended to underestimate small-scale fisheries, which now appear to be of significant importance in terms of size, food security, sustainability of stocks, national/regional economic value. It is widely recognised that fisheries and their management cannot operate in isolation from their surrounding ecosystems and associated biodiversity. Understanding the relationship between fishing and the environment, such as by-catch, removal of top predators, impact on associated biota and the incidental mortality of marine mammals, turtles and seabirds is critical and all these factors are required to be incorporated in an Ecosystem Approach to Fisheries. Species ranges and distributions are changing (expanding/contracting) as a result of sea temperatures, acidification, etc. (including commercial species). Changes in the population balance of the following groups were recognised to be of particular concern:

- sharks and rays
- large pelagics
- small pelagics
- reef and demersal fish
- sea cucumbers
- prawns and shrimp
- lobster
- focal non-target species, such as cetaceans, marine mammals and seabirds

Proposed Ecosystem Quality Objectives

- Restoring the populations of sharks and rays to sustainable levels
- Reduce fishing effort and capacity to match MSY/ESY or any other appropriate management reference points that reflect sustainable well-being in key shark and ray stocks
- Monitor populations of large pelagic fish and harvest rates to maintain sustainability or, where necessary, to implement management measures aiming at restoring populations to sustainable levels
- Monitor populations of small pelagic fish and harvest rates to maintain sustainability or, where necessary, to implement management measures aiming at restoring populations to sustainable levels
- Rebuilding and restoration of the populations of reef and demersal fish species to sustainable levels
- Rebuilding and restoration of the populations of sea cucumber species to sustainable levels
- Monitor populations of prawns/shrimps and harvest rates to maintain sustainability or, where necessary, to implement management measures aiming at restoring populations to sustainable levels
- Rebuilding and restoration of the populations of lobster species to sustainable levels

- Maximise the value of by-catch (where reduction is not possible) and eliminate discards
- Reduce habitat damage from destructive gear and methods

Environmental variability and extreme events

Shifts in seasonal rainfall patterns in terms of the distribution and volume of precipitation have already been reported by all countries within the WIO region, with associated impacts upon river flows and sediments into nearshore marine habitats. Heavy rainfall results in increased soil erosion and sediment input into coastal waters. Climatic extremes such as floods and droughts may become more common, and the frequency of intense cyclones may increase as a result of climate change. Sea level change, pH change (ocean acidification) and long-term increases in ocean temperature have already been recorded, and these trends are likely to increase with major impacts on coastlines, nearshore habitats, marine species and the people of the region. Rapid changes in the variability of El Niño Southern Oscillation and the Indian Ocean Dipole events could severely disrupt production systems and livelihoods due to more frequent and extreme floods and droughts with threats to fisheries, aquaculture, distribution of ecosystem elements and consequent impacts on socioeconomics and human well-being

Specific issues of concern

- Climate hazards and extreme weather events
- Sea level change
- Ocean acidification
- Changes in seawater temperatures
- Changes to hydrodynamics and ocean circulation
- Changes in productivity (shifts in primary and secondary production)
- Geohazards (tsunamis, volcanic eruptions, earthquakes)

Environmental variability and extreme events cause or exacerbate several of the issues identified in themes 1-3. Due to their long term nature, no EQOs are identified in the TDA/SAP, but understanding their potential trends and effects forms an important part of the SAP under the Long Term Monitoring and Indicators component. Actions related to mitigation and adaptation are detailed under themes 1-3.

Security and access as an overarching concern

In identifying the main areas of transboundary concern, the TDA process drew attention to the issues of security and accessibility that are a present threat in the region, primarily as a result of piracy activities. Such activities have prevented the ASCLME and SWIOF Projects from undertaking a comprehensive foundational survey of the region (in particular the East African Coastal and Somali Currents) and continue to preclude any attempts at a long-term monitoring programme within the northern areas of the management boundary.

Various alternative data capture mechanisms have been and are being explored. These include the use of autonomous underwater vehicles or gliders, wave-riders, self-propelled or expendable instrumentation (e.g. expendable bathythermographs, Argo floats and satellite drifters). Acquisition of higher resolution satellite imagery (altimetry, ocean colour, etc.) is another option that may assist in filling in the data gaps for this northern area. The use of ships and platforms of opportunity for sampling or equipment deployment is a further potential mechanism that could resolve some of the gaps.

This Strategic Action Programme recognises the importance and urgency for capturing data in the high-risk areas in order to revise and strengthen the TDA and the long-term ecosystem monitoring process and would give priority to such data capture and analysis where possible and feasible.

Chapter Four

Proposed Cooperative Actions to Implement the Strategic Action Programme

In order to address the challenges highlighted above and to fill gaps in knowledge, data capture and scientific/management skills, certain cooperative programmes of activity will be developed and adopted as part of an overall Large Marine Ecosystem management and governance approach. These include A. An Ecosystem Monitoring Programme; B. A Capacity Building and Training Programme, and C. A Science-Based Governance Programme.

4.A. An Ecosystem Monitoring Programme

The ASCLME and SWIOF Projects, together with participating countries, have been concerned with defining the baseline status of the ecosystems of the Western Indian Ocean, together with several regional partners. These efforts must be built into a long term monitoring programme to track changes in the status of the ecosystem. This can be summed up in the statement that *“You cannot manage what you haven’t measured and you cannot adapt to change unless you can recognise change”*.

Monitoring and Indicators

Effective management of Large Marine Ecosystems depends not only on our knowledge of the ecosystem and its current status, but also on understanding directional trends in ecosystem change, and on how management interventions have positive or negative effects on change over time. The current status of the LMEs in the Western Indian Ocean is presented in the national Marine Ecosystem Diagnostic Analyses (MEDAs) and in the Joint ASCLME-SWIOFP Transboundary Diagnostic Analysis. We need to understand the natural variability of the WIO LMEs and, from an established baseline, monitor the implementation of the SAP and the related responses in the state of the ecosystems.

By monitoring ecosystems, we can track changes over time, and coupled with an indicators programme, we can measure change against predefined criteria. This allows us to measure the effectiveness of our management interventions, and through a process of adaptive management, to improve and optimise these interventions to the greatest effect.

Types of Indicators

The Global Environment Facility identified three types of indicators:

- 1) **Process indicators** are indicators of project, institutional, or policy reform. These will be addressed in a Project Document to support this SAP Implementation process.
- 2) **Stress reduction** indicators relate to specific measures implemented by collaborating countries. Stress reduction indicators have been developed through the detailed discussion of SAP Targets and Action.
- 3) **Environmental status and socio-economic** indicators reflect the changing state of the ecosystem and are described in more detail below.

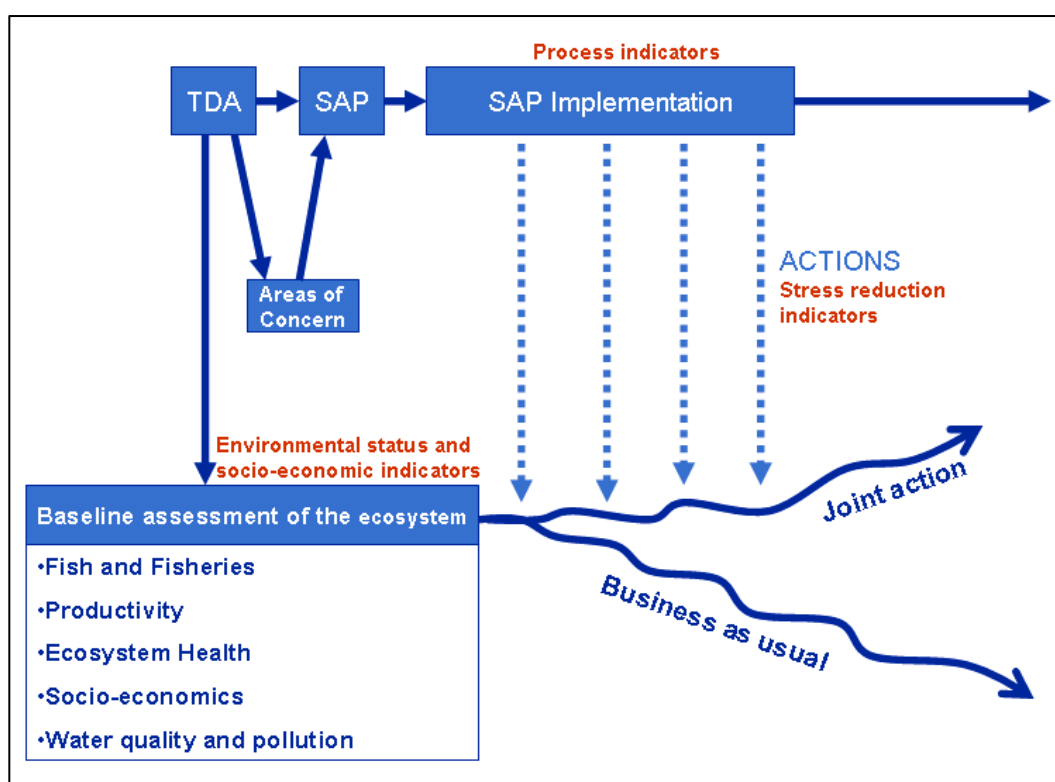


Figure 2: Schematic of TDA-SAP Process and Indicator Functions

Process of Indicator Selection

Participating countries identified the main regional areas of concern during the TDA development process, and within those areas, specific issues that need to be addressed by the Strategic Action Programme (see Chapter Three - *Challenges and Objectives for the Sustainability of Ecosystem Quality*). The selected interventions, or Actions and Targets in the Strategic Action Programme, have guided the selection of environmental status and socio-economic monitoring themes and associated indicators.

The national MEDAs identified existing data sets for monitoring, and the Causal Chain Analysis (CCA) process identified monitoring programmes and data sets for each main area of concern. The TDA prioritised these areas of concern, and the SAP now presents a framework summary of the monitoring programme that is a result of the MEDA-CCA-TDA process. The final indicator set selection will be chosen with the guidance and involvement of a monitoring and indicators working group created by the SAP Scientific and Technical Advisory Panel. Indicators will be scalable to allow reporting to national, regional and global forums. All of these indicators will form part of an overall Ecosystem Monitoring Programme that will be adopted and implemented by the countries and other partners. A detailed draft indicator set has been developed for each of the themes below, and the final indicator set will be rationalised based on existing data collection activities in the region, existing indicators of partner projects and regional priorities identified by the countries.

The final selection and adoption of indicators will acknowledge and, wherever feasible and appropriate, incorporate existing indicators that are already in use within other global assessment processes so as to ensure compatibility and options for comparative analysis.

Monitoring and Indicators Framework: Environmental status and socio-economic indicators

Indicator Theme 1: Fish and Fisheries

Fisheries indicators cover a spectrum of parameters based on national and sub-national statistics. Indicators will include, among others: reported landings (by species; functional groups; commercial species; total reported landings by LMEs; gears), fishing effort, value of reported landings by major commercial groups, Marine Trophic Index (MTI), Fishing in Balance Index (FIB), Primary Production Required (PPR) by fisheries, stock-catch status, Total biomass of surveyed species, trophic level of landings, proportion of predatory fish, proportion of under and moderately exploited stocks, distribution of fishing areas.

