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Developing a consensual information base for identifying priorities for intervention in the South China Sea

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ABSTRACT

The medium-term objective of the UNEP/GEF project entitled “Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand” was “to elaborate and agree at an intergovernmental level, the Strategic Action Programme encompassing specific targeted and costed actions for the longer-term, to address the priority issues and concerns”. This paper first describes the approach taken by the riparian countries of the South China Sea marine basin to arrive at a consensus on a common baseline of information and data to establish threats and to agree on priorities for intervention in the South China Sea. Case examples from the mangrove, fisheries and land-based pollution components of the South China Sea Strategic Action Programme (SAP) are provided to demonstrate the importance of establishing a consensual information base in: refining SAP targets; planning interventions for local benefit and high transboundary impact; and in developing analytical tools to inform the prioritisation of options for intervention in a shared water body. Initial priority problems and options for intervention contained in the Transboundary Diagnostic Analysis and framework SAP prepared between 1996 and 1999 are compared with those contained in the SAP endorsed in 2008. It is concluded that without the development of such a consensual information base there would have been no objective way of ensuring that the selected issues and priorities for intervention in the South China Sea are of any significance from the perspectives of the countries involved, the water body itself, or of potential transboundary or global benefits.

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1. Introduction

The 1996 Operational Strategy of the Global Environment Facility (GEF) defined the objective of its international waters focal area as “to contribute primarily as a catalyst in the implementation of a more comprehensive, ecosystem-based approach to managing international waters and their drainage basins as a means to achieve global environmental benefits” (GEF, 1996). Central to this strategy and its operational programmes was the recognition that, as a first step, countries would require support in joint fact-finding in order to develop the information base required to plan sectoral reforms and investments needed to mitigate or reverse transboundary environmental degradation of specific water bodies. Accordingly, the first set of GEF operational programs for international waters made reference to the “conduct of a transboundary diagnostic

analysis (TDA) to identify priority environmental concerns”² and the formulation of “a Strategic Action Program³ (SAP) of actions each country needs to take to address priority transboundary concerns.” The underlying rationale for this TDA and SAP approach was that, once the root causes of transboundary concerns had been identified and key threats to the given transboundary water system established, countries would collaborate in determining and agreeing upon the collective and national-level actions needed to address priority concerns. Definitions of the key attributes of the TDA and SAP approach used in the GEF international waters focal area are provided by Pernetta and Bewers (2012).

The United Nations Environment Programme (UNEP) implemented project entitled “Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand”⁴ supported seven riparian countries of the South China Sea through this TDA-SAP

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² GEF, 1997. Operational Programs, page 8-3 para 8.9 sub-para (a).

³ The spelling “program” has necessarily been used in verbatim quotations from American language sources. In normal text, the correct English spelling “programme” is used and, in all cases, assumes the same meaning.

⁴ Hereafter referred to as the SCS project.

process from 1997 to 2008. The project was financed by the GEF and co-financed by the participating countries. TDA and SAP development involved the design and operation of structured processes aimed at facilitating cross-sectoral collaboration, stakeholder participation, joint fact-finding and stepwise decision-making, scientific independence and veracity, and transparency with the information sharing required to establish threats and to plan priority interventions in a multi-lateral, intergovernmental setting. A key element of these processes included the development of procedures for information gathering, review and management aimed at enabling the participating countries to arrive at a consensus on a common package of information and data to be used in planning.

The complexity of the SCS project, which involved seven countries and six major areas of activity, resulted in the establishment of a large network of institutions and individuals involved directly and indirectly in project activities. This extensive network represented numerous entry points to a large number of national level sources of data and information relating to the science and management of habitats, fisheries and land-based pollution in the South China Sea and Gulf of Thailand. Ultimately, more than 100 institutions from the region were directly involved in the execution of project activities and more than 400 institutions were involved through individual participation in meetings and national level activities. Such networks of professionals with recognised expertise and competence in particular policy domains, such as environment and natural resource management, are often referred to as 'epistemic communities'. Epistemic communities have typically arisen in settings that require analysis of a diverse and complex range of information and data to guide multilateral decision-making on issues such as security and defence, marine pollution and stratospheric ozone protection (see Ruggie, 1975; Hass, 1989; Haas, 1992; Zito, 2001).

A key attribute in determining the degree of influence of decisions made and the advice given by epistemic communities is the level of consensus among members of the community on the set of information used in decision-making (Hass, 1989; Adler and Haas, 1992; Knorr-Cetina, 1999). While concerns for the efficacy of a consensus approach, such as possible suppression of diversity of opinion and values, have been reported in some settings (Van de Kerkhof, 2006), consensus-building was central to the operation of the SCS project. As reported by Chen (in this issue), the complex geo-politics of the South China Sea region and the lengthy negotiations involved in the development of the SCS project required the establishment of project management procedures to support the epistemic community of scientists, resource managers, economists and lawyers in reaching consensus on the priorities for intervention in the South China Sea. The unique management framework of the SCS project with its detailed terms of reference for all involved individuals, committees and other entities, described by Pernetta and Jiang (in this issue), not only facilitated the flow of information and data between and among members of the network to inform the development of the South China Sea SAP but also provided a well-defined structure within which data and information could be evaluated and consolidated at different levels.

Various studies indicate that consensus building can be enhanced by institutionalising procedures to ensure: clear definition of the roles and responsibilities of the actors involved; early identification of the needs and purpose of the process; mechanisms to foster and sustain stakeholder participation; scientific veracity and step-wise review of information used; and transparency with information sharing (McKinney, 1988; Susskind et al., 2003; Reed, 2008). The SCS project paid significant attention to all of these elements in establishing procedures for information gathering, review and management aimed at achieving consensus; this paper reviews these procedures.

Examples from the South China Sea SAP development process are provided to demonstrate the importance of establishing a consensual information base for ensuring that selected issues and actions included in any SAP for a shared water body are of priority from the perspectives of national interests as well as providing regional and global environmental benefits. An analysis of past and ongoing environmental cooperation in the South China Sea is provided by Chen (in this issue) on the SCS project. Also in this issue, Bewers and Pernetta review and discuss the specific outcomes of the SCS project and their applicability to multilateral cooperative initiatives for the management of coastal seas and marine basins. Similarly, Vo et al. (in this issue-a), and Chen et al. (in this issue) review local benefits of the SCS project in this issue.

2. Background to information and data management in the South China Sea

2.1. *Compiling information for the formulation of a transboundary diagnostic analysis and preliminary framework Strategic Action Programme for the South China Sea*

2.1.1. *Initiating multi-lateral collaboration*

During 1996, the Coordinating Body on the Seas of East Asia (COBSEA) requested assistance from the United Nations Environment Programme (UNEP) to prepare a proposal for grant assistance from the Global Environment Facility (GEF) to address the water related environmental problems of the marine environment of the South China Sea (UNEP, 1996). The GEF provided a project development facility (PDF-B) grant of US\$ 325,000 to undertake a transboundary diagnostic analysis of the water-related issues and problems of the South China Sea and to design an appropriate multi-country intervention to address priority issues. The seven participating countries⁵ each nominated a national focal point from within the ministries responsible for the environment to coordinate national inputs to this preparatory phase (UNEP, 1997).

Three meetings of national coordinators were convened between 1997 and 1999 to formulate a TDA and framework SAP for the South China Sea. These meetings initiated information gathering, review, and support for the identification of priority options for interventions to address transboundary concerns. The reports of those meetings provide a record of key steps taken and the approach developed for the compilation, step-wise review, and analysis of information and data required to identify priority issues and problems, and their immediate and ultimate causes for inclusion in a TDA report. Analysis of these causes enabled identification of the initial priority options for intervention for inclusion in the framework SAP.

The first meeting, convened in Bangkok, Thailand from 31 March to 4 April 1997, was attended by national coordinators and representatives of UNEP and other supporting organisations. Discussions focused on substantive consideration of the elements for inclusion in a TDA and SAP. The emphasis of a TDA is on the cause and effect chain (or "causal chain") of relationships between the environmental issue or problem and its root cause in the social, economic, and/or cultural spheres of human activity (UNEP, 1997; Pernetta and Bewers, 2012).

