SOME

MAMI WATA

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STATE OF THE MARINE ENVIRONMENT (SOME) REPORTING FRAMEWORK FOR THE ABIDJAN CONVENTION COUNTRIES

GUIDANCE AND EXAMPLES

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ACRONYMS

COP	Conference of Parties
DPSIR	Drivers-Pressures-State-Impact-Response
ICG-ESA	Intersessional Correspondence Group on Economic and Social Analysis (under OSPAR)
EU	European Union
EPA-SL	Environmental Protection Agency (Sierra Leone)
EEZ	Exclusive Economic Zone
EBSA	Ecologically or Biologically Significnat Marine Areas
FAO	Food and Agricultural Organization of the United Nations
IISD	International Institute for Sustainable Development
IUCN	International Union for Conservation of Nature
IEA	Integrated Environmental Assessment
IODE	International Oceanographic Data an d Information Exchange Programme
IOM	Integrated Ocean Management
IOC-UNESCO	Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organisation
MSP	Marine/Maritime Spatial Planning
MOU	Memorandum of Understanding
MSFD	Marine Strategy Framework Directive
NGO	Non-Governmental Organisation
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
OHI	Ocean Health Index
SDG	Sustainable Development Goal
SOME	State of the Marine Environment
UN	United Nations
UNEP / UN Environment	United Nations Environment Programme
SEA	Strategic Environmental Assessment

1. EXECUTIVE SUMMARY

The following document describes the general approach for the development of marine assessments or State of the Marine Environment reporting (SOME) in the Mami Wata project. The methodology follows the structure and approach described in the Integrated Environmental Assessment Training Manual (UNEP/IISD 2009) and offers, depending on availability of data and information, different options to develop SOME reports: literature-based, indicator-based or expert consultation approaches. The methodology has been adapted to the regional context in the member states of the Abidjan Convention, by incorporating best practices, case studies and feedback. This was done at the Technical Working Group meeting for the Mami Wata project (Freetown, Sierra Leone, 17–19 October 2017).

2. INTRODUCTION TO MARINE ASSESSMENTS

Knowledge of the health of the environment underpins good environmental management. Environmental assessment is a process that takes scientific data and knowledge and uses this to assess the condition and trend of environmental characteristics in order to support environmental decision-making. Where there is insufficient empirical data to assess the health and trends then expert judgement can be used to help to provide scientifically credible answers to policy-relevant questions. Environmental assessment can serve to bridge the gap between science and policy; it sensitizes the scientific community to policy needs and the policy community to the scientific basis for action (UNEP 2010).

SOME reporting is a specific type of environmental assessment, which focusses on a periodic assessment of the health and conditions of key elements of the marine environment. SOME reporting is an essential component of the integrated ocean management (IOM) cycle. Reports should be produced on a regular basis to help assess the impact of existing management measures and identify emerging environmental trends that may need additional management measures. Assessment intervals differ, for example, the European Union (EU) Marine Strategy Framework Directive (MSFD) sets a 6-year cycle for assessments, whilst in Australia State of the Environment reporting is done on a 5-year cycle.

Integrated ocean management is an approach that brings together EBSA (ecologically or biologically significant areas) information, SOME reporting and MSP (maritime spatial planning) processes to support traditional sectoral management. The Mami Wata project will provide support to countries of the Abidjan Convention Region to implement SOME reporting as part of a broader initiative to support IOM in the region.

As well as supporting national strategic policy, SOME reports serve different regional and international purposes. They contribute to the United Nations Regular Process, i.e. the World Ocean Assessment. At the regional level, SOME reports also contribute to reporting requirements to the Abidjan Convention. A reporting template was developed, presented and endorsed at the Abidjan Convention COP 11. This reporting template will be integrated in the SOME report under the Mami Wata project.

3. STATE OF THE MARINE ENVIRONMENT REPORTING

The basic purpose of the SOME report is to allow for regular assessment of an agreed set of regional indicators that show status and trends in environmental conditions. It provides necessary information for developing monitoring programs and policies implemented at local, national and regional levels. Furthermore, it increases the number of stakeholders involved in order to benefit from their feedback and valuable contributions. A SOME report aims at making conclusions about the status and trend of key indicators and recommendations that could reverse negative trends and improve the overall condition of the marine environment.

The SOME process can be based on a number of different methodological approaches, which can broadly be characterized into the following: indicator-based assessments, literature-review assessments, and expert elicitation. Indicator-based assessments are data driven approaches. These types of approaches use sequential measurements of key pre-defined indicators, such as water quality, to assess the status and trend for specific environmental variables. The major advantage of these types of approaches is that they are objective and have a high degree of confidence. The downside is that they are often dependent on expensive monitoring programs and are constrained by what can be measured.

Literature-review assessments are based on published data and information on key indicators, usually found in reports and scientific papers. The advantage of this approach is that it builds on existing knowledge and information and does not necessarily rely on a dedicated monitoring programme (although the published results may be due to the existence of such a program). As these approaches rely on published data they may often lag due to the time it takes before the results are published.

The final approach, expert elicitation, uses a workshop setting to bring together a diverse range of experts. The experts can discuss the available data for each of the key indicators and then formulate a consensus on the status and trend for each of the key indicators. This approach is the most subjective, but is particularly useful where there is a scarcity of recent or relevant data. An important aspect of this approach is that it should also include an estimated confidence for each of the indicators ranging from low when based only on expert opinion to high where appropriate data exists.