Indicator Theme 2: Productivity

The second theme would address the monitoring and assessment of primary and secondary productivity (distribution, biomass and species composition).

Indicator Theme 3: Ecosystem Health

The indicator theme addressing ecosystem health also addresses the status of focal (charismatic, indicator or keystone) species that are not commercially exploited. Examples of indicators include land cover change, incidence of coastal flooding / storm surges, shoreline change, ocean temperature change, sea level change over time, variability / persistent oceanographic features, ocean acidification, rainfall and air temperature, indices of ENSO and Indian Ocean Dipole (IOD), as well as the distribution and health of critical habitats such as coral reefs, mangroves and seagrasses.

Indicator Theme 4: Water Quality and Pollution

Theme 4 addresses the monitoring of inshore and offshore water quality, including river discharge in relation to Environmental Flow Requirements, turbidity levels & change, persistent organic pollutants: level and change over time, distribution of point source pollutants and measures of inshore water quality as well as levels of bacterial contamination in coastal waters and incidence of waterborne disease.

Indicator Theme 5: Socio-Economics

Socio-economic indicators in theme 5 would track change in socio-economic status and livelihoods activities. Several indicators are drawn from existing fisheries and coastal livelihood monitoring programmes, and would include indicators of changing levels of education, changes in economic status, changes in coastal livelihoods in relation to socio-economics of communities and indicators of gender empowerment. Indicators would also focus on demonstrating and confirming more effective community engagement into the LME sustainable management process.

Data for monitoring purposes

As with the other components of the ASCLME and SWIOFP TDA-SAP process, by grounding the monitoring and indicators programme in the MEDAs and having national institutions facilitating the monitoring, optimises benefit to participating countries, as well as the sustainability of the programme. As well as national data collection activities, regional and global partners will be key to securing data for the whole range of measurable parameters. Data will be used from *in situ* sensors, remote sensing platforms, and model products. An agreed data sharing and dissemination policy will be developed as the first step in implementing the monitoring programme. It will build on and consolidate the data

policies of the ASCLME and SWIOFP Projects as well as other existing or planned regional data and information handling and management policies and initiatives in the region which have been effective in ensuring country ownership of project data. A broader and more inclusive policy will need to be developed with countries and monitoring partners, particularly in relation to the need for repetitive access by research ships to equipment deployed throughout the region. In developing such a data policy it is recognised that efficient access to relevant data is a critical requirement to realising the full benefit of national and regional spatial planning.

Long-term data series, while required for the monitoring and indicators programme, will also be used for scenario prediction, to assist countries to predict and mitigate impacts of change due to natural or anthropogenic causes.

Partnerships

The monitoring and indicators programme will build on the partnerships established during the course of ASCLME and SWIOF Project activities through an Alliance (The Western Indian Ocean Sustainable Ecosystem Alliance - WIOSEA). Currently, these partnerships support cruises and offshore surveys, nearshore surveys, mooring deployment and process studies as well as data analysis and modelling. Further data management and dissemination partnerships will also be consolidated and strengthened to underpin the sustainability and preservation of long term monitoring datasets. Other partnerships will be negotiated and formalised as requirements are identified.

Outputs

The outputs of the monitoring and indicators programme will be delivered at pre-determined time intervals to the Science and Technical Advisory Panel for the Science-Based-Governance process, and will feed into national State of the Coast reports, the LME status report as well as feeding up into global indicator programmes such as IndiSeas, the Transboundary Waters Assessment Programme and the Ocean Health Index. Other processes such as the IPCC would be able to draw from long term data series developed as part of this programme.

The main product of the monitoring and indicators programme would be an annual state of the ecosystem report, reporting back on each of the components of the monitoring and indicators programme. The state of the ecosystem report will be reported via a permanent ecosystem portal such as the African Marine Atlas, and also feed into the Science-Based-Governance process.

Use of Marine Spatial Planning and Development of Marine Protected/Management Areas

Marine Spatial Planning (MSP), as a tool for coastal and marine management, will be supported as an important component of the monitoring and indicators programme. MSP allows for spatial planning and management of resources and human activities, to reduce conflict between sectors, and to ensure that critical ecosystem services are protected.

Established and growing networks of protected areas in the WIO region will continue to be supported. Spatially managed areas (including temporary and permanent closed areas) are an important conservation and management tool. Transboundary protected areas in particular, will be required for the role they play in maintaining important regional ecological processes and protecting migratory species.

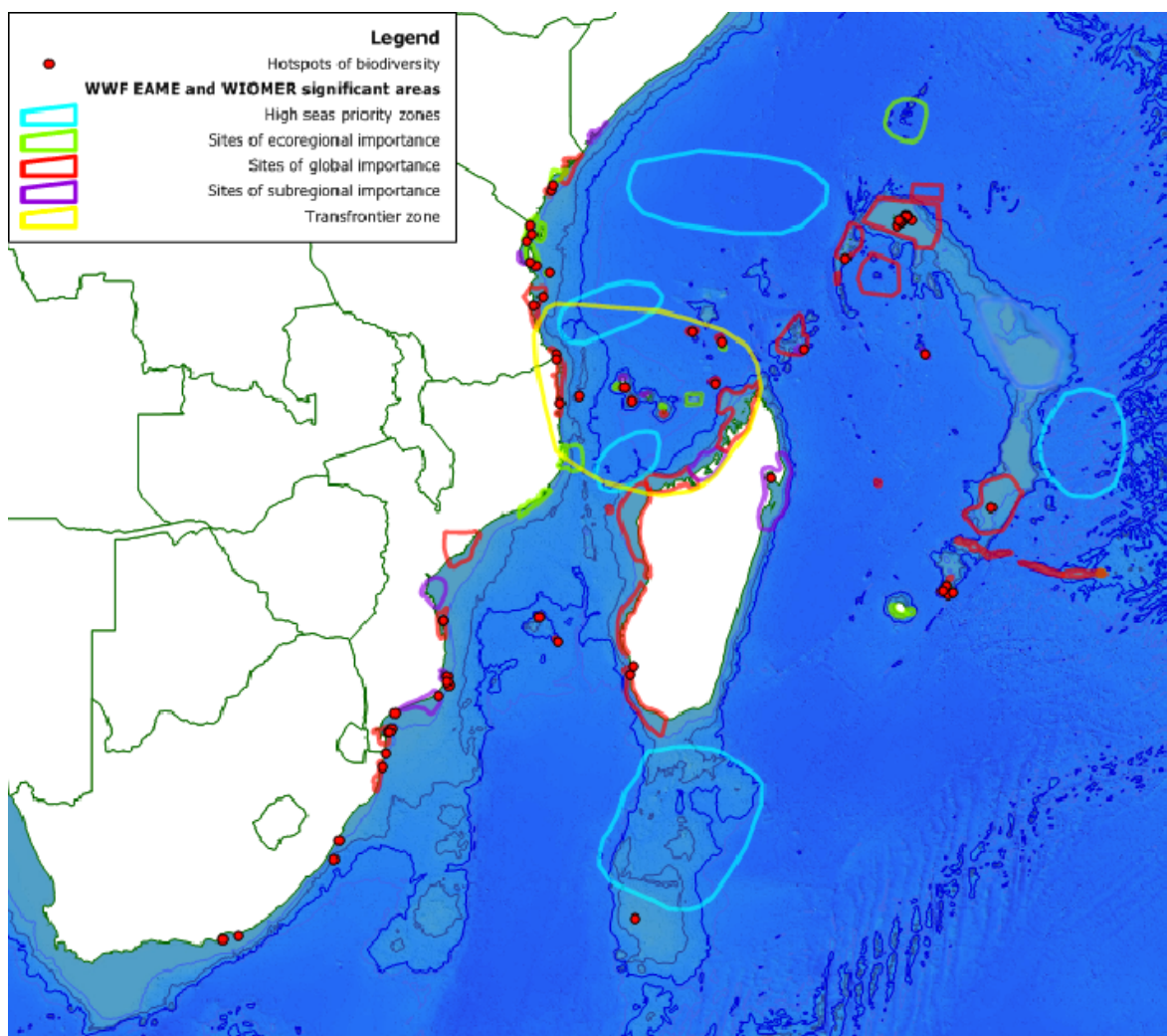


Figure 3: Map of the WIO region showing some of the main areas recently identified to be of particular ecosystem importance.

After: a) *The SWIOFP Biodiversity Retrospective Analysis: Hotspots of biodiversity importance* (SWIOFP 2012)¹; b) *The WWF East African Marine Ecoregion Vision* (WWF 2004)²; c) *The WWF Western Indian Ocean Marine Ecoregion Report* (WWF 2010)³

¹ SWIOFP 2012. Mainstreaming biodiversity in fisheries management: a retrospective analysis of existing data on vulnerable organisms in the South West Indian Ocean. A specialist report. Prepared for the South West Indian Ocean Fisheries Project (SWIOFP). Unpublished report.

² WWF Eastern African Marine Ecoregion. 2004. *The Eastern African Marine Ecoregion Vision: A large scale conservation approach to the management of biodiversity*. WWF: Dar es Salaam, Tanzania. 53pp.

³ WWF Ecorégion Marine de l'Océan Indien Occidental (WIOMER). 2010. *DRAFT Proposition de Stratégie Régionale et Plan d'Actions pour Préserver les Ecosystèmes Marins & la Pêche*.

Cooperation has already been established with the Convention on Biological Diversity (CBD) for the identification of Ecologically and Biologically Sensitive Areas (EBSAs) in national waters and high seas, the World Heritage Convention, WWF (EAME and WIOMER) for the identification of important areas for conservation interventions, and the FAO for the identification of Vulnerable Marine Ecosystems (VMEs). The IOC/UNESCO will be another important partner in the implementation of Marine Spatial Planning projects in the region.

Actions Related To Ecosystem Assessment and Monitoring That Would Be Addressed Through the Strategic Action Programme

The following Actions have been consolidated and summarised from the TDA development process and are appended in detail to the TDA document itself as [Appendix 4](#).