2.1.2. *Identifying initial information needs*

The first meeting initiated national level efforts to compile the information required to identify and analyse issues and problems relating to the South China Sea. It was agreed that the starting point

⁵ Cambodia, China, Indonesia, Malaysia, Philippines, Thailand, and Viet Nam.

in the analysis of the causal chain would be the environmental issues or problems. The analysis would then lead ultimately to their social, economic, and cultural root causes. Causal chain analyses were discussed for water related issues with transboundary significance, including freshwater scarcity, pollution, habitat and biological community modification, unsustainable exploitation of fisheries, and global change.⁶ Preliminary analyses of identified water-related issues and problems were also conducted at that meeting.⁷

The national coordinators committed to compile national information for incorporation into national reports aimed at informing efforts to identify the extent of the sources and impacts of identified issues, as well as trends in economic development and demographic characteristics. A national report structure was agreed and included *inter alia*: analysis of water related concerns and principal issues; analysis of the social and economic costs of identified water-related environmental issues; analysis of root causes; constraints to action; on-going and planned interventions relevant to the identified issues; proposed new interventions; and an assessment of the sectoral implications of such interventions.⁸

2.1.3. Establishing mechanisms for scientific and technical review

The second meeting was convened in Bangkok, Thailand from 23 to 29 June 1998. Participation was expanded to include national technical experts as well as senior advisors and experts from the region. In addition to an update on the status of national report preparation and TDA development, the meeting introduced mechanisms for regional level information sharing and review. Regional experts, for example, were invited to update the meeting on related on-going work in the region through presentations covering: efforts to link ecological and environmental values to economic values for mangrove ecosystems; the work of other GEF supported initiatives; and an overview of the Global Ocean Observing System.

Draft national reports had been prepared by six countries. These had been evaluated and feedback provided to national coordinators in advance of the second meeting. Second draft reports were submitted by these countries in advance of the meeting, three of which contained adequate information and a sufficient depth of analysis for use in the conduct of a regional analysis of water-related issues. The six reports were presented to the meeting by national coordinators and collectively reviewed by the participants. The meeting highlighted several limitations of these reports, including: the possibility that required information had not been compiled for use in the analyses due to it being held by national agencies not yet engaged in national consultations; the need to strengthen baseline information on the socio-economic implications of problems of the South China Sea; and some uncertainties regarding the science used in several studies referenced in national reports (UNEP, 1998a).

2.1.4. Prioritising transboundary problems and required interventions

Causal chain analyses by each country for each identified water-related problem were reviewed and finalised during the meeting⁹. The transboundary extent of these problems was characterised and

then prioritised on the basis of a Delphi-type¹⁰ exercise.¹¹ These priorities were then used as the foci for the preparation of a preliminary table of contents for the consolidated TDA report that was ultimately agreed by the national coordinators and regional experts.¹² An initial framework SAP to address the integrated management of water-related resources and environment of the South China Sea and a template for a full size GEF project document¹³ were also discussed during the meeting. The TDA and draft SAP were presented to, and revised by, the third meeting of the national coordinators convened in Bangkok, Thailand, 23 to 29 June 1998 (UNEP, 1998c).

The national reports, the TDA and the draft SAP were presented to the thirteenth meeting of the Coordinating Body on the Seas of East Asia (COBSEA) convened in Bangkok, Thailand, 18 to 19 November 1998. That meeting endorsed the draft SAP (UNEP, 1998c). The full project document for the SCS project was subsequently developed. Following an extensive process of country consultation and endorsement, and final GEF Chief Executive Officer endorsement in December 2001, the SCS project became operational at the time of final signature of the project document by UNEP on 21 January 2002.

2.2. Design of the SCS project

The design and implementation of a multilateral, inter-governmental initiative to address diverse priorities such as the loss and degradation of habitats, over-exploitation of fisheries and land-based pollution in a shared marine basin is complex. Global experience in shared water body management indicates that it often takes several decades before meaningful commitments to implementing the joint management required to address the root causes of transboundary water problems can be secured, even when only a single country is involved (e.g., the Murray Darling River system in Australia and Chesapeake Bay in the United States of America). The time required for these water bodies to respond to actions aimed at reducing stress is also on the decadal time scale (Steele, 1989; Pernetta and Elder, 1993). Central to these efforts is a need to establish mechanisms that enable the countries and sectors involved to obtain a better understanding of each other's issues, build trust and confidence among the various stakeholders, and establish a common understanding regarding water and coastal concerns (Ollila et al., 2000). Accordingly, the overall goals

¹⁰ The Delphi method was utilised as a key process tool by the SCS project to facilitate consensus decision-making. Linstone and Turoff (1975) defined the Delphi method "as a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem". A Delphi exercise involves the iterative questionnaire polling of group member views and opinions on specific problems. For example, the Delphi method was used to reach regional agreement on the transboundary significance of pelagic and demersal fish stocks. The results of this exercise were used to identify habitat areas that serve as critical fisheries refugia for fish stocks of transboundary significance.

¹¹ See Annex 6 of UNEP (1998a) entitled "Transboundary Aspects of Water-Related Environmental Issues in the South China Sea Analysed by Country to Produce a Comparative Qualitative Ranking of Importance".

¹² See Annex 7 of UNEP (1998b) entitled "Draft Outline for the Transboundary Diagnostic Analysis for the South China Sea and its Associated Freshwater Catchments".

¹³ 'Project document' is a term used within the GEF community to refer to the full project design document for a project. It is the key tool for formulating and implementing a GEF project, as well as for monitoring and evaluation, and is a legal instrument that must be appropriately signed in order for funds to be disbursed to a project. The project document also constitutes the contractual basis for any undertaking with a cooperating agency or supporting organisation, as well as the basis for the terms of agreement for any consultancy or contractual services for the project. A project document is also often referred to as a 'project brief'. The project document for the SCS project is available online at <http://www.unepscs.org/Project_Background.html>.

⁶ See Annex 3 of UNEP (1997) entitled "Transboundary Diagnostic Analysis".

⁷ See Annex 4 of UNEP (1997) entitled "Preliminary Analysis of Causes of Water-related Issues and Problems in the South China Sea Region".

⁸ See Annex 7 of UNEP (1997) entitled "Outline and Content of National Reports".

⁹ See Annex 5 of UNEP (1998a) entitled "Causal Chain Analysis of Water Related Environmental Issues in the South China Sea; by Country".

of the SCS project focused on fostering collaboration and partnership to address environmental problems of the South China Sea marine basin.

Efforts aimed at fostering collaboration and partnership among the participating countries were initiated during the project PDF-B phase from 1996 to 2001. The joint fact-finding and step-wise review of national sources of information, the TDA, and the framework SAP assisted in building some experience in information gathering, review and analysis. Participants in that process also gained familiarity with the challenges involved in compiling the necessary information and data and sharing them in a regional setting using a second language. The development of the SCS project recognised that these initial efforts would need to be intensified, both in terms of stakeholder involvement and the range of information used, to meet the project objectives.

At the time of its approval by COBSEA in 1998, the member countries requested that further elaboration and development of the framework SAP be a defined output from the operational phase of the project (UNEP, 1998c). Accordingly, funds from the GEF grant were allocated to a variety of activities designed to elaborate the information base required to achieve the medium term objective of “elaborating and agreeing at the intergovernmental level the Strategic Action Programme encompassing specific targeted and costed actions for the longer-term, to address the priority issues and concerns”. Projected outcomes of these activities included: an approved SAP based on a targeted and costed programme of actions; a framework for improved regional co-operation in the management of the environment of the South China Sea; and a series of national action plans for specific habitats and issues.