SOME reports usually apply a framework for assessing the status of key environmental features. The DPSIR framework (Drivers-Pressures-State-Impact-Response) is one such framework (Figure 1). The DPSIR framework is a stepwise approach to achieving the following: 1) identification of drivers and pressures, 2) determining the state and impact, and 3) assessment of the society's policy response.

This document follows the structure of the United Nations Environment Programme (UN Environment) and International Institute for Sustainable Development (IISD) Integrated Environmental Assessment Training Manual (2009). It is designed to provide guidance and relevant regional examples for the states in order to undertake SOME reporting. It will be used in the Mami Wata project and for the development of national marine assessment pilot projects in West Africa.

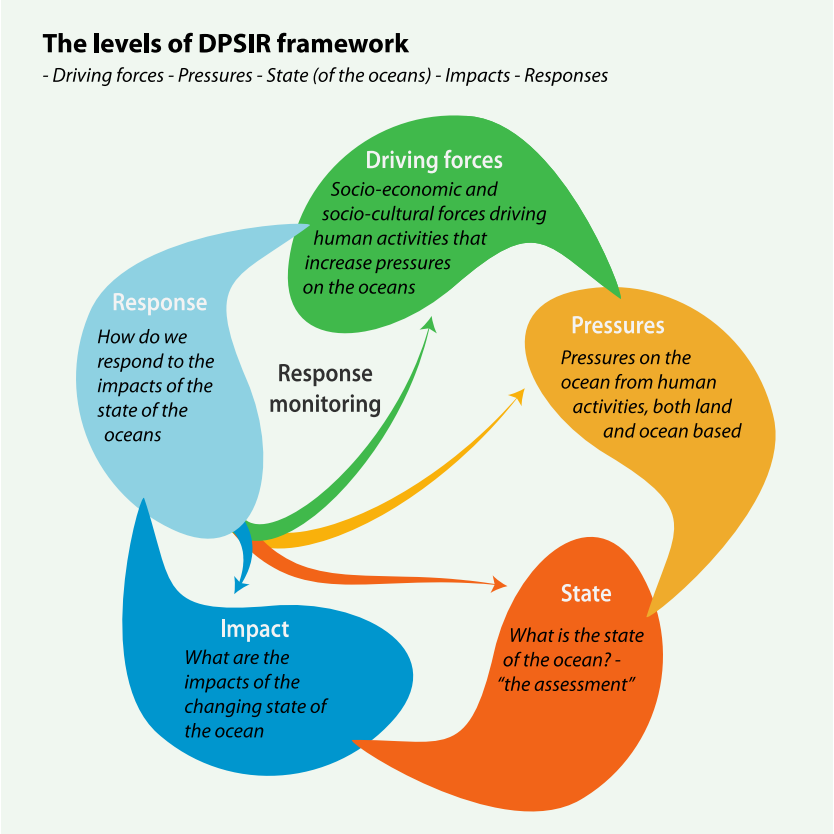


Figure 1. *The DPSIR framework in relation to State of the Marine Environment Reporting*

4. STEPWISE DEVELOPMENT OF SOME REPORTS

For a state or organisation seeking to develop its first SOME report the process can appear complex and daunting. The following section breaks this step-wise process, with examples and guidance relevant to SOME reporting tailored to countries of the Abidjan Convention region. The nine steps outlined below are not meant to be prescriptive, but instead provide a suggested framework for undertaking a SOME reporting process. The nine steps of a SOME reporting process are:

- Step 1: Mandating process
- Step 2: Designation of a Secretariat
- Step 3: Scoping and design
- Step 4: Establishing the working structure
- Step 5: Establishment of communities of practice (stakeholders)
- Step 6: Implementation
- Step 7: Communication
- Step 8: Review and publication
- Step 9: Monitoring, evaluation and learning

These steps are in principle independent of the selected method(s) for the assessment (indicator-based assessments, literature-review assessments, expert elicitation).

Step 1 – Mandating process

The initial step in the development of a SOME assessment is to secure the legal mandate for the national authority in charge of environmental reporting. The mandate or agreement should allow for coordination between relevant ministries/departments. This normally involves a contact and consultation meeting between the participating organizations, the determination of the need for the assessment, and establishing the scale and feasibility of securing funding to carry out the work.

The management of this step may depend on the institutional structure in any given country and the availability of resources. For example, the mandate for Cote d'Ivoire is under the Ministry of Environment, and the mandate for Sierra Leone is under the Presidency. Limited resources will demand that the development process is kept simple.

In this step, it is important to identify and decide which authorities and institutions will be involved in the process. This will depend on their statutory responsibilities, and who will be responsible for managing the process. Once the lead institution has been appointed by the government and other authorities and technical support institutions are identified, a first start-up meeting can be organized. This meeting has the purpose of defining the scope and goals of the national marine assessment, as well as the responsibility of the authorities and institutions involved. The outputs of this first phase include a conceptual framework and (optional) memoranda of understanding (MOU) between the parties involved in the SOME process.

The outcomes of this process will be incorporated into Step 4 below: Establishing the working structure.

Box 1: Case studies Cote d'Ivoire and Sierra Leone

The Ivorian Centre for Environmental Protection is mandated by the government for environmental monitoring and reporting. The mandate has been described in the legal text that creates the centre and describes the mandate of the centre. At the creation of the centre this was described in the Decree for the creation of the institute (1991). The reporting requires that the institute coordinating the report coordinates with other ministries and institutes.

In Sierra Leone, the mandate falls under the Office of the Presidency, which easily facilitates cooperation with other ministries as it has a broader mandate. The mandate for the leading instate or authority should allow the coordination with other ministries and stakeholders.