All activities will be undertaken in close collaboration with WIO-LaB and Nairobi Convention as well as SWIOFC and other national and regional fisheries management bodies (as appropriate). The following list includes cross-cutting activities related to Unpredictable Environmental Variability and Extreme Events

In undertaking these activities, the SAP will aim to identify and capture ‘best practices’ related to indicator monitoring and ecosystem assessment from within the region and from around the world

Actions related to Water Quality Degradation

- a. Develop and adopt a general programme for long-term water quality monitoring (biochemical and physical) with the partners of the WIOSEA and ensure that such water quality monitoring programmes target vulnerable areas as well as point-sources (e.g. coral reefs and other critical habitats as well as aqua/mariculture facilities)
- b. Review current capacity and then design and implement improved monitoring and evaluation systems for microbial contamination and for solid and liquid waste discharges both coastal and offshore (ship-based and platform based)
- c. Review existing vulnerability assessments to oil and hazardous chemical spills and develop an effective monitoring mechanism with specific indicators
- d. Develop and adopt a monitoring system for exotic, non-native and nuisance species

Actions related to Habitat and Community Modification (especially in relation to coral reefs, mangroves and seagrass beds and other identified vulnerable coastal and nearshore habitat types)

- a. Develop and implement monitoring and assessment mechanisms/protocols for appropriate indicators of vulnerable and critical habitat well-being including standard protocols for monitoring of watersheds (especially sediment loads and nutrient levels); coastal erosion; shoreline change and sea level rise; vulnerable and critical habitat types (e.g. Coral reef, mangrove, seagrass beds, deepwater habitats, etc.); exotic, non-native, invasive and nuisance species.
- b. Develop assessment and comparison reports to highlight altering trends in ecosystem goods and services along with cost-benefit analyses

- c. Incorporate the above into an overall national/regional marine spatial planning exercise and guidelines
- d. Publish/update comprehensive national and regional reports (including updated MEDAs and TDAs for the LME approach) along with a regional GIS Atlas
- e. Strengthen national and regional databases of indicator monitoring for identification of trends/changes and identify national and regional focal points and institutions for monitoring and data management
- f. Develop and implement regular reporting protocols at both national and regional level to ensure that the results from monitoring and any indications of changes are rapidly communicated and translated into adaptive management guidelines and policy realignments
- g. Identify and capture 'best practices' related to indicator monitoring and ecosystem assessment
- h. Establish regular regional meetings and symposia to share results and discuss trends from ecosystem assessment and indicator monitoring

Actions related to Declines in Living Marine Resources

- a. Develop and conduct appropriate stock assessment monitoring on key species
- b. Develop effective data collection protocols for landing points in the artisanal, semi-industrial and recreational sectors
- c. In parallel, develop databases for catch, effort, landings and other related biological and socio-economic data (including by-catch and discards data)
- d. Develop and adopt standard protocols for submissions (annual reporting, etc.) to the scientific committees of the RFMOs as well as to appropriate institutions at the national level
- e. Identify key fisheries for certification mechanisms and provide support to countries to move toward such certification
- f. Monitoring and development of anchored FADs as appropriate
- g. Undertake a study of resource-users and economic benefit of the reef and demersal fisheries in the region (to include recreational fisheries and tourism activities)
- h. Undertake further economic studies of effort and capacity and options for harvesting rules including retention and/or reduction options for by-catch and discards
- i. Undertake studies and develop appropriate monitoring and reporting protocols on the major impacts of climate change on reef and demersal fisheries
- j. Undertake migratory studies on fishers and the impact on resource use

4.B. A Capacity Building and Training Programme

The importance of building both human and institutional capacity to achieve effective regional management of the Western Indian Ocean Large Marine Ecosystems has been recognised by the countries as a priority throughout the MEDA-TDA-SAP development process. In order to ensure sustainability in scientific monitoring research, as well as in the provision of results and trends that can guide management options, it is essential to adopt effective training mechanisms and introduce new training courses where these are absent. Furthermore, the creation and support to new networks of relevant expertise within the region is also seen to be a necessity.

Following on from the national Capacity Building and Training strategies identified in each of the national MEDAs, the countries of the region have developed a regional Capacity

Building and Training Programme to help them to address their shortfalls and needs. The regional program is based on the following 15 key regional challenges:

1. A need for improved infrastructure and equipment in national institutions and facilities
2. A need for more and better equipped schools
3. A need for basic marine education in school curricula
4. A need for improved capacity and expertise (through short- and long- term training) at all levels including but not limited to fishers, processors, marketers, investment agencies, biological research, stock assessment, oceanographers, marine geographers, aquaculturists, marine engineers, economists, monitoring, surveillance and compliance, governance experts, socio-economists, marine lawyers, marine meteorologists and health and tourism planning.
5. Middle and senior managers often lack background and training in the marine field
6. A need for more incentives for Government service, particularly salaries
7. Choice of candidates for training programmes is often not taken strategically
8. Lack of implementation of training received
9. Language barriers pose a challenge
10. Communication challenges within and between government departments and ministries, and the private business sector - local, national, regional
11. Writing of research proposals and scientific articles, which could generate additional funds for research.
12. Other than South Africa, lack of offshore platforms for research and training
13. Training by NGOs not sustained
14. Lack of mentors and mentorship
15. Private-Public collaboration requires substantial expansion for maritime studies

To effectively address these challenges, the countries requested the formation of a Capacity Building and Training Coordination Group/Panel of regional partners supported by international bodies and individuals to facilitate training in the WIO LMEs region. The CB&T Action Component and the CB&T Coordination Group would aim to work closely with and cooperate with any existing or planned initiatives throughout the region and globally. It is further recognised that the National CB&T Plans are a critical and integral part of any regional CB&T initiative or programme and must be given equal priority and support.

The main functions of such a Group/Panel for Capacity Building and Training would include:

- To identify, encourage and advise on existing Capacity Building and Training initiatives in the region, and where appropriate, build on regional initiatives and centres with expertise for future training and support the development of such initiatives and centres.
- To undertake a coordination role, where appropriate, by identifying and expanding on key courses and training activities within and across the region, recognise and endeavouring to resolve national and regional communication issues and language barriers where possible.
- To successfully undertake specific interventions to implement the priority training requirements of the region as identified in the National Training Plans within each country MEDA as well as the regional training objectives as identified through the Transboundary Diagnostic Analysis.

This Group/Panel would interact directly with the partners of the Alliance and could be formally raised as a Working Group through the regional Scientific and Technical Advisory Panel.

It was noted that the CB&T Action Component of the SAP was mainly targeting tertiary education, yet it needed also to address middle level technician training as well as the Training-of-Trainers. The CB&T section should be expanded and should discuss who should be trained and why this is important for the SAP. It should also provide more emphasis on the need and intention for improved networking between universities, academic institutions and training centres in the region

Actions Related to Capacity Building and Training That Would Be Addressed Through the Strategic Action Programme

The following Actions have been consolidated and summarised from the TDA development process and are appended in detail to the TDA document itself as [Appendix 4](#).

All activities will be undertaken in close collaboration with WIO-LaB and Nairobi Convention as well as SWIOFC and other national and regional fisheries management bodies, as appropriate). The following list includes cross-cutting activities related to Unpredictable Environmental Variability and Extreme Events.

The overall aim of the Capacity Building and Training in relation to the identified Main Areas of Concern would be to identify (through capacity assessment and training needs analysis) and resolve gaps and weaknesses in specific areas as follows:

Actions related to Water Quality Degradation

- a. Monitoring and reporting of microbial contamination; solid waste; oil and hazardous chemicals; run-off from agriculture and sewage, etc.
- b. Design, construction and function of various forms of waste reception facilities including oil and hazardous chemicals handling, sewage systems, etc.
- c. Use of oil and hazardous chemical spill clean-up equipment, response measures and rapid response contingency plans

Actions related to Habitat and Community Modification (especially in relation to coral reefs, mangroves and seagrass beds and other identified vulnerable coastal and nearshore habitat types)

- a. Use of standardised methodologies for coastal vulnerability assessments and sustainable use of coastal resources (including critical habitat survey and monitoring for e.g. coral reefs, mangroves, seagrass beds etc.)
- b. Critical habitat rehabilitation and restoration techniques
- c. Taxonomic training for species identification and assessment of interactions (particularly in relation to management and control of exotic, non-native, invasive and nuisance species)

- d. Use of standard protocols for assessing, mapping, analysis and interpretation related to shoreline change, including monitoring methods for coastal erosion and sea level rise
- e. Ecosystem goods and services and cost-benefit evaluation skills and delivery
- f. Strengthening knowledge on best practices in shoreline management
- g. Strengthening of skills in development of 'best practice' guidelines for main sectors (tourism, mining, energy, etc.)
- h. EIA training for vulnerable habitats with a specific focus on deepwater and seamount habitats

Actions related to Declines in Living Marine Resources

- a. Monitoring, Control and Surveillance and Enforcement techniques
- b. Observer and Compliance/Control Officer training
- c. By-catch (including seabirds) mitigation measures
- d. TAC/TAE and Stock Assessment training to develop harvest control regulations
- e. Safety training for fisheries (including diver training for sea cucumber harvesting)

N.B. Including identification of appropriate short management training courses as well as long-term masters and doctoral study related to all of the above issues

4.C. A Science-Based Governance and Adaptive Management Programme

Understanding the dynamics of change and variability within the Large Marine Ecosystems of the Western Indian Ocean is crucial to any effective management and long-term planning of strategies for sustainable use. An Ecosystem Monitoring Programme can provide the necessary data and information with which to identify any such variability and changes and the Capacity Building and Training Programme can strengthen the skill-set necessary to recognise and interpret such changes. However, the next vitally important step is to communicate this scientific information in a manner that captures the broader implications, not only in terms of changes in such parameters as water quality, ocean-atmosphere interactions or living marine resource distribution /accessibility but also in terms of socioeconomic implications such as community welfare, sustainability of livelihoods, security of access to food sources, etc.

Managers and policy-makers in the Western Indian Ocean region have expressed an urgent need for accurate and timely information, prediction and guidance upon which to base management and governance decisions at both the national and the regional level. One of the challenges in providing such information is the need for any scientific conclusions to be reliable and trustworthy. For this to be ensured then results must be validated and verified through a process of confirming confidence limits and through peer review.

Scientists are understandably cautious about providing conclusions from their results based on anything less than standard scientific 'confidence limits' (commonly recognised as 95-99% confidence intervals). However, scientific results are frequently inconclusive and this then leads to a need for more studies in order to improve the conclusions. Collecting and analysing sufficient data to reach acceptable confidence limits can be very time consuming

and often labour intensive and inevitably has cost implications. Yet, managers and decision-makers need some reliable information to act on, particularly in the current environment of more rapid alterations and consequent impacts such as are now being seen as a result of climate variability and changes. Early action and adaptive management are essential to protect the welfare of the various ‘stakeholders’, including the coastal communities, up to the level of national economic interest and overall national governance.

Within this context of need versus caution, the Precautionary Approach is clearly a necessity. However, a more dynamic management approach is needed that can react to clear trends and signals in data pointing toward predictable changes and the requirement for appropriate consequent management responses. Such an approach also needs to be able to highlight priority areas for urgent study and analysis.

For several decades, scientists and managers have been experimenting with a methodology that allows for the building of scientific arguments based on a ‘weight-of-evidence’. This approach is being increasingly used now in environmental and fisheries science to arrive at guidelines and predictions that have sufficient strength-of-argument to be able to support and justify management decisions. The “weight-of-evidence” approach is also commonly used in other reasoned arguments within law, medicine and public administration. This approach is also currently being explored by a number of regional fisheries management organisations as a method for analyses of stock status indicators when data are considered insufficient to conduct full assessments. However, in most cases a formal system that reviews those qualitative indicators and provides a recommendation on the current status, based on the weight-of-evidence has yet to be developed.

The Strategic Action Programme will aim to develop and adopt an appropriate methodology for delivering scientific knowledge and the results of predictive modelling to decision-makers for adaptive management purposes (Science-Based Governance) using a ‘weight-of-evidence approach. This Science-Based Governance methodology would follow a sequential pathway described below in a Road-Map and as shown in Figure 5, but will also come under frequent review and possible revision by both the SAP Science and Technical Advisory Panel and the SAP Regional Steering Committee.

Wherever possible, the Science-Based Governance methodology would ‘anchor’ itself within existing bodies to avoid creating any further unnecessary administrative or institutional burdens. One obvious body for consideration here is the Western Indian Ocean Marine Science Association.