The project management framework (see Pernetta and Jiang, in this issue) developed for the project was, in part, designed to enable the timely and structured flow of information and data between and among all partners. The first meeting of the Regional Scientific and Technical Committee (RSTC) recognised the importance of this network of partners in assembling additional information and data and establishing procedures for review as follows:

“The Committee instructed the Regional Working Groups to prepare a list of data/information requirements in their first meetings, together with a suggested standard format for use at the level of the national committees.”¹⁴

“The Committee also indicated that there is strong need for the National Technical Working Group, and national committees in each country to review the data/information provided in the national reports, and to provide updated data and information for the project, particularly in relation to data sources at the national level which may have been ignored during the preparation of the national reports.”¹⁵

3. Establishing procedures for information gathering, review and management

3.1. Defining formal roles and responsibilities of national and regional entities

A total of 31 government-designated organisations signed Memoranda of Understanding (MoUs) with the UNEP to act as Specialised Executing Agencies (SEAs) for national level activities of the project. These MoUs contained detailed terms of reference for the key individuals and committees and defined the roles and

responsibilities of SEAs in implementing project tasks and supporting various national and regional committees established as part of the project management framework. The original MoUs outlined sixteen preparatory phase (2002 to 2004) tasks for which SEAs would be responsible. These tasks related to: establishing/revitalising and chairing national committees; information and data gathering, review and management; provision of scientific and technical advice to national committees and regional working groups and task forces; development of a National Action Plan (NAP); and the revision of the regional SAP.

The MoUs were amended during 2004 to reflect the roles and responsibilities of the SEAs during the operational phase of the project (2005 to 2008). Terms of Reference¹⁶ (ToR) were also clearly defined at project inception for the National Inter-Ministerial Committees (IMCs), National Technical Working Groups (NTWGs), and National Committees for the components and activities of the project. These ToR provided direction, for example, to the National Committees to compile and share information and data with the NTWG, the Regional Working Groups (RWGs) and the RSTC. The NTWGs were, for example, charged with the responsibility of reviewing and approving the scientific and technical content of reports from the SEAs prior to their submission to the IMCs or RWGs.

A corresponding set of ToR were established for the RSTC and each of the RWGs established for mangroves (RWG-M), wetlands (RWG-W), coral reefs (RWG-CR), seagrass (RWG-SG), fisheries (RWG-F) and land-based pollution (RWG-LbP). The RWGs were charged with co-ordinating the work of National Committees in order to ensure the effective execution of activities in the various project components. Specific RWG activities included *inter alia*: development of criteria for determining the global, regional and transboundary significance of habitats and fish stocks; coordination of efforts to develop national meta-databases; compilation and review of information relating to economic valuation; and the step-wise review of information and data compiled by national committees. The RSTC was mandated to coordinate and review the work of the RWGs and provide sound scientific and technical advice to the Project Steering Committee (PSC).

3.2. Agreeing information needs and specifying data fields

3.2.1. Confirming causes of identified issues and problems

Specific information needs were discussed by the early preliminary phase meetings of each of the six RWGs convened between 2002 and 2003. The national reports and TDA were discussed and known national and regional sources of information were identified. Emphasis was placed on confirming the causes of identified issues and problems identified in the TDA via the conduct of causal chain analyses for each of the four priority habitats, fisheries and pollution. In addition to undertaking a technical and scientific analysis of the water-related issues and problems, the RSTC and RWGs worked to identify the information needed to prioritise actions in relation to maximising benefits from the investments or expenditures to be committed under the Strategic Action Programme.

Efforts to identify information needs during these early meetings considered the scale of the transboundary nature of particular marine environmental problems. The reports of those meetings indicate a progressive shift in emphasis from consideration of specific national issues to those that were significant from regional or global perspectives. It was emphasised that actions that solve local problems and simultaneously result in regional and/or global

¹⁴ See paragraph 7.1.3 of UNEP (2002a).

¹⁵ See paragraph 7.1.4 of UNEP (2002a).

¹⁶ Approved by the First Meeting of the Project Steering Committee (UNEP, 2001).

environmental benefits will generally be of higher priority because the cumulative value of the benefits will exceed the value of the actions having solely local effect.

3.2.2. Preparation of questionnaires to collate regionally comparable data

Given the complexity of the information required to inform decision-making, several RWGs requested that a workshop be convened to develop formats for the collation of information and data. A workshop was subsequently convened in Bangkok, Thailand, during August 2002 and attended by country nominated experts, observers, and representatives of the Southeast Asia regional centre of the Global Change System for Analysis, Research and Training (SEA START RC), and the Project Coordinating Unit (PCU). This workshop developed detailed questionnaire templates for the compilation of information and data required to characterise known habitat sites and fisheries of national, regional and global significance in the South China Sea, and provide a basis for the analysis of the local and regional impacts of land-based pollution (UNEP, 2002b).

The habitat questionnaire templates provided a common tool for the development of comparable national data and information sets relating to *inter alia* the distribution and diversity of coastal habitats, the richness of habitat building species and hotspots of biodiversity, present threats and the status of management. The questionnaires for fisheries focused on the compilation of information and data on landings and fishing effort by fishing gear type and administrative units, the contribution of the fisheries sector to employment and food security, identification of species of regional, global and/or transboundary significance, areas of significance to the maintenance of exploited fish stocks, and threats to those areas. The land-based pollution questionnaire was directed towards the compilation of information from monitoring stations in the South China Sea, on coastal impacts, including the quality of ambient water and sediments, human health impacts and loading data from various sources.

3.2.3. Identification of component-specific information needs

The questionnaires were subsequently reviewed and amended by meetings of the RWGs. For example, the second meeting of the RWG on mangroves discussed and agreed on the list of obligate¹⁷ and associated mangrove species that would be used as indicators of biodiversity during site characterisations (UNEP, 2002c). The corresponding meeting of the RWG on seagrass considered questionnaire fields relating to extractive and non-extractive uses of seagrass resources and the ecological function of seagrass beds. The RWG-SG deemed it necessary to include these economic valuation characteristics in the lists of data and information required for the identification and characterisation of seagrass sites. This was required to evaluate the potential benefits and costs of management action versus a no action scenario (UNEP, 2002d).

Similarly, in considering the regional formats for collecting water quality data and information, the RWG-LbP agreed that the ASEAN water quality criteria be applied, which resulted in an agreed list used by all countries. The RWG also agreed that the standards for sediment samples and biological samples used in China, which were the only criteria adopted in the participating countries at that time, would be used as regional criteria for comparison with other relevant data and information (UNEP, 2002e). The second meeting of the RSTC considered the discussions held

during preceding meetings of the RWGs on the questionnaires and urged the project's National Technical Focal Points to ensure that coordination and cooperation among the various national sectoral agencies in the compilation of this data was facilitated and that corresponding activities be included in the work plans of the national committees and technical working groups (UNEP, 2002f).

3.2.4. Initiating development of a regional meta-database

It was also recognised by the RWGs and the RSTC that, while many valuable data sets on coastal habitats, fisheries and land-based pollution had been previously developed in the participating countries, access to, and the sharing of, this information was often limited. Contributing to such limitations were weak data management systems in most countries, coupled with limited interaction and communication among sectors, such as between environment and fisheries departments. The August 2002 workshop considered this issue and prepared a regional meta-database entry form for the compilation of meta-data in relation to existing data sets (UNEP, 2002b). It was envisaged that a catalogue of meta-data would then be made available to the project network with the aim of improving the sharing of information about data sets. The meta-data would include, for example, summary level information about the spatial and temporal coverage of data, contact details for the organisation or individual holding it, and any access limitations that might apply.

3.3. Fostering stakeholder participation in information collection and review

3.3.1. Role of the project management framework

The project management framework emphasised and fostered stakeholder participation in information collection in several ways. The opportunity for groups of specialists from each country to meet together was the simplest. Through the various national and regional committees, specialists met not just as individuals but as representatives of the community of specialists in their country. Hence, the project management framework served as a conduit for the exchange of ideas and information in two directions: upward from the national to the regional and downward from the regional to the national. The National Committees established or revitalised by each of the SEAs for the project components and sub-components provided the specialist lower-level forums required for the compilation and review of information and data. As detailed by Pernetta and Jiang (this issue), too frequently, large-scale projects, if they create any kind of forum for scientific and technical specialists to meet, do so in the form of a single body advising a single political decision-making body. Limitations in such an approach are rarely considered at the project design phase as the range of scientific information required to provide a sound basis for transboundary water resource management are not well known. Conversely, the creation of multiple bodies is seen as being resource intensive whilst providing little value added.