The conceptual framework is prepared with input from the national environmental authority and normally they will play a central role. The Environmental Protection Agency (EPA) of Sierra Leone was coordinating the work when their State of the Marine Environment Report was produced. The framework also describes what the national marine assessment and its goals are, its general organization, the methodology, the process, guidance for implementation, required resources, and clarification on needs for additional fundraising or in-kind support.

Step 2 – Designation of a Secretariat

In step 2 a Secretariat should be designated. The Secretariat will be responsible for the overall management of the assessment and the institutional coordination of the process. It is essential that the relevant authorities and institutions are involved in the process and, that their roles are properly defined. IOM is a cyclical process and marine assessments are produced on a regular basis (e.g. 5–6 years). It is therefore important that the institutions involved can lead this process for a long time.

There are no guidelines or rigid rules and design of the institutional framework will depend on the national organizational capacities and structures. As an example, the Sierra Leone SOME report (2015) was developed by the Environmental Protection Agency of Sierra Leone (EPA-SL). The EPA-SL was charged by the governmental council to develop the report. Marine authorities and institutions were asked to contribute in this process. The Abidjan Convention (UN Environment) and GRID-Arendal provided technical support.

In most of the cases, a SOME report is developed by the national environmental authority that holds the legal mandate for environmental reporting. In some cases, another organization (e.g. university) is appointed to lead the process. In these cases, it is essential that the national environmental authority is involved. The process may also include the designation of a consultative

Box 2: Disputed area between Guinea and Sierra Leone

In disputed marine areas it may difficult to impose management because of either lack of legislation or conflicting legislation. An example of a disputed marine area in West Africa is the marine border area between Guinea and Sierra Leone. In this area there are challenges to regulate fisheries and other activities.

council. The consultative council advises and supports the participatory process and stakeholder consultation. It consists of representatives from relevant authorities, of the private sector (e.g. local fisheries organizations, ocean industries, tourist boards) and possibly non-governmental organizations (NGO).

The secretariat that coordinates the development of the SOME will normally be a government organization (e.g. the ministry of environment or national environment council). This secretariat should have a legal mandate for preparing the national marine assessment. Other options are also possible, e.g. a university or non-governemtal organisation (NGO) appointed by the government. The appointment by the government is essential as it increases the legitimacy of the marine assessment and the likelihood that the national marine assessment results will be accepted and used by decision makers.

Criteria for selecting a secretariat include:
- Capacity to engage key stakeholders
- Sufficient capacity (staff) to lead the process
- Access to relevant data and information
- Recognized ability to carry out high quality environmental assessments and reporting on time and budget
- Acceptable to a wide range of stakeholders

In order to lead the process efficiently, there is a need to appoint a senior staff person with a strong technical and administrative capacity to coordinate the process. This staff person will act as a focal point for communication and takes up the responsibility to lead the development process at the national level.

Step 3 – Scoping and design

The main objectives of step 3 are to:
- define the geographic boundaries of the SOME;
- agree on the methodology for the assessment, and clarify any methodological issues.
- establish the structure of the SOME report, considering the priority environmental issues;
- identify main sources of data and information

Assessment boundaries

The geographic boundary of the marine assessment needs to be defined, taking into account that some environmental problems have regional and global impacts. Many marine assessments focus mainly on the national scale, whilst addressing regional issues when it is required for analytic reasons, e.g. assessing the state of mangroves is done on a national scale, including all mangrove habitats within the boundaries, while an analysis of hydrocarbon pollution from shipping and the offshore oil industry might require a transboundary assessment.

It will be important to take into account the extent of coastal and marine habitats and natural boundaries, not just political boundaries. There should be coherence in the approach between two neighbouring countries. It is also important to consider the impact of land based activities on the marine environment, linking activities in the catchments to impacts in the coastal and marine areas.

Methodology

SOME assessments are based upon the Drivers-Pressure-State-Impact-Response (DPSIR) framework (see Figure 1), which shows relationships between human activity and the state and trends of the environment and human well-being. This analytical framework helps one to understand connections among the components of the integrated marine assessment.

As stated in section 3, there are three main methods used for integrated marine assessments:
- Indicator-based assessments
- Literature-review assessments
- Expert consultation based (expert elicitation)

Indicator-based assessments are those based on quantitative primary measurements of field data that monitor a particular variable. The variables are chosen because their status indicate the condition of the ecosystem or habitat. For example, water quality indicators such as dissolved oxygen, nitrogen, phosphate or chloride concentrations are commonly used as indicators of the overall status of the marine environment as they indicate pollution or nutrient enrichment. Examples of indicator-based assessments include the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) Quality Status Report (2010) and the Ocean Health Index (OHI).

Literature-based assessments do not rely directly upon primary data sources but rather upon a survey of published literature and available information, e.g. UN World Ocean Assessment (2016).

Expert consultation based assessments (expert elicitation, Annex 1) rely on expert judgment supported by published and readily available data, e.g. Sierra Leone State of the Marine Environment Assessment (2015).

It is also possible to apply a combination of methods: e.g. for those chapters in the report where sufficient data and information is available, the indicator or literature based methodology can be applied, while chapter which lack sufficient background data can be based upon expert elicitation.

A decision framework for assessment methodologies has been developed by UNEP (2016) (Figure 2). This framework takes into consideration the type of assessment, available time and resources and purpose of the assessment.