The development of appropriate national mechanisms for effective delivery of Science-Based Governance will require specific in-country consultations and ‘roundtable’ brainstorming. This is recognised as being an essential part of the actions that would be pursued and supported through the SAP, building on the Science-Based Governance regional and national roundtables and workshops that have been supported and promoted through the ASCLME and SWIOF Projects to date.

Road-Map for the Incorporation of Scientific Knowledge into Management and Policy Decisions

I. From Knowledge and Research to Review

Scientific Knowledge and studies will be available to a review panel from two sources. The first source would be traditional publications which have already

proven their results through acceptable confidence intervals. The second source would be the results of the Ecosystem Monitoring and Indicators Programme and through associated papers submitted as ‘Trends in Ecosystem Variability and Adaptive Management in the Western Indian Ocean’. These would be sent to an appropriate regional scientific body (e.g. WIOMSA) so that this body could consider any submissions to be sent to an appropriate set of Peer Reviewers that is multi-disciplinary (including natural and social scientists as well as economists and governance/policy experts). The Peer Review process would be purposely comprehensive to ensure that all implications from either published, peer-reviewed papers or from any ‘trends’ seen to be arising from other studies and research are taken into account. In particular, publications and possible ‘trends’ would be discussed in the context of their social and economic implications to countries and the region, and particularly in the context of the appropriate Millennium Development Goals and the World Summit on Sustainable Development Plan of Implementation. Based on these discussions, scenarios would be evolved showing different options for managers or policy-makers at the national level and for management bodies such as RFMOs or environmental conventions, etc. for their discussion and further action. It is envisaged that this process could be evolved much more specifically under a regional scientific body, such as WIOMSA, that could effectively oversee and drive this Science-Based Governance process, assuming that there was sufficient support, capacity and resources to carry out this relatively demanding function.

2. From Review to Trend Assessment through Weight-of-Evidence

The selected Peer Reviewers would consider the weight-of-evidence in each individual paper in terms of scientific method, appropriate linked and supportive references, spatial and temporal relevance to the WIO and particularly more sensitive areas, social and economic implications and related need for urgent action, etc. a set of quantitative and qualitative indices will be developed by recognised regional scientific bodies such as WIOMSA, along with the SAP Scientific and Technical Advisory Panel (see below). The aim would be to arrive at a measure of probability that a particular noted trend has validity and should be acted upon. In its simplest form, such an allocation of probability could fall into five-category summary (Highly Probable; Probable, Likely; Unlikely; Highly Unlikely) or similar allocations, but based on some rather more specific allocation of statistical values wherever possible. Trends that are identified as being Unlikely or Highly Unlikely would be eliminated from further review or action. Trends that fall into the Likely category would be referred back within a ‘fast-track’ system for more study. Trends that fell into the Probable or Highly Probable category would be recommended for further urgent review and action.

3. From Trend Adoption to Management and Policy

Those Trends that are allocated a Probable or Highly Probable category would then be considered in detail in the context of their implications at the ecosystem management level (including socio-economic and community welfare implications). Proposed management options would be defined related to different levels of cost, enforcement, social disruption or improvements, human resource needs, etc. The assessment of probability and the optional adaptive management strategies would then be drafted into a briefing report along with proposed prioritisation for further studies and funding. This Report would be submitted to the SAP Regional Steering Committee (see below) as part of an annual ‘State of the LMEs’ report. After review

and discussion (and possible amendments), the SAP Regional Steering Committee would ensure appropriate dissemination of these reports to A. National Focal Institutions and the national SAP Scientific and Steering Bodies for further discussion and onward advice to management and policy levels in-country, and B. Intergovernmental Organisations for consideration and possible action at the regional level. These reports would also be shared with the Alliance partners who could provide further input in terms of actions that they may be able to support to address any strong trends and urgent issues arising.

4. Feedback from Management and Policy to further Research

Recognising that this Trends and WoE approach has inherent weaknesses in terms of full confidence and validity, those Trends that have been identified as Probable or Highly Probable would receive highest priority for further studies and related funding and would be channelled into such a fast-track through the interventions of the STAP and such regional bodies as WIOMSA which could keep a record of priority studies (along with their level of priority) and would cooperate closely with regional and international funding agencies in order to address the highest priorities in research as efficiently as possible.

Figure 4 provides some examples of trends already recognised during the TDA process and by partners to the TDA-SAP development that could be addressed through this mechanism.

Figure 4: Some Working Examples of the Science-Based Governance Approach

Example One: Productivity in the Mozambique Channel

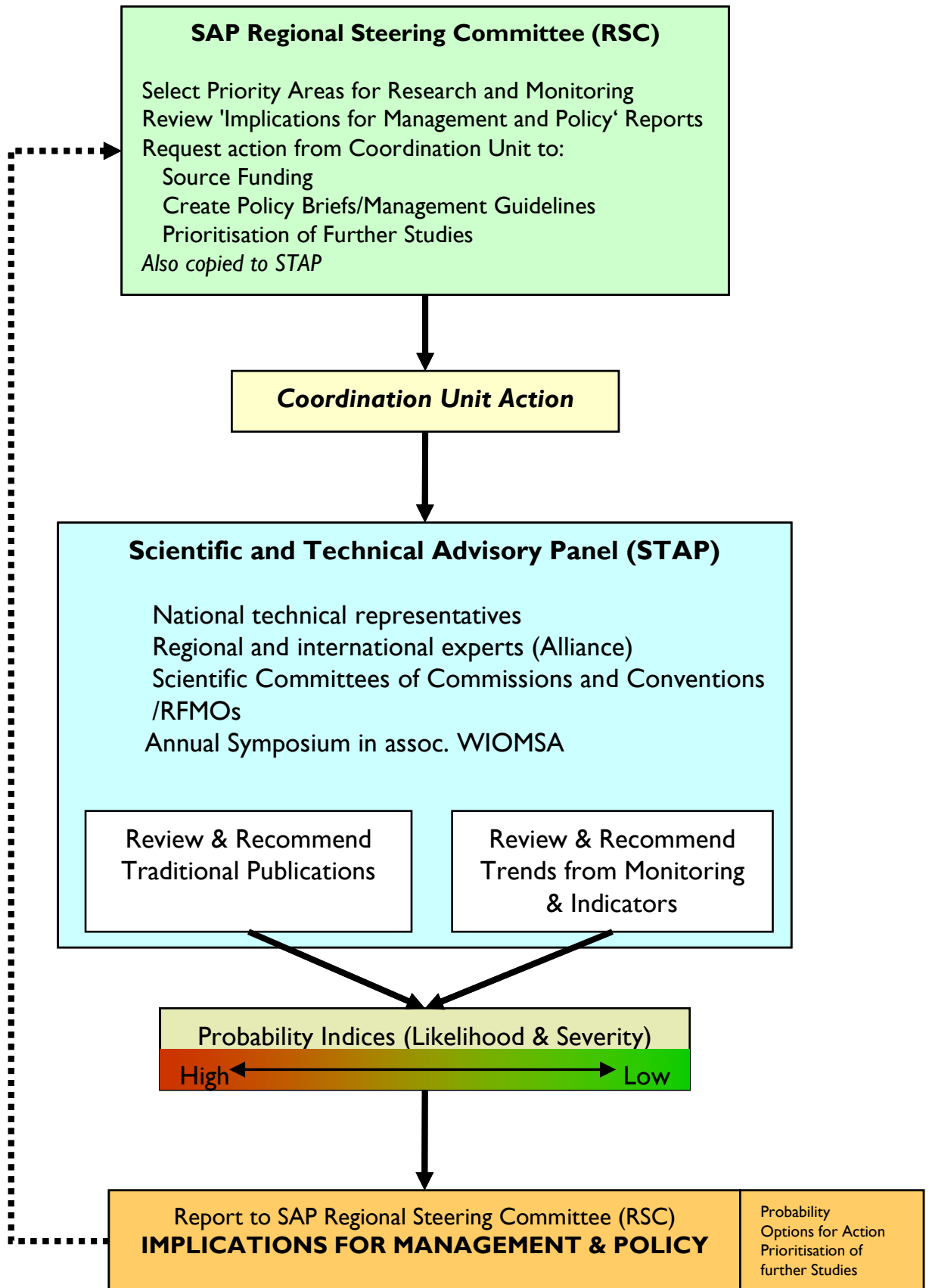
Recent studies have demonstrated the important role of large dipole eddy systems in the Mozambique Channel which constitute the flow of the Agulhas Current (no longer linear as was previously assumed). The dipole eddies create upwelling features in the channel which lift nutrient-rich water up into the photic zone and provide the foundation for a highly productive food web supporting top predators, including human population. Certain trends in the data are now suggesting that changes in ocean-climate interactions may be driving alterations in the kinetic energy of these eddies and associated productivity. Such an event might well be quite normal and cyclic in the long-term but could also have consequences for the millions of people who live on the long coastlines bordering the Mozambique Channel as well as distant water fleets that have licence arrangements with bordering countries for set quotas. The trends at present are too uncertain to take any decisive action in terms of adaptive management (e.g. more stringent quotas, alternative sources of fish/protein, alternative livelihoods). However, this sort of trend should be seen as a high priority and should be targeted for immediate support in terms of further studies that can help to clarify the trend and arrive at predictions temporally, spatially and in terms of size of impact. The WoE approach and the Science-Based Governance mechanism would highlight this issue and make strong recommendations regarding the type of studies needed and would help to identify funding for such a study. In actual fact, this process has already been followed through an ACEP-ASCLME-SWIOFP-IRD partnership and through support from a variety of WIO Alliance partners in attempts to access priority funding for these important studies. In this sense, an SBG and WoE approach is already evolving alongside the Alliance. The research itself is very multidisciplinary in terms of the natural sciences. The analysis and modelling will be even more so through the incorporation of socio-economic issues and cultural impacts.

Example Two: Sea Level and Temperature Rises in the WIO Region

A number of peer-reviewed papers¹ have demonstrated that the WIO region is something of a hotspot for change in terms of the impacts from climate change and/or variability. Since the 1980s global sea level rise has been recorded at around 3.5 mm per year and is getting faster accord to more recent altimetry records (since the 1990s). However, this is not globally uniform and trends are now apparent that indicate a sea level rise of as much as 10 mm per year around a number of Indian Ocean islands. Similarly, the Indian Ocean as a whole has experienced some of the strongest levels of global warming of up to 1° C since 1950. Yet recent published work on the Agulhas Current demonstrates level of warming up to 1.5° C since only the 1980s, with evidence that this significant warming is a result of the intensification of the Agulhas Current system as a response to an increase in trade wind in the south Indian Ocean. The implications of a continued trend of this nature (i.e. in terms of sea level rise and sea surface temperature) are multitudinous. If the trend for a 10 mm rise in sea level per annum around the islands is confirmed then this has major implications for coastal communities, tourism, freshwater lenses and seawater inundation, etc. Furthermore, if sea temperatures continue to rise in the Agulhas Current at the rate of 0.5° C per decade as per the peer-reviewed results of these studies indicate, then the next 30 years could see significant impacts in terms of ocean-atmosphere interactions and weather patterns, ocean acidification, alteration in critical habitat types (coral reefs, etc.), and the migration of living marine resources upon which coastal communities depend. Already there is published evidence that fish-stocks such as sardine, anchovy and rock lobster have significantly shifted their distributions in a southerly and easterly direction which will inevitably directly affect coastal communities that depend on these stocks for as a food source and for their livelihoods. Initial management decisions should address such issues as set-back regulations for coastal building; enhanced legislative protection for coral reefs, mangroves and seagrass beds as well as other wetlands, all of which provide a vital form of protection against sea level rise, etc. Any realistic adaptive management decisions would need to be based on further data collection and predictive modelling.