A single committee comprising coral reef biologists, mangrove foresters and seagrass scientists, for example, is unlikely to contain adequate specialist knowledge with respect to each coastal habitat type and the implications for management of the varying socio-economic and environmental situations in all participating countries. The nature of the environmental and ecological processes in coral reef, mangrove, and seagrass systems, the threats they face, and the management options for their sustainability are fundamentally different and, frequently, not part of the shared body of ecological knowledge. The establishment of more specialised lower-level forums, i.e., National Committees for each project component, created opportunities for the consolidation of a wider body of highly specialised knowledge and experience prior to it being shared with

¹⁷ Obligate or 'true' mangrove species are found only in mangrove ecosystems, whilst associated mangrove species are those which are found in other ecosystems in addition to mangroves.

specialists working on other systems. The individual members of the National Committees and their organisations represented a substantial resource of information and expertise and, through participation in committee meetings, this knowledge base was brought to the table and provided a mechanism for broad stakeholder participation in information base development. All SEAs subsequently sub-contracted selected individuals and national organisations represented on their committees to assist with the execution of data-related project activities.

3.3.2. A diverse mix of national specialised executing agencies

The SEAs comprised a diverse range of government ministries, both ministries of agriculture/forestry/fisheries ministries and ministries of natural resources/environment, as well as specialised institutes or centres, universities and non-governmental organisations from the seven participating countries (see Pernetta and Jiang, this issue). The blend of SEA types varied by country and project component, mainly due to inter-country and interdisciplinary differences in the roles and responsibilities of the types of organisation in resource and environmental management. For instance, in Cambodia, SEAs were derived solely from government, with equal representation of the agriculture/forestry/fisheries and environment ministries. In contrast, a diverse mix of government agencies, specialised institutes or centres and non-governmental organisations represented the Indonesian SEAs. Half of Thailand's SEAs were universities, largely due to the highly regarded role of academia in the science and management of coastal and marine resources in Thailand.

The mix of SEA types also varied widely among project components, with the fisheries component SEAs represented solely by fisheries agencies, while those for the wetlands component comprised SEAs from environment ministries, universities and a non-governmental organisation. The mandates and resource capabilities, both human and technical, of each of the SEAs varied widely as did their respective levels of experience working in cross-sectoral settings and in task management, e.g., preparing ToR for consultants, letting contracts and quality assurance of information and data products. The support secured and the experience developed via the sub-contracting of members of national committees was a key element of national coordination required to ensure successful compilation of the necessary information and data.

3.3.3. Commitment of support from national networks

The following constitutes a brief analysis of each sub-contract let by SEAs to determine: the number of project personnel or research assistants hired by the SEAs; the number of individual consultants hired to execute specific tasks; and the number of institutions sub-contracted for each of the tasks specified in the memoranda of understanding between the SEAs and UNEP. Analysis of the compiled data provides some insight into the total human resource limitations of the SEAs, the extent of specialist expertise available within the SEAs, and the overall extent to which the established national networks were formally drawn upon to support information gathering and review activities. Ultimately, more than 100 institutions from the region were directly involved in the execution of project activities and more than 400 institutions were involved through individual participation in meetings.

Of the 310 contracts let by the SEAs with individuals and organisations, 64 percent related to tasks associated with development of the information base required to confirm the causes of problems and in determining the comparative net benefit of options for intervention. From Fig. 1 it may be seen that the category of tasks for which the greatest number of contracts were let related to the assembly of data and information. Of the 118 contracts (38 percent of total sub-contracts) let in this task area, 61 were with supporting

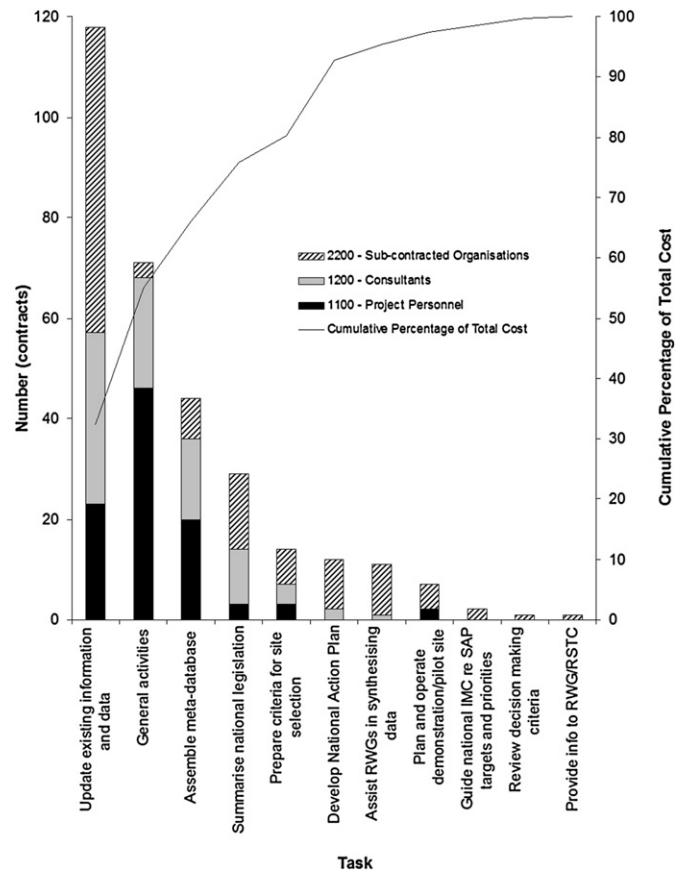


Fig. 1. The total number of project personnel, individual consultants and national supporting organisations sub-contracted by the Specialised Executing Agencies to support national execution of UNEP/GEF SCS project activities, including the relative contribution of each task area to the total cost of 310 national sub-contracts.

national organisations, 34 with individual consultants, and 23 for project personnel and/or research assistants recruited into the SEA. Expenditure on these sub-contracts accounted for 32 percent of the total of US\$ 1.23 million of GEF grant funds disbursed by SEAs through sub-contracts to support the execution of agreed MoU tasks.

The large number of contracts let with supporting national organisations for information collection in part reflects the disaggregated nature of data and information holdings at the national level. It also demonstrates the need for broad stakeholder participation in the compilation of the types of information required to identify the transboundary significance of problems, their causes and the associated priorities for intervention. The total number and low average value of the contracts let in this task area (US\$ 3383) provides some insight into the need to engage stakeholders in this process. An alternative approach may have been to let fewer large contracts with individual consultants, although it is unlikely such an approach would have enabled access to the depth of information required.

Efforts to foster stakeholder participation in information and data collection were not only effective in overcoming barriers associated with limited cross-sectoral information sharing in the participating countries. Through direct involvement in national committees and the formalities associated with the contracting process, supporting organisations were exposed to the how and why their information was being used. This was not only important for generating national level support for elaboration of the framework SAP and supporting National Action Plans. It also provided national committee members with substantive tasks for which

they were responsible for reporting progress during meetings. The subsequent review of outputs by committee members was critical in terms of ensuring consensus on the information and data to be used in subsequent steps and shared with committees responsible for the other project components, the NTWGs, RWGs and the RSTC.

3.4. Step-wise scientific and technical review by inter-linked groups of experts

3.4.1. National and regional review of information and data

The project management framework not only facilitated the collection of information and data by the SEAs and national committees but also instituted mechanisms for joint fact finding and step-wise scientific and technical review. Information resources developed at the project component level were subject to national level review through National Technical Working Groups (NTWGs) prior to inclusion in the broad information base used to formulate advice for national Inter-Ministerial Committees (IMCs) and regional level bodies. Thus, the highly specialised knowledge and experience used to evaluate the status and trends in mangrove ecosystems for example, was developed by a group of mangrove specialists before it was shared with other specialists having other, often very divergent, interests and concerns.

In addition to providing a mechanism for the clear separation of scientific and political considerations, the NTWGs established national-level linkages and networking among mangrove scientists, other habitat specialists, pollution experts, fisheries specialists, and lawyers and economists. This was important from the perspective of enabling cross-sectoral collaboration and the broad scientific and technical evaluation of information and data. Fisheries focal points, for example, were exposed to data sets being compiled by habitat specialists. Many of these data sets contained information relevant to the efforts of the region's fisheries scientists and managers to identify habitat areas critical to the early life history of important species. Such information is not routinely collected by fisheries departments and participation in the NTWGs enabled fisheries and environment specialists to develop a better understanding of each other's information and data holdings and needs and to identify areas in which national level information sharing could be improved.