The method selected will depend on the type of information available and the budget. To determine this, it is necessary to ask the following questions:

- Are existing assessments available that enable a synthesis approach to be used for the assessment or portions of the assessment?
- Is recent data or literature available that enable an analysis approach to be used for the assessment (or sections of the assessment)?
- Are there knowledgeable experts available on the different subjects in the marine assessment (biodiversity and ecosystems, the physical and socio-economic aspects of the marine environment)?

It has to be remarked that data and information on the marine environment for the purpose of the development of national integrated marine assessments in West Africa, is often absent or unavailable, outdated or with an insufficient spatial resolution.

It will therefore be necessary to identify a priori:

- Is relevant data and information on the national marine environment is available?
- Are the timescale and resolution of the data appropriate (for example, the age of the data should match the time period covered by the SOME report)?
- Can the data be obtained in a timely manner for the development of the national marine assessment?

This can be quantified in a table which summarises the availability of quantitative data, published/grey literature, and experts in the relevant field (Table 1). Countries should involve their national marine/oceanographic data centres and other relevant agencies in this review.

Table 1. *Example of inventory table to assess available data for the SOME report.*

Data	Data owner	Timescale (data)	Availability of data	Expert
Socio-economic data Fisheries Marine energy industry Tourism etc…	[Institution]	[Annual, biannual, 5-yearly,…]	[Immediate, embargo, etc., not accessible]	[Name, authority]
Environmental data Biological Pollution Oceanographic etc…	[Institution]	[Annual, biannual, 5-yearly,…]	[Immediate, embargo, etc., not accessible]	[Name, authority]

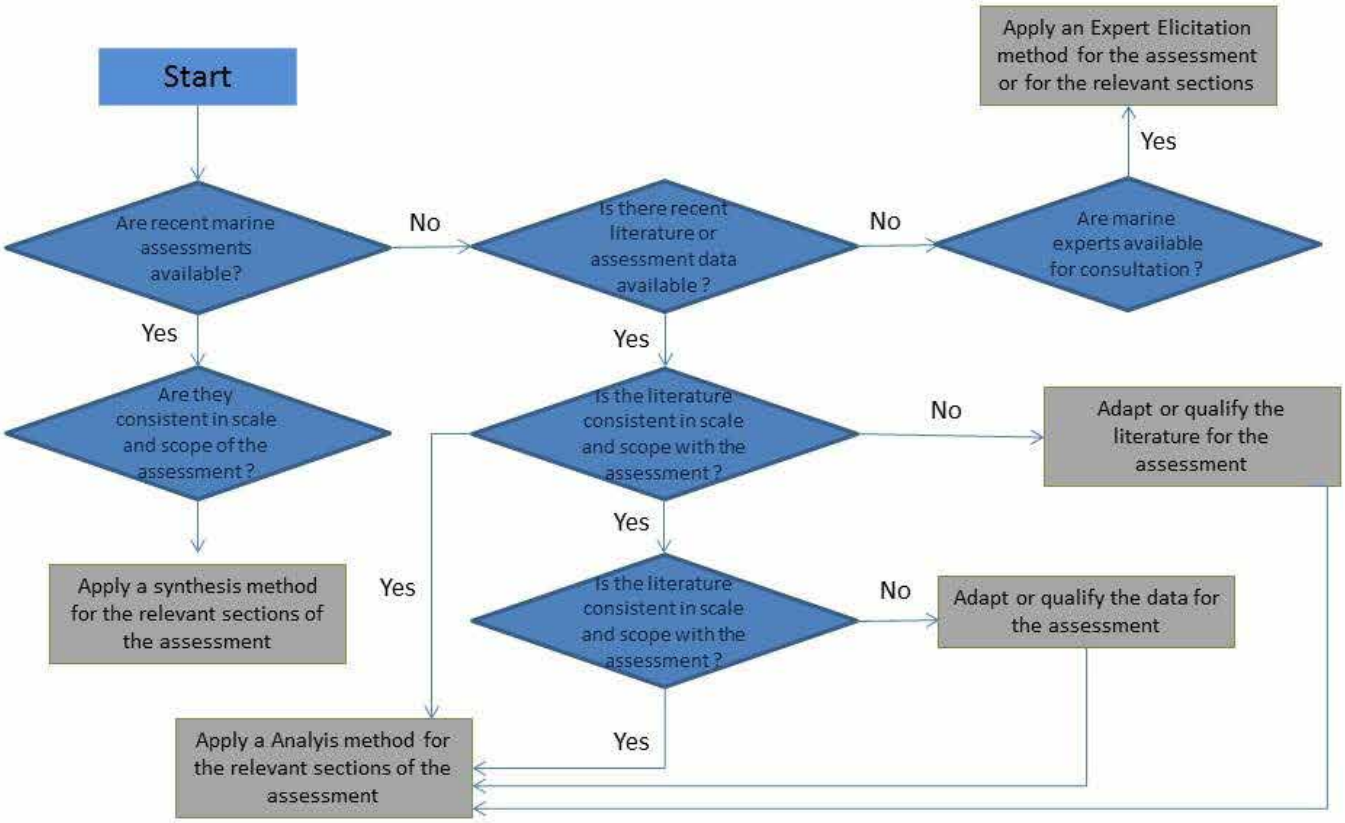


Figure 2. *A decision framework to identify the appropriate methodology for a marine assessment (UNEP, 2016)*

The following decision framework indicates which method to follow for the development of the marine assessment. The selected methodology for the Mami Wata marine assessment pilot projects will be based upon the proposed methodological framework of UNEP (2016) (Figure 2). The methods can be combined, e.g. for those sections where sufficient data and information or existing assessments are available, a synthesis/analysis method can be used, while for those sections where no information is available, the expert elicitation method can be applied.