¹ Cazenave, A and W. Llovel. 2010. Contemporary Sea Level Rise. *Annual Review of Marine Science* 2(1):145-173.
Rouault, M., B. Pohl and P. Penven, (2010) Coastal Oceanic Climate Change and Variability from 1982 to 2009 around South Africa, *African Journal of Marine Science* 32(2): 237-246

Figure 5: Schematic Flow-Chart for a Science-Based Governance Mechanism



Actions Related to Science-Based Governance and Adaptive Management that would be addressed through the Strategic Action Programme

The following Actions have been consolidated and summarised from the TDA development process and are appended in detail to the TDA document itself as [Appendix 4](#).

All activities will be undertaken in close collaboration with WIO-LaB and Nairobi Convention as well as SWIOFC and other national and regional fisheries management bodies as appropriate). The following list includes cross-cutting activities related to Unpredictable Environmental Variability and Extreme Events.

Actions related to Water Quality Degradation

- a. Development and adoption of effective and standardised Environmental Impact Assessment criteria, standards and regulations for watershed, coastal and offshore activities that could contaminate/pollute the marine ecosystem (including mariculture/aquaculture and impacts from contamination, waste and potential invasive species)
- b. Review existing national plans for waste management and develop new plans and programmes as necessary including A. Development of appropriate port facilities for recycling and reuse of ship-borne wastes and B. Implementation of incentive measures/mechanism for use of such facilities and implement an awareness and educational campaign
- c. Ratify and adopt IMO protocols into all domestic legislation and regulations throughout participating countries
- d. Review existing national and regional Oil and Hazardous Materials Spill Contingency Plans and Oil Spill Response measures
- e. Prepare, adopt or modify/improve regional guidelines for OHMSCP and Rapid Response including the development and/or support any on-going process to adopt a regional response facility and emergency centre for Oil and Hazardous Materials
- f. Collaborate closely with the oil, gas, chemical and shipping industry and IMO to develop appropriate responses, equipment stockpiles and response coordination centre(s)

Actions related to Habitat and Community Modification (especially in relation to coral reefs, mangroves and seagrass beds and other identified vulnerable coastal and nearshore habitat types)

- a. Review and update as appropriate Coastal and Nearshore Vulnerability assessments and mapping (including ecosystem services evaluation and habitat monitoring and management strategies as well as loss-mitigation and reduction measures for high-priority critical habitat types)
- b. Develop/improve Integrated Coastal Zone Management institutional, policy and legislative frameworks (including regulations relating to shoreline management and coastal set-backs; critical coastal habitat strategies;
- c. Develop a regional strategy for collaboration and sharing of best lessons and practices in ICZM and habitat management, especially in relation to vulnerable areas and MPAs.
- d. Develop effective plans and strategies (as per above) to apply to deepwater vulnerable/critical habitats (including seamounts both within and beyond national jurisdiction)

- e. Review/Revise national legal and policy frameworks relevant to the control of non-native, invasive and nuisance species to ensure compliance with international law (including IMO)

Actions related to Declines in Living Marine Resources

- a. Set by-catch target levels and develop regulations and processes for controlling discards, for inclusion on EAF Management Plans
- b. Undertake studies on value and value-added options for various fisheries/species.
- c. Develop EAF Management Plans (regional and national – as appropriate) for all harvested species (including regulations and guidelines relating to environmentally friendly/ selective gear, zonation, artisanal versus industrial access and control, regulations to combat destructive fishing)
- d. Further develop management plans and policies specific to certain fishery types such as small-scale, subsistence and ornamental fisheries

4.D. Community Engagement and Stakeholder Involvement for more Inclusive and Effective Implementation of a Strategic Action Programme for LME Management

Communication and stakeholder participation will always pose a significant challenge when working across the extensive ASCLME region, the different languages, many countries and accessibility of coastal communities involved. Building on a broad range of activities undertaken, and through discussions and advice from the countries, a range of activities is planned, aimed at addressing the challenges, expanding our communication network and ensuring broad communications and stakeholder participation throughout the ASCLME region. These will include but not be limited to:

Broadening the scope of community involvement:

A Distance Learning and Information Sharing Tool (DLIST) was successfully introduced as a pilot project through a Community Stakeholder Participation Demonstration undertaken within nine communities, covering all the participating countries except Somalia. While recognising the challenges in developing a cost-effective mechanism to broaden the current participation, the pilot phase has made some useful steps in ensuring dissemination of information on marine issues to the communities, and the communication of local issues by these communities into the TDA/SAP process, through MEDA input reports and information in the Local Economic Development Plans (LEDs). An electronic community of some 400 members has been developed, and following a review process, an expansion of these activities will be considered. In order to build on this demonstration work, the Strategic Action Programme will need to consider the outputs from the DLIST process and from the Community Stakeholder Participation Demonstration in terms of the Local Economic Development Plans that have been developed, as well as through the MEDA inputs and any guidance these can give to further community engagement in the Strategic Action Programme. Special attention would be given to the feasibility of implementing the Local Economic Development Plans.

Enhancing Involvement of the Private Sector and Industry:

So far, during the TDA-SAP development process there has been very successful engagement with marine industry through the World Ocean Council - WOC (which is an industry consortium) as well as through growing partnerships with fishing cooperatives

such as the Southern Indian Ocean Deep Sea Fishers Association (SIODFA). A recent *Aide Memoire* with the World Ocean Council has brought them into the Alliance partnership and identified areas of mutual cooperation and collaboration as follows:

- Cooperation in the Smart Ocean/Smart Industries programme: Leading ocean industry companies aim to collaborate with the scientific community in a systematic, regular, sustained and integrated collection and reporting of standardised oceanographic and atmospheric data as a contribution to maintaining and improving ocean health and for modelling of ocean conditions and climate change
- Demonstrating an effective process for engaging the Ocean Business Community into the objectives of LME Strategic Action Programme including mutual improved data quality assurance and control along with the development of pragmatic and workable management mechanisms and practices
- Incorporating the private sector into the Alliance of Partners in the region (the Western Indian Ocean Sustainable Ecosystems Alliance – WIOSEA)
- Using the SAP Implementation process as a demonstration of private sector engagement in the monitoring and management process for Large Marine Ecosystems which can be replicated around the world.

Website

The ASCLME and SWIOFP Project websites serve as an internationally accessible resource with comprehensive background information about the Projects and their activities and periodic updates covering ongoing actions. A popular feature has been the cruise blog, which serves as a slightly less formal window into the Project's activities, showcasing Project scientific activities as and when they happen. Over 60,000 visitors have seen the site, with over 124,000 page-views. Websites are a relatively low-cost but very flexible method of making such information available to large audiences, and can be enhanced and expanded through the SAP Implementation Process to provide useful links to Alliance partners.

Films

The ASCLME Project has produced two films, a 26 minute documentary-style “education and awareness-raising” film, produced in conjunction with WIO-LaB, entitled *Rivers of Life, Oceans of Plenty* and a shorter 10 minute film, aimed at policy-makers with an emphasis on climate change and its impacts on marine and coastal resources, entitled *Planning for Change*. The films were distributed as DVDs and are available electronically. Further films will be explored, covering some of the key regional issues addressed in the SAP.

Education

In addition to the films above, a partnership will be explored to further develop a series of educational materials, aimed at school level, and based around workbooks and video-based lessons, which cover environmental issues and the impacts of human activities from the water cycle, down rivers, through estuaries and into the sea. Completed modules include the water cycle, rivers and estuaries (temperate), with modules on the coastal environment, shallow water ecosystems and the broader ocean in development. A key concept of this series is that the materials are introduced to educators through workshops, which enable deeper understanding and familiarity with the materials, and making the information more locally relevant by choosing and incorporating local case studies and assisting educators

with effectively utilising the materials. In conjunction with the Education ministries, these material will explored as a possible addition into existing school curricula.

Newsletters

The ASCLME Project, latterly in conjunction with SWIOFP, has produced annual printed newsletters in 3 languages, covering project activities and achievements throughout the region and serving as a useful and engaging summary of activities of the Projects and their various partners. These are also available electronically. The first newsletter also included a large poster showcasing the Project and region. These activities proved to be enormously successful, and could be continued and expanded through the SAP Implementation Process.

Media Engagement

The SAP Implementation Process will continue to utilise mass media, particularly in print, with focal activities such as ship port visits and large meetings serving as useful “incentives” to engage media interest in the Project and its activities.

Ad hoc

The SAP Implementation Process will continue to communicate with stakeholders through meetings, both regionally and internationally and will often produce event-specific communications materials targeted at specific events or audiences. Ship port visits have enabled some public participation activities such as ship visits, which serve as a useful opportunity to showcase marine research and the broader issues which the SAP Implementation Process aims to tackle. Networking with other LME practitioners and marine researchers in general has been facilitated through active participation in various conferences. Publication of peer reviewed scientific papers and contributions to academic books will also be vital parts of the SAP Implementation Process and its communication activities.

Actions identified from the TDA process in relation to Community Engagement and Stakeholder Involvement tend to be cross-cutting across the various Main Areas of Concern. Education and awareness campaigns, for example, could appropriately address water quality issues, habitat and community modification and declines in living marine resources rather than focusing on one specific issue. Likewise, the selection of long-term monitoring stations at the community level would want to capture changes in habitat as well as water quality and living marine resources. The Causal Chain Analysis (CCA) undertaken and reported on in the TDA identified the key root causes. All of these ultimately require the engagement of stakeholders at various levels of society to fully address. Most of them are particularly noticeable at the community level. Whilst the previous 3 SAP components (Ecosystem Monitoring; Capacity Building and Training; Science-Based Governance) address the Main Areas of Concern noted in the TDA, this component in turn seeks to address the Root Causes underlying the Main Areas of Concern as a cross-cutting activity that will effectively engage society in achieving the vision of the SAP. While stakeholders are embedded in each of the 3 existing components, stakeholder engagement, particularly at the community level, is sufficiently vital as to warrant an additional Component in the SAP.

Notwithstanding the root causes identified through the Causal Chain Analysis (and the necessity for a broad stakeholder engagement to address these root causes) there were some specific activities that were identified in the TDA that relate to community and stakeholder engagement include:

- Selecting and adopting appropriate indicators of socioeconomic stability and welfare related to ecosystem goods and services
- Selecting and adopting demonstration sites and associated long-term monitoring stations (particularly using community and stakeholder monitoring approaches)
- Community and stakeholder training in participatory shoreline monitoring
- Test/Pilot management strategies at demonstration sites (with a clear focus on socio-economic linkages and community welfare) including monitoring and enforcement plans and activities and appropriate engagement and collaboration with local coastal communities
- Development of effective education and awareness campaigns and materials including media programmes, school campaigns and workshops, brochures and information leaflets
- Community and stakeholder awareness raising programmes
- Develop a mechanism for consultation with key stakeholders in order to agree on sustainable catch levels and rules for harvesting control/ mechanisms for all harvested species for inclusion in EAF management Plans

Chapter Five

Proposed Cooperative Mechanisms and Institutional Arrangements

The ASCLME and SWIOF Projects have undertaken a Policy and Governance Assessment for the Large Marine Ecosystems which has also taken into account similar work undertaken during the WIO-LaB project and other related marine and environmental projects in the region.