The participation of the project component focal points and the national technical focal points in regular meetings of the RWGs and the RSTC established the feedback loops between national and regional organs of the management framework. The routine meetings of the RWGs, convened twice a year from 2002 until early 2004 and annually thereafter, enabled groups of national experts on coastal habitats, fisheries and pollution to meet together in a regional setting. Regional Task Forces on economic valuation (RTF-E) and legal matters (RTF-L) were established in 2003 to strengthen efforts to compile and analyse information relating to economic valuation of habitats and pollution and regional arrangements for cooperation in the South China Sea.

3.4.2. Assessment of national focal point participation in regional forums

A key factor in the operation of such step-wise multi-lateral collaboration is the continuity of participation of national representatives in the regional forums. Senior government officials and scientists from the environment and natural resource sectors in developing East Asian countries typically carry high work loads overseeing the routine work of departments, providing advisory services to Ministers and the Cabinet and managing a variety of externally financed projects. Participation in week-long regional meetings can present significant challenges to individuals in balancing time away from their offices combined with meeting

preparation with their other work commitments. Last minute cancellations and non-attendance at meetings does occur, particularly in instances where the country representative does not have a vested interest in the planned business of the meeting or some form of binding personal or professional obligation to other participants.

Between 2002 and 2008, the SCS project convened a total of 69 regional working group and task force meetings, totalling 261 formal meeting days. A broad assessment of attendance by national project focal point and task force members at these meetings was conducted to assess the continuity of participation in the regional forums. On average, the attendance rate of nationally-nominated focal points in regional meetings was 90 percent. Focal points were represented by alternates from their agencies on 60 percent of the occasions in which they were unable to attend. The overall non-participation rate of nationally-nominated focal points in regional working group and task force meetings (i.e., no focal point or alternate present for a given country on any meeting day) was only 4 percent of the aggregate 1718 person meeting days.

Focal points for the fisheries and wetlands components contributed most to non-participation rates (Fig. 2). In the case of fisheries, this may be explained by the large number of regional and international fisheries forums that fisheries scientists and managers from Southeast Asia were required to attend. It is also pertinent to note that the data presented above do not include the participation of the various regional expert members of the working groups and task forces in meetings. Expert members gave their time and expertise freely to the work of the project and the estimated participation rate amongst this latter group was 94 percent. The overall non-participation rate of national focal points and regional experts combined was 3.6 percent.

3.5. Region-wide sharing of a consensual information base on the South China Sea

The information and data compiled to confirm and quantify key threats to the marine environment of the South China Sea and to determine priorities for intervention across areas of concern, such as habitat degradation and loss, over-exploitation of fisheries, and land-based pollution, were many and varied. Through the procedures outlined above, this information and data were reviewed at various levels and the feedback loops between national and regional organs of the project management framework enabled decisions to be made regarding whether or not these should be included in the common set of baseline information and data to be used in planning. This process relied on a culture of scientific independence and veracity established within each of the national

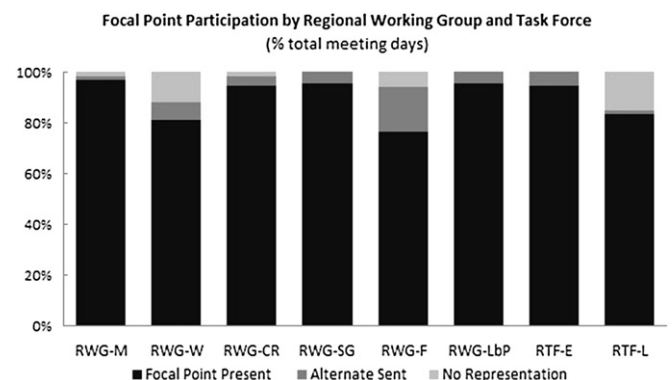


Fig. 2. National focal point participation in regional working group and task force meetings as a percentage of the total number of person meeting days.

and regional bodies to arrive at consensus on the information suitable for use in NAP and SAP development.

At the primary level, national-level sources of information were compiled into various forms, including characterisations of habitat sites, fisheries, pollution and monitoring stations, as well as national meta-data catalogues. This was accompanied by detailed desk-based reviews of past and on-going projects, policy and legal reviews, and analysis of strategic and operational plans of relevant sectoral agencies involved in environmental and resource management. To enable ease of access to the information and data compiled during the preparatory phase, a series of booklets were produced by the RWGs on habitats and land-based pollution. Efforts to produce comprehensive national reports on mangroves, wetlands, coral reefs, seagrass, fisheries and land-based pollution in the South China Sea were initiated during the preparatory phase. Prepared in both national and English languages, these reports also benefited from step-wise review by national committees, NTWGs, RWGs and the RSTC. These were published and the outputs disseminated regionally and online in 2007.

The raw information and data, in the form of discussion and information documents, was provided to RWGs, RTFs, RSTC, and PSC meetings during the period 2002 to 2008. The analysis of this information and the subsequent reports of the meetings provide a detailed account of the steps taken to arrive at consensus on various issues and priorities for inclusion in NAPs and the regional SAP. These discussion documents and meeting reports, each meticulously internally referenced to one another, number in excess of 1700 and, collectively, represent possibly one of the most insightful accounts of the collaborative analysis of issues and planning options for the joint management of any shared marine basin globally.¹⁸ Building on this extensive knowledge base, the RWGs, RTFs and RSTC each contributed to the publication of a series of South China Sea knowledge documents, technical publications, regional guidelines, and training resources.

At the time of project development and during its early preparatory phase, the rapid proliferation of the 'blogosphere' and online technologies during the subsequent decade was not envisaged, nor was the rapid increase in Internet use in countries bordering the South China Sea during the same period. For example, the growth in the number of Internet users for the participating countries ranged between 300% (Malaysia) and 8510% (Viet Nam) during the first 5-years of project operation (UNEP, 2007a). Indeed, the project document did not envisage the use of such online technologies, although a basic website was created in 2002 to overcome problems with the electronic distribution of meeting documents and reports caused by unreliable e-mail communications and limited e-mail storage space at that time.

During the early stages of the operational phase of the project, it became apparent that the website could be used to: improve the flow of information and data; enhance accessibility to project outputs; and facilitate the online sharing of information and experiences relating to project execution and NAP and SAP development. The project website was subsequently redeveloped in the final quarter of 2005 using free, open source, software. Efforts thereafter focused on: the use of the website to enhance ease of accessibility to information and data products; development of intuitive and user-friendly online repositories and databases; building experience within the project's extensive partner network in the online updating of databases and information sharing; and raising general awareness of the existence of the website and its information resources.

¹⁸ All meeting discussion documents and reports can be accessed online via the SCS project website <<http://www.unepscs.org>>.

A review of the development, key features and usage of the project databases and website was published as a South China Sea Knowledge Document in 2007 (see UNEP, 2007a). Key features include *inter alia*: a collaborative Google Earth based Geographical Information System for the management and update of habitat site data¹⁹; a regional meta-database catalogue of national and regional information and data sets²⁰; an online gridded (raster) based nutrient carrying capacity modelling system that links chlorophyll concentrations in specific locations of the SCS to land-based nutrient loading²¹; a repository of more than 1800 project documents and publications²²; a large collection of regionally-specific training materials²³; a catalogue of multi-media public awareness resources²⁴; and a lessons learned repository.²⁵ Of significance is the extensive online index of national language publications produced by SEAs, national committees and demonstration projects.²⁶ The wide regional and global dissemination of these information resources via establishment of a partnership with Google Earth were reported in a GEF International Waters Experience Note in 2008 (see Paterson, 2008).

4. Discussion

4.1. Experiences in the use of a consensual information base in revising the South China Sea Strategic Action Programme

4.1.1. Refining Strategic Action Programme targets: the case of mangroves

The structured process of the national and regional entities working simultaneously expanded opportunities for review and learning with, for example, the RTF-E providing advice on economic valuation to the biologists and the legal specialists providing advice to the national committees regarding needs for the strengthening of national legal regimes. This was an important element in the elaboration of the regional SAP that was initiated during the fifth meetings of the RWGs in 2004. During these meetings, the specific targets and goals of the framework SAP were reviewed in the light of work completed and the more comprehensive information developed during the preparatory phase. This was followed by the step-wise scientific and technical review of the SAP by the RWGs and RSTC at the regional level, and related feedback between regional and national committees on both the SAP and NAPs. For example, during its fifth meeting in September 2004, the RWG on mangroves (RWG-M) noted that most of the mangrove related activities in the 1998 framework SAP had been initiated as part of the implementation of the SCS project. Several demonstration projects were also in the process of being launched to assist in the development of best mangrove management practices for regional sharing of experiences and lessons learned.