Selection of the methodology requires insight in data and information availability. The involved experts usually have good insight in this. The available budget should also be considered since normally a much smaller budget is needed to produce an expert consultation based assessment. This methodology will also give more up to date results since data and reports from monitoring systems only are available some time after collection. The expert consultation based method gives less quantifiable assessments than the other methods.

It is essential that the experts involved learn and understand how the applied methodologies work. The process approach is iterative (learning by doing) with specific steps. The process is flexible and adaptable to local needs and characteristics.

Identify main sources of data and information

A survey of available national data and information should be performed at the start of the project. Data and information providers at the national level include:

- Ministries responsible for marine sectors, e.g. energy, fisheries, tourism, environment
- Central Bureau of Statistics
- Universities, research institutions: e.g. national marine research institutions
- NGOs: e.g. BirdLife International
- Stakeholders
- Coastal communities and resource users

In addition to national data and information, there are also global and regional marine data and information sources that can be used to fill gaps in national data. Global and regional data sets are often compiled from a range of different data sources and while they commonly lack the high resolution of national datas sets, they can still be useful in guiding SOME Reporting. Data and information providers at the regional/global level include:

- World Ocean Assessment (UN)
- UN Food and Agricultural Organisation (FAO)
- International Union for Conservation of Nature (IUCN)
- UN Environment (UNEP)
- The International Oceanographic Data and Information Exchange (IODE)
- UNEP-World Conservation Monitoring Centre (https://data.oceanplus.org/)
- GRID-Arendal (http://www.bluehabitats.org/)

The Ocean Health Index (OHI) project provides indicators on the status of the marine environment in the Exclusive Economic Zone of all states (Halpern et al. 2012). The method is based upon a distillation of complex data towards indices. The OHI data can be used as additional information source.

The Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organisation

(IOC-UNESCO) has developed a network of national marine data and information centres in coastal states across Africa. Through these centres, national data collections were developed. These consisted of data (from global and local sources) on the physicochemical status of the marine environment, satellite analyses, ocean climatology, weather climatology, geology, base mapping, ecology, fisheries. A catalogue of data sets can also be accessed through a central GeoNetwork server.[1]

The African Marine Atlas[2] provides maps, images, data and information which can be useful as baseline data in the development of integrated marine assessments.

Step 4 – Establishing the working structure

In this step the key process elements are brought together and the working structure is established. Several groups should be established in addition to the Secretariat to organize the drafting process of the report and the writing of the different main themes.

There are several outcomes to be achieved from this step:

- To share and make sure participants of the process understand the integrated marine assessment methodology
- To have a timetable for each of the activities and well-defined results/outcomes proposed at each stage
- To identify the requirements of human, financial and infra-structure resources and how to overcome any shortfalls in these;
- To have adequate coordination mechanisms with the process stakeholders;

Primary collaborating institutions have a direct role in the assessment, including coordination, selection of key issues to be covered, data collection and analysis, drafting of assessment reports and communication of results. Primary collaborating institutions are typically governmental, academic or specialized NGOs.

Secondary participants are those who are invited to contribute their views, but who do not typically play a coordinating role or have responsibility for assessment products. They may come from a wide range of sectors and include e.g., government departments or agencies, academic, non-governmental organizations, corporations, civil society organizations, youth or women's groups, aboriginal associations or the media.

It is important that the different stakeholders participate throughout the entire process, providing information or developing specific activities.

Box 3: Case study I: stakeholder engagement in Ghana

Ghana has prepared two State of Environment Reports since 2004. The draft second report was completed in 2016. To ensure adequate coordination with process stakeholders, the approach adopted was underlined by the principle of ensuring stakeholder ownership of the process itself and outputs of the process. The process of stakeholder engagement was carried out in three stages.

Stage 1: Formation of thematic workgroups
Process stakeholders were assigned to various thematic workgroups. The thematic workgroups identified the information and data required for their themes. Workgroup members made direct contacts with secondary stakeholders for additional information and data. Individuals within the Thematic workgroup prepared write-ups on subthemes based on data and information gathered. The write ups were integrated into the main themes during coordination meetings of the thematic workgroups

Stage 2: Thematic workgroup consultations with stake-holders
The draft thematic reports were discussed at consultation meetings with secondary stakeholders, particularly those representing sources of data and information

Stage 3: Stakeholder validation of draft thematic repots.
The final draft report was submitted to a broader stakeholder validation meeting.

Box 4: Case study II: coastal vulnerability chart Côte d'Ivoire

In Côte d'Ivoire a vulnerability chart for the coastal zone was developed with contributions of public authorities (ministries and others), universities and research centres (centre universitaire de recherche appliquées et de télédetection, centre de recherché oceanographique), the private sector (petroleum companies) and coastal populations. The objective of this map is to identify the sensitive or vulnerable areas in the coastal zone of Côte d'Ivoire to allow a rapid and efficient intervention in case of a disaster.