The Policy and Governance Assessment has shown that the western Indian Ocean Region has a plethora of regional institutions that have legal competence in relation to various and diverse aspects of marine resource management in the region. These range from the Nairobi Convention, primarily concerned with biodiversity issues, land based pollution, and some areas of coastal zone management; through the South West Indian Ocean Fisheries Commission (SWIOFC) which is an advisory body restricted to EEZ resources; to the Indian Ocean Tuna Commission (IOTC); and the Southern Indian Ocean Fisheries Agreement (SIOFA), which is a non-tuna Regional Fisheries Body which has only recently entered into force and operates within the high seas. All these treaty regimes have clear but separate mandates. While there is some potential for overlap in their mandates, there is little expectation or desire by these bodies to expand their competences. There are also a number of regional integration and cooperation bodies which add another layer of institutional requirements and interactions, often seeking to coordinate the activities of sub-groups of countries in their national activities and in the wider regional bodies. Notable are the SADC, COMESA, COI, IGAD and the East African Community which has highly detailed and sophisticated protocols on Environment and Natural Resource Management and on Marine Resources and Fisheries. The African Union NEPAD also runs a regional fisheries project (SPFIF), funded by the World Bank and NEPAD which is coordinating the Partnership for African Fisheries initiative and CAMFA. Also quite recently, the countries in cooperation with UNESCO-IOC have created an IOC sub-commission for Africa and the adjacent Island States. The IOC Sub-Commission for Africa and Adjacent Island States is an intergovernmental subsidiary body of the Intergovernmental Oceanographic Commission of UNESCO responsible for the promotion of regional and international cooperation, and the development and coordination of the Commission's marine scientific and research programmes, the ocean services, the ocean observing systems, capacity development and related activities in the region by taking account of the specific interests and priorities of Member States from Africa.

Furthermore, the countries of the WIO region are party to a significant number of global treaties, conventions and agreements relating to environment, fisheries, marine shipping and pollution, wildlife and heritage, etc., many of which have quite detailed legal requirements that the countries often find difficult to meet in terms of their formal commitments. The full list of these commitments is included in the final report from the Regional Policy and Governance Assessment.

This Assessment therefore discussed a variety of options for the development of an Ecosystem Based Management approach in the Western Indian Ocean region that could deliver the objectives and outputs of a Strategic Action Programme, taking into account the need to develop strong links between Science and Governance and the need also to coordinate between these many different mandates and sectors. The final group of options that could feasibly be adopted were defined as follows:

A 'Business as Usual' Approach – Maintaining the *Status Quo*

Virtually all the national reports developed in this Assessment process, as well as a series of reports prepared by the wider project and other financed projects, have highlighted the shortcomings of the current situation. Apart from specifically funded, project-based activities and the activities of sectoral organisations discussed later, there are very few systemic transboundary collaborative management activities in the region. Language and cultural differences, as well as widely different levels of development impede collaboration; nevertheless the work done by both the ASCLME and the SWIOF Projects and the WIO-LaB Project before them demonstrate that there is a need for change to reflect the full economic value to the region of effective LME based management of the marine environment and its resources – maintaining the *status quo* would be a major lost opportunity.

Enhancement of an existing institution

The Policy and Governance Assessment has highlighted the many and varied mandates and responsibilities both within national governments and within the regional Intergovernmental Organisations ranging across the various sectors from environment, fisheries and aquaculture to energy (oil and gas), shipping and transport, tourism, mining, biosafety and invasives, etc. Many of these existing institutions are addressing their mandates as best as possible, but often under difficult financial constraints. Within the UN there had been an ongoing discussion about the lack of comprehensive ocean governance institutions at the global and regional level. While sectoral issues such as maritime transport, deep seabed mining and fisheries are the responsibility of, respectively, the International Maritime Organization, the International Seabed Authority and the various Fisheries Management Bodies under FAO, there is virtually no coordination between or among them. The Assessment concluded that, despite, or perhaps because of, the large number of regional bodies that exist in the WIO region there does not seem to be an obvious candidate for a role in promoting the co-ordination of ecosystem based management for the LME as a whole.

Establishment of a new institution

While a number of other GEF-financed LME projects have sought to develop new institutions to take on an LME management role after the GEF project, it has been made very clear that there is little appetite in the WIO region for a similar approach. Participating countries have expressed clearly and on a number of occasions that they are not interested in supporting the creation of any form of Commission or new over-arching body. This decision to avoid creating any new regional institutional arrangement with overall responsibility for LME management is based on the logic that there are already mandated institutions that have historically been managing many of the LME issues and continue to do so. Any new regional management body would therefore only serve to confound and confuse by acting against expectations and crossing existing mandates, inevitably leading to contradictions and potential conflicts and alienation.

A Structured Non-Binding Collaboration and Cooperation Mechanism

The Assessment noted that other models have been used in similar situations which promote partnership and cooperation through non-binding cooperative agreements. One such model has been notable successful in East Asia and that is the Partnerships in

Environmental Management for the Seas of East Asia (PEMSEA) which has eleven states in it partnership at very different stages of development. The partnership also includes nearly 20 non-country partners such as IUCN, the International Ocean Institute and the IOC Sub-Commission for the Western Pacific.

It is an arrangement based on this less formal model which seems to have evolved somewhat organically from the work of the ASCLME and SWIOF Projects. In seeking to find ways of establishing collaboration without creating new (or changing existing) institutions, the model of a Western Indian Ocean Sustainable Ecosystem Alliance has developed and is already proving to be effective. There is already a large degree of support for a Western Indian Ocean Sustainable Ecosystem Alliance (WIOSEA). Such an approach was initially proposed at the First Western Indian Ocean Stocktaking Meeting for an Ecosystem-Based Management Programme, in March 2010, which was convened alongside the Conference of the Parties to the Nairobi Convention. This meeting was a high-level policy meeting of the Western Indian Ocean countries participating in ASCLME, SWIOFP and WIO-LaB along with a number of active regional and global agencies and funders. The countries and their partner agencies endorsed “the need for developing and implementing a Western Indian Ocean Sustainable Ecosystem Alliance based on the principles of ecosystem-based management, which will ensure the efforts and inputs of all stakeholders are captured and evolved into an effective regional management and governance system for the WIO LMEs”. Since then, the Alliance has been discussed and supported at a number of regional scientific and policy level meetings, and at a number of international level platforms particularly in relation to the need to capture high seas management issues within the LME governance mechanisms.

Conclusions from the Policy and Governance Assessment

It was clear from this analysis that there is a need for change to reflect the full economic value to the region of effective LME based management of the marine environment and its resources. Undoubtedly, maintaining the *status quo* is seen as a major lost opportunity. There are already a large number of players and funding streams in the region that can act as a ‘core’ group of mandated bodies driving some of the essential requirements of an LME Management Strategy. In this context, there is no need for new institutions. What is needed is a mechanism that will facilitate better collaboration and encourage a better focus on ‘gap’ areas that are poorly addressed (or not at all), while identifying new partnerships to strengthen activities related to LME management. The collaboration of the ASCLME and SWIOF Projects has already provided a model for the region as a whole and much of the foundation work for this has already been done by the Project Management Units. In particular, this is evolving well through the existing *Aides Memoire* which have been adopted with many and varied partners for collaboration in such areas of mutual interest as LME monitoring, predictive modelling, governance mechanisms, identification of critical habitats, designation of MPAs, high seas management, etc, etc. It was therefore a strong recommendation from this report that both projects were already approaching the management and governance needs in an appropriate manner and that the ‘Alliance’ model should be evolved and adopted for the WIO LMEs.

However, notwithstanding the decision to use an Alliance model for actual implementation of activities within the Strategic Action Programme, the countries have noted the advisability to link the SAP directly with a national or regional institution or body within the participating countries that can provide an executive ‘home’ for the SAP, particularly in context of legal and financial accountability.

A Western Indian Ocean Alliance of Partners for Implementation of a Strategic Action Programme for LME Management

The Alliance approach has been embraced by a large number of the partners who are working with the ASCLME and SWIOF Projects as well as by the countries through the Project Joint Steering Committee. The intended method of delivering the necessary cooperative actions to implement the proposed Strategic Action Programme would be through such an ‘Alliance’ of partners. The basic concept of such an Alliance is to build on and consolidate the relationships already established during the implementation of the ASCLME and the SWIOF Projects. It would act as a means of unifying governments, international organisations, scientific bodies, NGOs, the private sector and civil society within the WIO region in efforts to consolidate support for the development and implementation of an ecosystem approach to marine governance and for the actual implementation of the Strategic Action Programme. This Western Indian Ocean Sustainable Ecosystem Alliance has a current membership of 22 regional and global academic, scientific and Intergovernmental institutions and NGOs (as well as private industry through a single Council) through bipartite and tripartite agreements. The various partners of the Alliance have agreed to allocate funding and capacity to support the Strategic Action Programme for the Western Indian Ocean, particularly in the areas of Ecosystem Monitoring; Capacity Building and Training; and the development of Science-Based Governance as well as Community Engagement. The intention now is to consolidate these partnership agreements through the Strategic Action Programme under one single agreement for cooperation. The following text describes the bodies and interactions surrounding and supporting such an Alliance.

A SAP Alliance at the Scientific and Technical Level

The foundation of this Alliance would be a working partnership at a scientific and technical level. Building on existing agreements and partnerships for long-term monitoring of the ecosystem and impacts, collaboration at this technical level would involve the identification of ‘gaps’ in science, data capture and monitoring and the subsequent negotiation and adoption of further agreements through the Alliance to address the gaps. In terms of existing partnerships, much of the scientific monitoring of the WIO LMEs is being undertaken through an ‘Alliance’ agreement. Various partners within this Alliance would take responsibility for funding and delivery of specific activities (e.g. monitoring of indicators of ecosystem welfare; community security; MPA and refugia development and monitoring; fish stock assessments; etc.). Because activities would follow existing funding streams there would not be the need for large initial injections of finance. However, it can be expected that an effective working Alliance will attract further funding and interest, especially for ‘gap’ activities.

A **Scientific and Technical Advisory Panel** would be the major body for ensuring delivery of the 5-year Ecosystem Monitoring Programme and Capacity Building and Training Programme as well as working closely with WIOMSA to advise on any strong trends in the scientific data that need fast action at the management level. The **Scientific and Technical Advisory Panel** would also review data handling and analysis/modelling at the LME level and ensure effective access and sharing where appropriate. Membership would consist of the following representation:

Permanent Members:

- National Representatives (nominated through the SAP Focal Institute in each country)
- Representation from each IGO involved in the SAP Alliance (probably from their respective Scientific Committees).

Observer Members:

- Representation from each NGO involved in the SAP Alliance (possibly through WIO-C)
- Representation from WIOMSA
- Representation from other Alliance partners assisting in Ecosystem Monitoring or Capacity Building and Training (e.g. national research institutions working in the region)
- Representation from Private Sector groups (possibly through World Ocean Council)
- Representation from other projects engaged in LME-related activities in the region
- Representation from appropriate African Economic Communities and Development Bodies.