The fifth meeting of the RWG-M recommended a proposed target for the mangrove component of the revised SAP as "66% of the present area of mangroves should be brought under protection by the year 2012" (UNEP, 2004a). The RSTC, at its subsequent meeting in December 2004, considered this target and recommended that the

¹⁹ See <<http://gis.unepscs.org>>.

²⁰ See <<http://metadata.unepscs.org>>.

²¹ See <http://www.unepscs.org/nutrient_model/>.

²² See <<http://www.unepscs.org/remository/html>>.

²³ See <<http://www.unepscs.org/Training/Workshops/Materials.html>>.

²⁴ See <http://www.unepscs.org/South_China_Sea_Online_Public_Awareness_Centre/Community_Awareness_Materials/South_China_Sea_MultiMedia_Centre.html>.

²⁵ See <http://www.unepscs.org/South_China_Sea_Knowledge/Lessons_Learned/SCS_Lessons_Learned.html>.

²⁶ See <http://www.unepscs.org/South_China_Sea_National_Publications/>.

RWG-M should consider the definition of 'protection' and ensure common understanding of this term in the region (UNEP, 2004b). It was pointed out by RSTC members from Indonesia and the Philippines that 'protection' in those countries meant 'non-use' of mangrove timber and other mangrove forest products (UNEP, 2004b). During its subsequent and sixth meeting in August 2005, the RWG-M used information and data on the total area of mangrove sites under various forms of land-use designation and management and the contents of the draft NAPs to identify potential targets for each of the participating countries for mangrove management.

In considering the recommendation of the preceding RSTC meeting, the RWG-M included the following two additional types of management regime to accommodate the various interpretations of the term 'protection': non-use of mangrove timber but extractive use of other mangrove resources; and 'sustainable management area' in which mangrove uses were considered to be conducted in a sustainable manner (UNEP, 2005a). In doing so, the RWG-M noted that 'protection' in the context of mangroves implied non-use of either mangroves or associated resources such as is found in national parks for example.

Following iterations of this step-wise review resulted in regional agreement by 2007 on five categories of mangrove forest: (1) production forest, used on a sustainable basis for timber and woodchip production; (2) conversion forest, a category in Indonesia representing areas of mangrove designated for alternative land use under current plans; (3) Parks and Protected Areas; and (4) areas in which timber extraction is not permitted but extractive use of other resources is permitted. In the case of Thailand, another category was recognised as (5) "Private land, unregulated use". Estimates of areas of mangrove in each of the countries subject to various forms of management were refined during subsequent RWG-M meetings following consultations between working group members and various national counterparts.

Similarly, in defining priority options for intervention, the RWG-M gave consideration to the causes of mangrove destruction identified in the TDA in the light of new information and data. The TDA in 2000 had identified the conversion of mangrove forest to sites for pond aquaculture, particularly for shrimp, clear felling of timber for woodchip production, land clearance for urban and port development and human settlements, and the harvest of timber products for domestic use.

It was the consensus view of the RWG-M in 2007 that, based on the comprehensive set of information and data it had compiled, the present causes of loss of mangrove habitat are no longer dominated by shrimp culture although this remains one reason for conversion in China, Indonesia and Viet Nam. It was also recognised that the conversion of mangrove to land for industrial purposes, including harbour construction, has grown over the last ten years and is now significant in China but of low importance in Indonesia, the Philippines and Viet Nam, and unimportant in Thailand and Cambodia. Degradation of mangrove habitats as a consequence of chronic pollution from shrimp farming operations is now more prevalent in China, Indonesia and Thailand, whilst charcoal production continues to degrade mangrove in Cambodia, Indonesia and the Philippines despite legislation banning all harvesting of mangroves in Cambodia and the Philippines (UNEP, 2007b).

Thus, at the time of finalising mangrove SAP targets and priority actions, the following anthropogenic and natural threats were seen as the current priority threats to mangrove systems bordering the South China Sea. Anthropogenic threats comprise: (1) reclamation and infrastructure development; (2) pollution from shrimp farming (China, Indonesia, Thailand); (3) industrial conversion (China, small in Philippines, Indonesia and Viet Nam, negligible in Cambodia, and Thailand); (4) charcoal production (Indonesia, Philippines and

Cambodia); and (5) conversion to shrimp culture (potential long-term threat in Viet Nam). Natural threats comprise: (1) sea level rise; and (2) episodic events, e.g., tsunamis and typhoons (UNEP, 2008a). Accordingly, the revision of SAP targets for mangroves in the South China Sea focused on identifying mangrove areas under various forms of management, consideration of national realities with respect to various threats, management capabilities, and defining proposed areas of mangrove to be subject to changes in designation and/or management to address these threats. The revised 2008 SAP targets for mangroves are included in Vo et al. (in this issue-b).

The target for mangroves defined in the 1998 framework SAP was defined simply as "By 2010, to maintain the area of mangroves in the region at no less than 90% of the present (1998) area". Priority regional and national actions emphasised resource assessment, reviews of management, the piloting of various management approaches for mangroves, and awareness activities. The revised targets in the 2008 SAP provide the platform not only to build on advances made during the operation of the SCS project but also to reflect emerging trends in mangrove threats and priorities. The target of enrichment planting to increase mangrove biodiversity, for example, was included following lengthy consideration by the RWG-M of the results of largely single species mangrove reforestation initiatives in the region during recent decades.

4.1.2. Planning interventions for local benefit and high transboundary impact: the case of fisheries refugia

The cross-sectoral collaboration in information and data collection and the joint fact finding facilitated by the project enabled detailed consideration of the need for improved integration of fisheries management and coastal habitat management. This was a key element in the planning of interventions aimed at the simultaneous achievement of local level benefits for fisheries and biodiversity that would also have transboundary impacts at regional and global levels. In addition to the step-wise consideration of this issue by the various RWGs and the RSTC, the Regional Science Conferences, convened as part of the SCS project, provided members of the project network an opportunity to collegially review and assess the project's overall progress, to consider new ideas and to share experiences in project implementation and cross-sectoral coordination.

The programme of the second Regional Science Conference held in November 2005 included an opportunity for RWGs for the habitat sub-components of the project to meet with members of the RWG on fisheries (RWG-F) and senior fisheries advisors of the Southeast Asian Fisheries Development Center (SEAFDEC) and the Food and Agriculture Organization of the United Nations (FAO). This event focused on the critical linkages between fisheries and coastal habitats and related threats to each sector. Actions aimed at reducing the degradation and loss of habitats, the dependence and effects of fisheries on coastal habitats, and regional policy guidance for fisheries habitat management were all considered.

The dilemma the fisheries and environment sectors discussed during the second Regional Science Conference is that conservation of habitat does not necessarily result in increased fish stocks if the conserved habitat is not of significance to the life-cycles of the fished species; and responsible fishing effort does not necessarily result in improved habitat condition. From an integrated management perspective, consensus was reached that, although fish production is intrinsically linked to the quality and expanse of habitats and the dependence of coastal communities on fish for food and income is high, past approaches to both fisheries and habitat management had not adequately addressed these linkages. It was thus acknowledged that the effort of the RWG-F to establish a regional system of fisheries *refugia* should be focused on the

identification of areas of habitat of critical significance to the life-cycle of important fish stocks for collaborative management by fisheries and environment departments.

The subsequent seventh meeting of the RWG-F in May 2006 (UNEP, 2006) initiated efforts to prepare a preliminary inventory of known spawning areas for significant pelagic, demersal, and invertebrate species in the Gulf of Thailand. This meeting agreed that fisheries focal points would coordinate with habitat component counterparts during the inter-session period to compile information on habitat areas that act as critical spawning and nursery areas for important fish species and, specifically, to evaluate which of the project's habitat demonstration sites are critical inshore nursery *refugia* for important demersal species.