The principal steps of the development process of this map were the following:

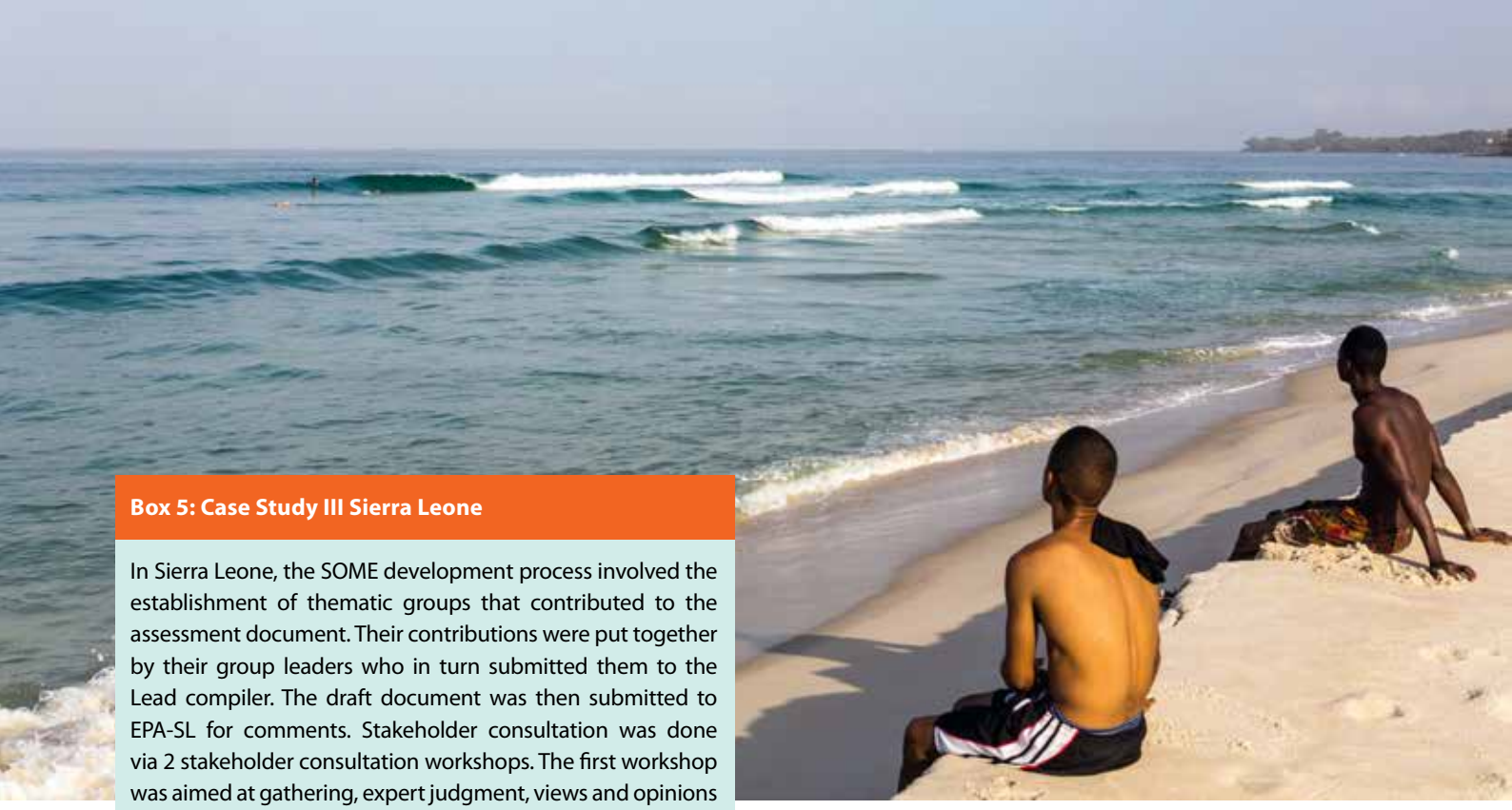
1. Identification of the stakeholders
2. Capacity building workshop
3. Validation of the data collection forms
4. Simulation in the field (verification)
5. Lessons learned

The role of the different actors in the development process were:

- The government administrations were charged with the organization of the populations and the managing of the local equipment to combat pollution in case of a disaster.
- The universities and research centres were responsible for the design, the development and realization of the maps.
- The private sector contributed data and information on equipment and installations and their location.

The population was made aware, trained and informed to participate in case of disasters.

1. http://geonetwork.iode.org/geonetworkAMA/srv/en/main.home
2. http://www.africanmarineatlas.org/



Box 5: Case Study III Sierra Leone

In Sierra Leone, the SOME development process involved the establishment of thematic groups that contributed to the assessment document. Their contributions were put together by their group leaders who in turn submitted them to the Lead compiler. The draft document was then submitted to EPA-SL for comments. Stakeholder consultation was done via 2 stakeholder consultation workshops. The first workshop was aimed at gathering, expert judgment, views and opinions on various marine socio-economic and environmental parameters. The second workshop was aimed at seeking comments opinions and endorsement of the results of the assessment before finalizing the SOME report.

Stakeholder engagement for the development of the National Action Plan for the management of the Sierra Leone coastal Area 2010

The initial national stakeholders' consultation identified the problems, traditional management strategies and summarized the needs and barriers for Sierra Leone discussed the proposed contents of the report and mechanisms to mobilise data and information gathering. The final national stakeholders' consultation selected the priority action activities for Sierra Leone.

The principal stakeholders had the opportunity to identify the key issues for each of the sectors considered. Meetings were held and studies conducted on vulnerable groups in order to assess mechanisms that are used to manage the problems in the various sectors as well as in the local communities. Study interviews and meetings conducted were designed to achieve the following:

- To acquaint the people with details of the project,
- To seek information on the problems faced in the management of the resources and the environment;
- To obtain possible information on how poor people are dealing with the problems and challenges,
- To suggest ways on how these problems and challenges can be tackled by the various sectors.