The responsibilities of this Group would be as follows:

- To oversee, monitor and evaluate the 5-year SAP Ecosystem Monitoring Programme
- To oversee, monitor and evaluate the 5-year Capacity Building and Monitoring Programme
- To review scientific data and information arising from the Ecosystem Monitoring Programme, identify any 'trends', encourage publication and advise on possible management and policy actions that may need to be considered
- To ensure that all data and information are effectively processed, analysed and their conclusions are made available to the appropriate scientific bodies and authorities
- To promote and encourage peer-reviewed publications in appropriate journals, including through WIOMSA
- To identify gaps in both the Ecosystem Monitoring and Indicators Programme and the Capacity Building and Training Programme and to advise on possible options for filling such gaps in terms of partners and funding
- To adopt *Ad Hoc* Working Groups to address specific issues as identified by the STAP or by the SAP Regional Steering Committee e.g. impacts from oil and gas exploration and extraction; implications of transboundary threats from and into high seas areas, etc.
- To report on all of the above to the SAP Regional Steering Committee
- To request assistance and facilitation as appropriate
- Form a SAP Regional Coordination Unit in order to fulfil the above responsibilities and in order to disseminate reports, information and guidelines where appropriate.

An LME Science Conference will be held annually. This would link in with the WIOMSA Scientific Conference held biennially and would aim to look at broader LME-related issues. In the intervening year, the STAP would organise a smaller and more focused event with the Alliance partners based on a very specific agenda set by the STAP and endorsed by the SAP Regional Steering Committee to ensure high-priority research and governance issues are addressed. The Science Conference would be followed immediately by a Donor and Private Sector Symposium (whereby donors and industry partners could pledge support

for certain high priority issues) and this would then be followed by a meeting of the STAP which would review all of the outcomes from the previous Science Conference and Donor/Private Sector Symposium and provide an Advisory Report to the SAP Regional Steering Committee

The SAP Alliance at the Cooperative Management Level

Another important function of the Alliance would be to provide a platform for more efficient cross-sectoral coordination of activities leading to more cooperative management within the LMEs. The currently informal Alliance of partners includes national bodies from the WIO region, International climate and marine research groups and institutions from around the world, members of the UN Oceans group, and the private sector industries (including oil, gas, shipping and tourism).

A primary focus would therefore be to bring together the various sectors that work within, impact on and/or benefit from the Large Marine Ecosystems of the WIO region. Within the governments of the region this includes the sectors dealing with environment, fisheries, energy (particularly oil and gas), tourism, shipping and transport, mining, etc. But an effective and full cooperative management strategy needs also to engage with those government bodies responsible for education, health and finance. Furthermore, it is essential to involve the equivalent companies and groups in the private sector that control oil and gas exploration and extraction, shipping, tourism, fishing, mineral extraction, etc. The Projects have also been exploring possible mechanisms for engaging communities into the management process. This is an inherently difficult process simply from the point-of-view of sheer scale and numbers. However, some progress has been made through a series of demonstrations of interaction at the community level undertaken as part of the Marine Ecosystem Diagnostic Analyses for each country and this would be further developed through the implementation process for this Strategic Action Programme (see section 4.D). In order to better facilitate this necessary level of cross-sectoral management of the SAP, a **SAP Policy Regional Steering Committee** would be established. Representation on this management-level Committee would consist of:

- Cross-sectoral representation from the countries at the level of Permanent Secretaries and Directors-General
- Representation from IGOs involved in SAP Management
- The Chair of the regional Scientific and Technical Advisory Panel
- Representation from other groups and invited observers (permanent or occasional, at the discretion of the Committee Members)

The responsibilities of this Regional Steering Committee would be as follows:

- To ensure comprehensive cross-sectoral engagement in the SAP management process and in overall management issues related to the Large Marine Ecosystems
- To identify any gaps in the SAP process (either sectoral, scientific, capacity, training, funding or management-related) and to advise either the Scientific and Technical Advisory Panel or a regional Coordination Unit of actions that they should take to address these gaps
- To provide a regular platform for exchange of views and updating of activities between the various IGOs, NGOs, Private Sector representation and Governments related to SAP management and the LMEs

- To ensure that the mandates of responsible regional bodies such as the conventions and the RFMOs, etc. are recognised and respected and to provide a forum for interaction between such bodies
- To review and edit draft Policy Briefs developed through the Scientific and Technical Advisory Panel, the SAP Regional Steering Committee and the Coordination Unit and endorsing their circulation to the countries
- To explore and, where appropriate, develop management mechanisms for adjacent high seas areas that fall within the LMEs and border the countries of the WIO region

Interaction between the regional SAP Scientific and Technical Advisory Panel and the SAP Regional Steering Committee

The STAP would respond to the requirements of the SAP Regional Steering Committee in terms of scientific advice and identifying and advising the Regional Steering Committee on any strong trends in science that they need to be aware of in terms of management and policy actions and realignments. Much of this would be through the Science-Based-Governance process as defined above. The STAP would provide regular Reports to the SAP Regional Steering Committee. On the basis of these Reports, the SAP Regional Steering Committee would then call on the SAP Coordination Unit (see below) to take action by, for example, A. facilitating a search for funding for prioritized studies, and B. drafting Policy Briefs based on the management options and recommendations as endorsed by the SAP Regional Steering Committee.

SAP Management Arrangements at the National Level

For this SAP management process to be effective at the regional level, it will need to be anchored at the national level. Fortunately, the TDA drafting and SAP development process has naturally evolved expert groups within each country that have, at the technical level, worked with the projects to develop and finalise the MEDAs and the TDAs, and at the management and policy level steered the development of this SAP.

The most expeditious way forward therefore in ensuring that the SAP management process and the scientific and technical alliance are actively represented in each country would be to maintain these national working and steering bodies.

The expert technical groups in each country that have driven the MEDA-TDA process would therefore continue to act as a long-term SAP National Scientific and Technical Advisory Panel. The same multi-sectoral government and NGO representatives would make up the core of such a body and would invite further members and observers as they feel appropriate.

Each country also nominated a multi-sectoral management/policy group to develop and finalise the SAP document for endorsement by the countries. This same body could be constituted into a national SAP Steering Committee (effectively an Inter-Ministerial Committee for LME SAP Management) where such a body does not already exist at policy level. The same multi-sectoral representation could sit on this Committee but it would also be able to expand its representation as it deemed necessary.

However, it is also recognised that many of the countries also have similar bodies in existence such as the Integrated Coastal Management Inter-Ministerial Committees and the

FAO National Task Groups for the Ecosystem Approach to Fisheries. Where this is the case, the countries should consider whether such bodies might be more appropriate to take on the functions of a national SAP Steering group through a straightforward amendment in responsibility and/or the inclusion of SAP issues in their Terms of Reference. Such a national SAP Committee should thus fit within an existing body where possible but should have representation at the policy level from different sectors (e.g. at the level of Permanent Secretaries and Directors-General).

For the sake of simplicity and continuity, it would then be most logical if the Chair of each National Scientific and Technical Advisory Panel were to sit on the regional SAP Scientific and Technical Advisory Panel, and if the Chair of each national SAP Steering Committee were to sit on the regional SAP Regional Steering Committee.

A SAP Regional Coordination Unit

A small unit or office would be established, based on the existing Project Coordination Unit structure and approach for the ASCLME and SWIOF Projects. This PCU has effectively been carrying out the function of facilitating development of the Alliance and the adoption of agreements with all of the partners as well as coordinating these partnerships in terms of much of the Ecosystem Monitoring Programme. For example, the ASCLME Project and PCU has built capacity for supporting the Alliance as well as project delivery through the creation and maintenance of such posts as a Policy and Governance Coordinator, a Data and Science Coordinator, a Capacity Building and Training Coordinator and a regional Cruise Coordinator as well as an Information Technology and Communications Coordinator. All of these posts have more recently been made available to the SWIOF Project to ensure joint cooperative actions in developing the TDA and SAP process. All of these positions represent a requirement for sustainability to oversee the appropriate functions within the Cooperative Actions of the SAP and in support of the Alliance. Close links would need to be developed with the Nairobi Convention in terms of their Protocols on Land Based Sources and Activities and Integrated Coastal Zone Management and with SWIOFC and any follow-up processes related to the SWIOF Project. This Regional Coordination Unit would focus on providing a facilitating service to the other two main SAP Implementation bodies (The Scientific and Technical Advisory Panel and the SAP Regional Steering Committee). The Regional Coordination Unit would have a Manager/Director as well as a small staff of 2-3 technical people and 2-3 administrative officers (finance and secretarial).

The responsibilities of the Regional Coordination Unit would be:

- The day-to-day delivery of the Ecosystem Monitoring Programme
- The day-to-day delivery of the Capacity Building Programme
- Reporting to the SAP Regional Steering Committee on overall SAP Progress and SAP activity monitoring and evaluation
- Data and Information Handling and Sharing
- Assisting in the development of Briefing and Media documents
- Disseminate regular programme reporting documents and newsletters
- Assisting both the Scientific and Technical Advisory Panel and the SAP Regional Steering Committee in identifying funding opportunities for SAP activities and gaps and accessing those funds where possible
- Liaising with other LME-related projects in the region and bringing them into the Alliance for the SAP

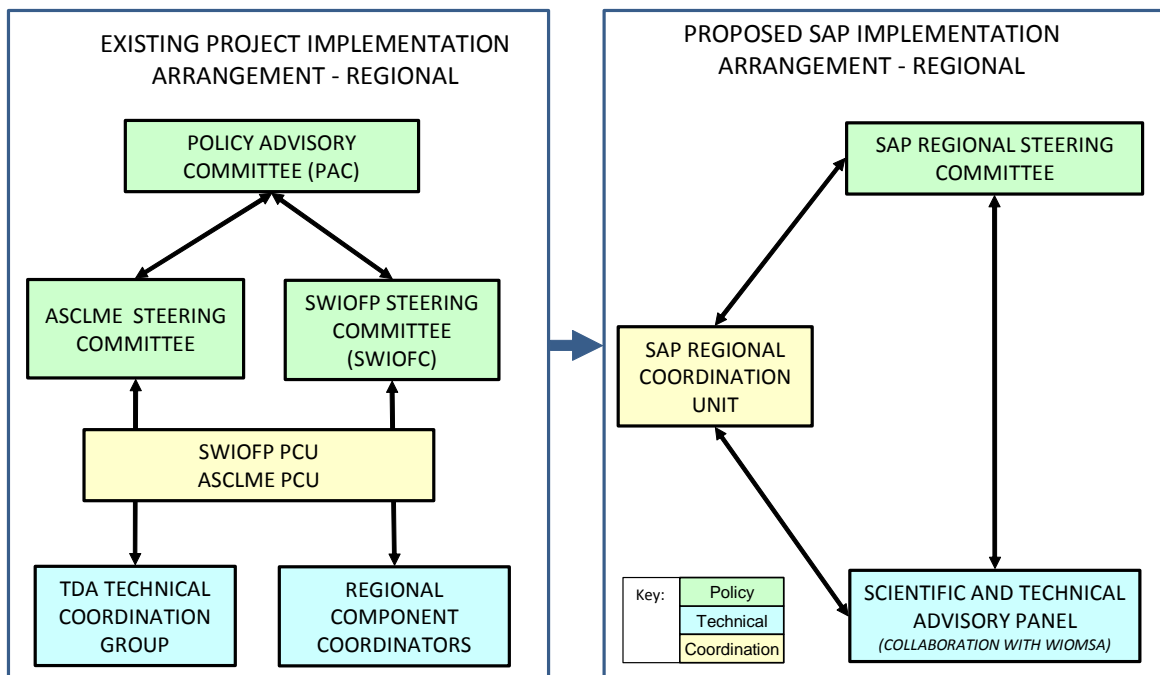
- Providing a logistical service for all SAP groups in terms of travel arrangements and meetings
- Responding to ‘calls for action’ from both the Scientific and Technical Advisory Panel and the SAP Regional Steering Committee
- Ensuring effective coordination between Alliance members
- Have responsibility for Day-to-Day financial and administrative matters and report back to the STAP and the SAP Regional Steering Committee on such matters

In order for this structure of a regional policy and technical body to have credibility and for such a Coordination Unit to be functional at the regional level, it should ideally be ‘anchored’ or linked to some existing regional body with the appropriate mandate and responsibilities. There are several possible options but the appropriate body would be one that has a cross-sectoral interest that can truly represent all interests in line with an ecosystem approach.