This activity relied on a detailed review of the collective information base developed by the habitat sub-components, specifically: the national reports on mangroves, wetlands, coral reefs and seagrass; the habitat site characterisations prepared by each habitat sub-component; information and data compiled in habitat demonstration site planning; the habitat sections of the regional meta-database catalogue; and the outcomes of various national consultations on the *refugia* concept. Combined with the insights gained through improved communication among fisheries and environment specialists, this information base represented a large source of information on the locations of coastal habitats and their usage by marine species that had not previously been available to the fisheries sector in such an accessible form.

The fisheries specialists of the RWG-F and SEAFDEC complemented the above review with the analysis of data relating to fish egg and larval distribution and abundance generated by past and ongoing fish early life history research in the South China Sea (UNEP, 2007c). This fish early life history information enabled consideration of the importance of habitat sites from the perspectives not only of local biodiversity and fisheries benefits but also from their transboundary benefits in terms of regional fish stock sustainability and food security. For example, the distribution and abundance of larvae of the regionally significant short mackerel, *Rastrelliger brachysoma*, revealed only three distinct coastal locations utilised by the early life phase of this species, one being in the coastal waters near Mu Koh Samui in Thailand, and two on the east coast of Viet Nam.²⁷

Thus the process of *refugia* site selection acknowledged that efforts to safeguard habitats important to fish life-cycles should give priority to those sites for which the potential exists for the simultaneous achievement of local benefits and positive transboundary impacts. This approach was used by the RWG-F to agree on the selection of 14 priority sites for inclusion in an initial system of fisheries *refugia* and an additional 9 sites for which additional information is required prior to their inclusion in the system. The inclusion of a *refugia* site at Mu Koh Samui in the initial selection of sites was based on both the potential benefits to local food security associated with effective management in national waters and the potential transboundary benefits given the importance of short mackerel to all countries of the region. Further information on the regional fisheries *refugia* initiative is included in Paterson et al. (in this issue).

4.1.3. Development of modelling tools: determining the nutrient carrying capacity of the South China Sea

The ultimate causes of land-based pollution in the South China Sea were confirmed by the RWG-LbP to include increases in coastal population density, increased food production in the agricultural

sector and increased industrialisation. The proximate causes include inadequate waste-water treatment whilst intermediate causes include inadequate standards and lack of capacity to monitor, regulate and control pollution discharges. A major contributing factor is the lack of financial resources to invest in actions addressing the causes at all levels. In analysing national information it was apparent that key sources of waste ranked as follows: domestic, agricultural, industrial, poor land-use practices, and urban solid waste. To assist with the revision of the draft SAP targets, the land-based pollution component of the SCS project aimed to evaluate the carrying/assimilation capacity of sub-regions and sensitive ecosystems and the transboundary movements of contaminants within the South China Sea.

The fifth meeting of the RWG-LbP (UNEP, 2005b) agreed to use the ambient concentrations of contaminants in coastal waters as indicators of the input of contaminants derived from riverine sources. Subsequently, in considering available information that had been compiled by the RWG-LbP, the RSTC endorsed this approach and recommended that the RWG-LbP work with its expert member from SEA START RC to undertake a regional project to estimate the carrying capacity of the open shelf system based on its natural capacity to assimilate contaminants, in particular nutrient inputs, from land. The RSTC recognised that the modelling of heavy metal inputs and impacts required more reliable data for heavy metal concentrations in coastal waters and loading in the South China Sea marine basin than are currently available.

The resultant modelling system provides a tool to estimate land-based nutrient loading from rivers under data scarce scenarios. The simulation model enables variation of nutrient loading from particular rivers, stretches of coastline, or catchments to estimate the distribution of surface chlorophyll in the South China Sea, or a sub-region or sub-basin therein. This enables evaluation of the response of phytoplankton biomass to nutrient input from land at various spatial and temporal scales. Importantly, the modelling system is run entirely in Microsoft Excel, to which most scientists and managers in the South China Sea region have access and with which they are familiar. The RWG-LbP and RSTC, with the assistance of the PCU, has facilitated the wide online dissemination of this tool via the South China Sea project website.²⁸

The model can be run to estimate the monthly 'effective' loading of total nutrient from any catchment, as point or non-point loadings. This tool was critical in demonstrating that, while nutrient pollution of the South China Sea is important from a local perspective, it is not significant from the transboundary perspective of basin-wide assimilative capacity. Priority regional level interventions for land-based pollution were refined on the basis of the model predictions, and included SAP actions to investigate the extension of the model in the estimation of total contaminant loading and carrying capacity of the SCS basin using quantitative modelling and GIS for seven heavy metals (Hg, Cd, Pb, Cu, Cr, As, Zn) (UNEP, 2008b).

4.2. Significance for planning of the approach to establish a consensual information base

At the time of project development, the overall strategic support provided to GEF-funded international waters initiatives was to meet the incremental costs of groups of countries working together to better understand environmental influences on international waters and to work collaboratively to address them. Emphasis was also placed on building the capacity of existing national institutions to effectively participate in structured processes aimed at

²⁷ See Annex 5 of UNEP (2007c) entitled "Distribution and Abundance of Fish Larvae in the Gulf of Thailand and South China Sea".

²⁸ http://www.unepscs/nutrient_model/.

assembling information for use in assessing the water-related environmental problems and conflicts in their part of the basin or marine ecosystem, and sharing this information at the multi-country or regional level. This collaborative, factual analysis was deemed an essential starting point for diagnosing the root causes of stress in water systems and in identifying priority options for intervention for subsequent inclusion in targeted, costed SAPs. Accordingly, the overall goal, mid-term objective and activities of the SCS project were aligned with these objectives.

The first meeting of the RSTC concluded that the achievement of these goals and objectives could be hindered by insufficient data and information at both national and regional levels (UNEP, 2002a). At that meeting, the RSTC instructed the RWGs to prepare lists of data and information required and urged the NTWGs and national committees in each country to review the data and information collated during the preparatory phase of the project, and to regularly provide updated data and information, particularly in relation to data sources that may have been ignored during the preparation of the national reports used in finalising the TDA in 1999. The experience presented above indicates that the procedures for information gathering, review, and management established by the SCS project were effective in allowing seven countries to reach consensus on the information and data to be used in identifying priorities for intervention in a shared marine basin.

The information and data management achievements of the SCS project are significant in terms of: the volumes of information and data compiled at the regional level to date; the establishment of an effective platform for regional sharing of information and data online via the South China Sea project website; and the scientific independence and veracity achieved by the various national and regional organs of the project management framework in the process of joint fact-finding and the setting of priorities. The patience and commitment of the many individuals involved in the process of information gathering and review was also significant, especially considering that all regional meetings were conducted in English which was a second and, in some instances, a third language of national focal points. The translation of national language reports and research papers into English by national focal points for presentation and discussion during regional meetings was an important step in that process.

The high rate of participation of national representatives in regional working group and task force meetings is also of significance, particularly from the perspective of continuity of participation in the discussion of issues pertaining to SAP development. The joint fact-finding and step-wise review and analysis of issues and options relied on the sustained attention of key national participants over periods of time ranging from 2 to 5 years. Many higher-level decisions relating to SAP targets and priority interventions depended on national focal points having participated in discussions and having contributed to decisions relating to a series of lower-level, but related, issues. For example, the task of prioritising fisheries *refugia* sites on the basis of potential transboundary impact required an understanding of the procedures followed during previous meetings to develop and agree regional lists of fish species of transboundary significance. The fact that no national focal points were remunerated for their involvement in the project or these regional meetings adds to the significance of these commitments.

It is perhaps important in this context to note the significant role played by all members of the Project Co-ordinating Unit (PCU) in fostering a sense of unity and group identity such that by the end of the Project all participants were proud to be considered a member of the South China Sea 'family'. This role for the PCU staff involved careful selection of restaurants where local cuisine was served and where all members' religious and dietary customs could be catered

for; ensuring that no meetings were scheduled for major religious²⁹ or cultural holidays. All participants in all regional meetings with the exception of the Regional Scientific Conferences ate all their meals together fostering the group identity and sense that the individuals belonged to a particular and privileged epistemic community.