The following groups were consulted: community leaders and government authorities, population centres (villages, towns), special interest groups (e.g. NGOs), etc. The mechanisms of consultation included: public meetings, personal discussions, and administration of questionnaires.

In order to facilitate an active relationship with collaborating institutions, it is important to:

- identify a contact person at the institution.
- establish a clear definition of their role and responsibilities
- keep the contact person regularly informed about progress and seek out his/her views on key decisions.

It is essential to design this step to ensure stakeholder ownership of the process and the outcome.

Structure and key issues

The Secretariat will ensure scientific and political credibility, and if necessary use the consultative council to ensure policy relevance. The technical team has to identify the best way to interact with stakeholders, and the best way to deal with constraints related to data availability. The methodologies have to be customized to local conditions. It is useful to review earlier marine assessments and processes, indicators, available information sources and organizations that have done similar assessments.

In addition to the Secretariat described in step 2, a consultative council should be considered.

Consultative Council

A consultative council serves the role to coordinate the activities between the Secretariat and the other Ministries and participating organisations. The council should consist of participants from some of the most important Ministries, and perhaps also from the office of the Prime Minister. A consultative council can help facilitate data sharing between different Ministries and other relevant organisations. It can also be used to help identify the available expertise within these groups.

In addition, relevant stakeholders from the private sector, local authorities and NGO`s should be represented.

Technical Team

The technical team's role is to undertake specialized analysis, provide, analyse and interpret data, provide peer review, and help engage the wider expert community.

The members of the technical team need to be selected according to the following criteria:

- experience in marine environmental reporting or integrated environmental assessments
- high public profile and recognized leadership capacity
- good relationship with the national environmental authority
- capacities to communicate with marine stakeholders from the public and private sector
- ability to build consensus on key environmental issues
- experience in organizing and facilitating workshops
- sufficient capacity (time) to dedicate to the development process of the marine assessment

The selection could be accomplished by selection process (tendering) or direct invitation.

For practical reasons, it is proposed that the technical teams for the development of national marine assessments in Mami Wata pilot projects consist of a small team (e.g. 3-5 experts) with the following roles: coordinating the report, data management/ analysis/report writing and workshop leading/consultation.

Editorial team

An editorial team, responsible for writing the text of the assessment, need to be appointed. Different experts could be responsible for writing different chapters. The editorial team could be identical to the technical team, part of this or a separate team.

Step 5 – Establishment of communities of practice

A stakeholder analysis is essential to ensure that the different stakeholders are represented. The analysis identifies and examines key stakeholders, fulfilling criteria such as representation across sectors, gender and vulnerability. The analysis alone does not guarantee though that the identified stakeholders are going to be active in the process - this may need incentives and strong leadership.

Including a broad cross-section of relevant stakeholders can help create a community of practice. A strong community of practice can aid in the collection and analysis of data and information, and will create ownership of the process and results.

Stakeholders are:

- those whose interests are affected by environmental problems or their decisions have environmental effects;
- those who have information, resources or expertise required for policy formulation and strategy implementation;
- those who control key mechanisms (e.g., funding) for policy and strategy formulation and implementation.

To enhance stakeholder participation and their contributions there are three key principles.

- Inclusivity. Include a full range of stakeholders representing different groups of interest, including marginal and vulnerable groups.
- Pertinence. Include stakeholders whose interests are significantly affected by the issues covered in the national marine assessment.
- Gender perspective. Women and men must have equal access to all stages of the participatory process, and it is important to respond to the demands from women and men. This allows formulating and implementing better integrated policies and strategies.
- The technical teams need to select tools and methods that local stakeholders and contributors can work with.

Box 6: Case Study IV: Stakeholder consultation

Sierra Leone: stakeholder consultation in the development SOME process for Sierra Leone was done via two stakeholder consultation workshops. The first workshop was aimed to gather expert judgment and opinions on various marine socio-economic and environmental parameters. The second workshop was aimed to ask opinions and endorse the results of the workshop, before being finalized in the Sierra Leone SOME report. European Union: stakeholder consultation in the EU member states' MSFD implementation is done via consultation of documents available on the national websites of the responsible authorities.

Box 7: Case Study V: Stakeholder engagement in the Belize Integrated Coastal Zone Management plan

The development of the Belize Integrated Coastal Zone Management plan consisted of 17 steps. In every step of the process, stakeholder participation was critical, especially for the data acquisition, ecosystem assessments and marine spatial planning processes. The stakeholder engagement process was primarily coordinated by Coastal Advisory Committees (CACs) from the coastal planning regions along the coast and offshore cays. These CACs convened representatives from multiple sectors and interest (from tourism to fishing to preservation) to make recommendations for development and conservation in their regions. Stakeholder consultations were held countrywide at strategic locations during the planning phase. These consultations included community level group meetings and interviews (face to face and telephone) with local experts in coastal zone management and key partners at the United States-based Natural Capital Project. These consultations were crucial for identifying existing conflicts of interest with respect to resources use. They also helped capture the stakeholders' vision as it pertains to maintaining a healthy coastal and marine environment that will continue to support livelihoods in the future. More information can be found in the Belize Integrated Coastal Zone Management Plan (2013).

Step 6 – Implementation

The implementation stage has three basic components:

- identification of marine environmental issues, indicators and sources of data
- data collection, analysis and writing
- publication and translation (if needed)

The data collection and analysis stage could have several steps depending on the choice of methods. It should anyway start with identification and analysis of data, but could be complemented with an expert elicitation approach for the whole or parts of the assessment. It is necessary to have follow up meetings to keep the report writing progressing. During the process, especially once data has been collected, it can seem that activities slow down. A regular interaction with the technical teams is needed to keep up momentum. Also, technical teams need to serve as reviewers and should bring relevant experiences from other assessments to the attention of participants.