Figure 6: SAP Implementation Arrangements

The following diagrams show the relationship between the present coordination and implementation structures for the ASCLME/SWIOF Projects (left) and how these would roll-over to become the future SAP Implementation arrangements (left). This is shown for both the regional institutional arrangements (top) and national institutional arrangements (bottom).

REGIONAL ARRANGEMENTS



NATIONAL ARRANGEMENTS

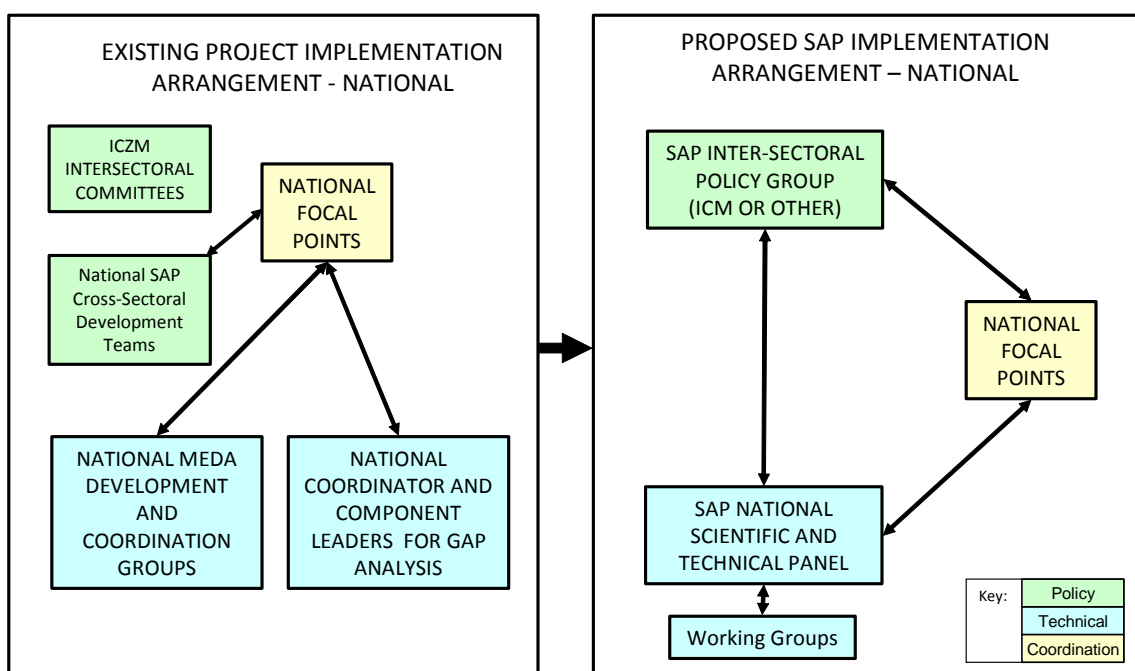
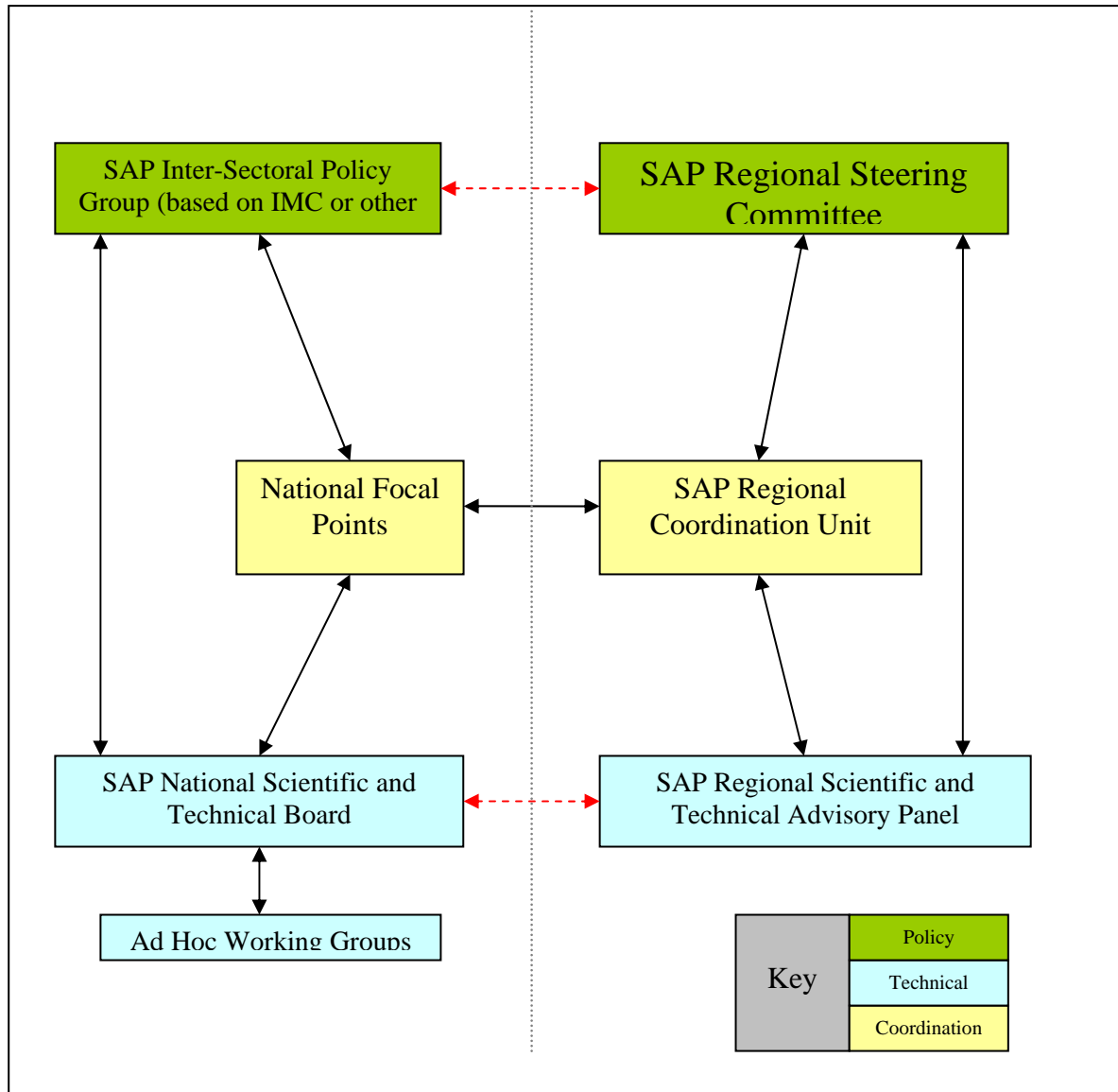


Figure 7: SAP Implementation from Existing Structure

The following figure takes the above explanation of the ‘roll-over’ from current Project Implementation into SAP Implementation to define a national/regional interactive process and combines the national and regional level institutional arrangements into one simplified diagram showing the institutional linkages during SAP Implementation.



The day-to-day linkages between the regional and national SAP implementation decisions and actions would be through the Regional Coordination Unit. However, national policy level and technical level representation would sit on the regional level policy and technical committees.

Chapter Six

Sustainability and Funding

The sustainability of a Strategic Action Programme and its implementation rests on three main pillars:

A. The Scientific and Technical Alliance of Partners

A suite of agreements and partnerships have been negotiated and confirmed through the ASCLME and SWIOF Projects during the MEDA-TDA-SAP development phase. These cover a multitude of areas and activities of mutual interest and intended cooperation. The long-term plan within the Strategic Action Programme would be to consolidate these partnerships into a single 'Alliance' agreement so that, through the Scientific and Technical component of the SAP, these agreements would become inter-linked and coordinated under a single Alliance of partners to address the needs of the Ecosystem Monitoring and Indicators and the Capacity Building and Training components of the SAP. This Alliance of partners has two main objectives within the SAP implementation process: **A.** to identify existing activities that the Alliance partners are carrying out in terms of LME monitoring, capacity building and training and to rationalise those within the overall components so as to make the most cost-effective use of existing resources and efforts, and **B.** to identify gaps in monitoring, capacity building and training and to recommend and negotiate mechanisms to address and fill those gaps through resources and funding (either from existing partners or through new 'alliances'). With these objectives clearly prioritised, this would create the necessary long-term sustainability for both of these SAP components.

B. Financial Partnerships

Focusing on existing activities and funding through the various partners as described above and by rationalising these activities and funding within an Alliance of mutual interest and cooperation should ultimately ensure that every priority activity under the SAP has an identified responsible entity to address it in terms of funds and delivery. Furthermore, as is already being seen to happen within the Projects, the broad and respected membership of the Alliance provides strength to any further funding requests that may be made to better ensure sustainability of actions and especially to fill in gaps in activities. Within this context, it is expected that the Alliance, as a single SAP scientific and technical implementation body, would apply for grants to help to expand its monitoring, capacity building and training programmes as and when necessary. Such applications may be made by individual Alliance members or consortia of Alliance members but would have the backing and support of the entire Alliance, which would carry greater weight during any grant submission review and assessment process.

C. National and Regional Management and Steering

It is important to the sustainability of this overall process that the countries of the region and their designated Intergovernmental Organisations (through various regional treaties, conventions and agreements) should steer and drive the SAP Management Process and provide steering and guidance to the scientific and technical Alliance if it is to be regionally effective whilst receiving full and adequate support at the national level. The simplest structure for achieving such management sustainability is as has been

presented above; i.e. a national SAP Scientific and Technical Advisory Panel and a national SAP Management body within each country that feeds in respectively to the regional Scientific/Technical and Management bodies. Many of these national bodies already exist or have been created during the MEDA-TDA-SAP development phase and can very easily be re-modelled and sustained. Elements of the regional bodies can be seen within individual secretariats or regional scientific bodies but they do not currently represent a sustainable and coordinated approach to LME SAP Management. Again, it should be a fairly simple matter to rationalise this situation into a single Regional Steering Committee as defined above which would then strengthen the opportunity or sustainable regional management of the SAP and the LMEs.