One explanation for the apparently high levels of commitment of national focal points to these regional processes might be the various inter-personal and professional networks established as part of the project management framework. For example, in presenting information and data for review at either a NTWG or RWG/RTF meeting, focal points were not only representing their SEA, but also their national committees and the network of stakeholders involved in the development of the information bases for each of the project components. The analysis presented above on the sub-contracting of national supporting organisations by SEAs shows, in part, the extent to which these networks were built or strengthened. As a result of the partnerships built with supporting organisations, SEAs had a vested interest in following the information and data they had compiled through the structured process of review and its subsequent use in project decision-making.

Similarly important relationships were established at the regional level wherein national experts were linked together regionally in working groups and task forces with responsibilities for reporting to the RSTC. The clear definition of the roles, responsibilities, and reporting requirements of each of the SEAs and national focal points in MoUs and ToRs meant that each participant in these regional forums had a clear understanding of what was expected of one another. During each regional meeting, agreements would be reached about ongoing information and data needs and activities for inclusion in the group's work plan to guide the completion of these tasks between meetings.

The prompt production of detailed meeting reports by the PCU staff that were tabled and approved before the closure of each meeting meant that members of each individual working group or task force knew what commitments had been made by their group and had a hard copy 'reminder' before leaving the meeting. Subsequently all meeting reports were copy edited and published 'online' within two weeks of the closure of the meeting enabling members of other working groups and task forces to access this information and to gauge the progress of work across inter-related project components. Following this the meeting reports were printed and hard copies distributed throughout the network. This introduced an element of 'social commitment' at both national and regional levels that may have also contributed to high participation and levels of engagement in the information and data aspects of the project.

The SCS project document envisaged that the data and information outcomes of the project would simply be national and regional meta-databases for each project component and sub-component. It did not envisage the development and operation of a project website and various online databases subsequently created by the project to enhance region-wide sharing of information and data. As such, no GEF grant funds were programmed or spent in support of the online initiatives of the South China Sea project. The increased availability of low-cost and user-friendly software for the online management and sharing of information and data during the operation of the project enabled these achievements. Similarly, the rapid expansion of low-cost high-speed Internet connections in Southeast Asia at the mid-point of the project provided members of the project network with ready access to the World-Wide Web and hence the possibility to share project information online.

²⁹ No project meetings were convened during the Islamic month of Ramadan, for example.

The SCS project databases and website have been recognised as a rich and extremely valuable source of information, data, databases, training materials, models and other items of relevance to the South China Sea. Perhaps the best independent recognition of the role of the website as a mechanism for information and data sharing comes from the Internet company 'Google'. In February 2008, the SCS project website was showcased by Google in its 'Google Earth Outreach Showcase'³⁰ and featured in the official Google news.³¹ That news item highlighted the online outreach initiatives of the South China Sea project as "a great example of how to connect with a wide audience" and was widely syndicated across the Internet. At that time, Google added the project as a permanent feature of the 'outreach' map layer in its popular Google Earth system.

The question arises as to how access to the online information resources generated by the SCS project can be sustained in the longer term. The ninth meeting of the RSTC in 2008 considered an analysis of the usage and effectiveness of the SCS project website as well as a series of recommendations regarding the operation and management of this online information resource following project closure. It was noted that the future use of the website would be influenced by the post project situation regarding regional co-ordination. Several scenarios were identified at that time, including: GEF funded SAP implementation from 2009 to 2014; priority community-level interventions implemented by the GEF Small Grants Programme (GEF SGP) and other donors; and, little or no regional co-ordination of SAP activities. Following consideration of how the website could support each of these scenarios, and the related resource requirements, the RSTC delivered the following recommendation to the PSC (UNEP, 2008c):

"The RSTC recognises that the existing project website provides a rich and extremely valuable source of information, data, databases, training materials, models and other items of relevance to the South China Sea. Furthermore the website was recognised internationally by Google Earth, the GEF Secretariat and IW-Learn as being the most comprehensive body of information and data pertaining to any large marine ecosystem or shared water body world-wide. In addition, the number of individual visits to the site per month; the numbers of document downloads; and the number of countries from which visitors originate (120+ of which the seven participating countries all rank in the top 20) attest to the global and regional significance of the site.

In light of this, and recognising that COBSEA has decided to take responsibility for oversight of the implementation of the Strategic Action Programme the RSTC recommends that the Project Steering Committee recommend to COBSEA that the COBSEA Secretariat be charged with responsibility for maintaining a South China Sea website. The COBSEA Secretariat would need to assess the resource requirements both financial and human, bearing in mind that the site would need to be modified to make pages available for national focal points to provide up-dates of the actions and activities associated with the implementation of the National Action Plans and Strategic Action Programme."

It was subsequently agreed that COBSEA would assume responsibility for the maintenance and update of the SCS project website. Funds from the GEF project grant were transferred to COBSEA in order to contract a commercial web host to operate the website during the period 2009–2010. The costed SAP included the

allocation of financial resources for the longer-term hosting of the website and online databases. At the time of project closure, it was envisaged that costs for the ongoing maintenance and update of these information resources would be met via SAP implementation. It was also envisaged that actions to generate the information and data that had been prioritised by each of the RWGs and RTFs during SAP development would be implemented as part of SAP implementation. The latter included ongoing support to the continued operation of the working groups and task forces.

However, as reported by Bewers and Pernetta (in this issue), UNEP and the GEF did not progress towards a SAP implementation project for the South China Sea. As a result, the cooperation in information and data collection, analysis and management has stagnated during the period 2009–2012. While UNEP has continued to cover the costs of commercial hosting for the SCS project website, it is apparent that there has been little or no update of the information and data contained in the site by the COBSEA Secretariat. For example, reports of the successful SCS – GEF SGP partnership reported by Chen et al. (in this issue), could not be found on the SCS project website or the COBSEA website at the time of preparing this paper. It is unlikely that this situation of limited information update and sharing will improve without action to strengthen the regional coordination of SAP implementation. Further discussion of the issue of sustainability is provided by Bewers and Pernetta (in this issue).

5. Conclusions

The approach to the gathering, review, and management of information and data described in this paper reflects the overall goal and objective of the South China Sea project and its planned contribution to the GEF international waters focal area of investments. The effort of creating a regional level environment, in which collaboration and partnership in addressing environmental problems of a marine basin can be fostered and encouraged, depends on broad stakeholder participation in the compilation, analysis and agreement on the information and data to be used in decision-making. In terms of the project's medium-term objective to elaborate the South China Sea SAP, it is concluded here that without the development of such a consensual information base there would have been no objective way of ensuring that the selected issues and priority options are of any significance from the perspectives of the countries involved, the water body itself, or of potential transboundary or global benefits.

As a 'foundational' GEF international waters project, the approach to the compilation and use of information and data established by the SCS project was aimed at developing consensus among the participating countries on the selection and use of the best available information to plan and guide investments. The experiences presented above indicate that this was successfully achieved. The approach also built a significant epistemic community of scientists and resource managers experienced in the application of such a consensual information base to the TDA/SAP process underpinning GEF investments in international waters. Case examples on the development of the mangrove, fisheries and land-based pollution components of the South China Sea SAP demonstrate the importance of establishing a consensual information base in ensuring that selected issues and actions included in any SAP for a shared water body are of priority from the perspectives of both national and transboundary benefits.

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The authors recognise that the work reported here was the outcome of collective discussion and step-wise collection, review,

³⁰ Available online at http://www.google.com/earth/outreach/stories/showcase.html#kml=South_China_Sea_Project.

³¹ Available online at <http://google-latlong.blogspot.com/2008/02/south-china-sea-project.html>.

and analysis of information and data by the extensive partner network established by the SCS project. Accordingly the authors wish to acknowledge the significant contributions of the more than 100 national and regional organisations and more than 400 individual members of the SCS 'family'. Particular appreciation is extended to the SEA START RC for its important role in facilitating the development of questionnaire forms for the compilation of regionally comparable data sets for coastal habitats, fisheries, and land-based pollution. A special acknowledgement must also be made of the contributions of the many regional experts, all of whom gave their time and expertise freely to the work of the various regional bodies and were instrumental in fostering a culture of scientific independence and veracity to the processes described in this paper. The authors further recognise that without the financial support of the Global Environment Facility and the intellectual and leadership skills of the Project Coordinating Unit this work would not have been possible.

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