Identification of marine environmental issues, indicators and sources of data

The identification of environmental issues and priorities requires a series of steps that help participants in the SOME assessment move from a general DPSIR conceptual framework towards specific issues and interrelationships that will be analysed in the assessment products.

The starting point is a conceptual framework that identifies the key domains of the marine environment and its interactions with human society. The conceptual framework is specific for

Table 2. *Example of inventory table to assess available data for the SOME report.*

Issue	Score = 0 No known impact	Score = 1 Slight impact	Score = 2 Moderate impact	Score = 3 Severe impact
Issue 4: Micro-biological pollution "The adverse effects of microbial constituents of human sewage released to water bodies."	Normal incidence of bacterial related gastro-enteric disorders in fisheries product consumers and no fisheries closures or advisories.	There is minor increase in incidence of bacterial related gastro-enteric disorders in fisheries product consumers but no fisheries closures or advisories.	Public health authorities aware of marked increase in the incidence of bacterial related gastro-enteric disorders in fisheries product consumers; or There are limited area closures or advisories reducing the exploitation or marketability of fisheries products	There are large closure areas; or Very restrictive advisories affecting the marketability of fisheries products; or There exists widespread public or tourist awareness of hazards resulting in major reductions in the exploitation; or marketability of fisheries products
Issue 5: Eutrophication "Artificially enhanced primary productivity in receiving water basins related to the increased availability or supply of nutrients, including cultural eutrophication in lakes."	No visible effects on the abundance and distributions of natural living resource distributions in the area; and No increased frequency of hypoxia or fish mortality events or harmful algal blooms associated with enhanced primary production; and No evidence of periodically reduced dissolved oxygen or fish and zoobenthos mortality; and No evident abnormality in the frequency of algal blooms.	Increased abundance of epiphytic algae; or A statistically significant trend in decreased water transparency associated with algal production as compared with long-term (>20 year) data sets; or Measurable shallowing of the depth range of macrophytes	Increased filamentous algal production resulting in algal mats; or Medium frequency (up to once per year) of large-scale hypoxia and/or fish and zoobenthos mortality events and/or Harmful algal blooms	High frequency (>1 event per year), or intensity, or large areas of periodic hypoxic conditions; or high frequencies of fish and zoobenthos mortality events; or harmful algal blooms; or Significant changes in the littoral community; or Presence of hydrogen sulphide in historically well oxygenated areas

the SOME assessment under development. For instance, Cote d'Ivoire has many coastal lagoons which form an integral part of the coastal and marine environment. This ecosystem will be represented in the conceptual framework for Cote d'Ivoire while this might not be the case for another country.

Once the framework is developed, a range of environmental issues can be identified with the help of experts and stakeholders. These issues can be formulated in a more specific way than the general categories in the conceptual framework. The formulation does not require a technical or scientific language, as input is required from a diverse group of experts and stakeholders. It might be necessary to shorten the identified issue list through prioritization based upon a number of criteria.

The UN Global International Waters Assessment (GIWA) methodology (UNEP, 2002) grouped 21 issues in five predetermined major concerns, namely: water shortage, pollution, habitat and community modification, unsustainable exploitation of fish and other living resources, and global change (Annex 2). The methodology enables the importance of each of the 21 environmental issues relating each of the five predetermined major concerns to be preliminarily assessed based on a four-point scale where: 0 = no known impact; 1 = slight impact; 2= moderate impact, and 3= severe impact. Issues rated (3) and (4) are considered significant and are prioritized for more detailed evaluation of their contribution to the related major concern. An example of the GIWA methodology is provided in Table 2

The result is a short list of clearly formulated priority issues with a clear link to the conceptual framework and strongly linked to the concerns formulated by the stakeholders about the marine environment.

The SOME assessment makes use of indicators to describe various parameters on the marine environment including biodiversity and ecosystems, the physical environment as well as socio-economic aspects. The number and type of indicators will depend on the selected methodology and objectives. The indicators describe quantitatively various issues and trends.

e.g. Extent of mangrove habitat in hectare
e.g. Net turnover of tourism sector in dollar
e.g. Fish stock in tons

Optionally, it can be valuable to include indicators on the Sustainable Development Goals (SDGs), especially SDG 14:[3]

"Conserve and sustainability use the oceans, seas and marine resources for sustainable development".

The selected indicators can directly build on earlier identified priority issues. Secondary information from e.g. statistical offices, other projects and organizations might be required to overcome time and resource information as well as common technical difficulties.

The task of data and information identification and location requires a significant effort just to locate. The data and information holders need to agree that their data and information can be shared for the purpose of the development of the report.

3. http://unstats.un.org/sdgs/indicators

Box 8: Case Study – Socio-economic data in the OSPAR region

OSPAR decided in 2015 to re-stablish the intersessional correspondence group on economic and social analysis (ICG-ESA) working group to ensure that the data gathered for the next EU Marine Strategy Framework Directive's initial assessment on the economic analysis of the use of the marine environment was as coordinated as practicable. This would then contribute to the Intermediate Assessment 2017.

The ICG-ESA developed a list of socio-economic indicators that could be used to prepare a more coherent economic analysis. This included a list of common marine economic sectors: Fisheries and aquaculture, shipping, ports, oil and gas and offshore wind energy. The used indicators include gross added value (in million Euro), employed persons (in 1000 Full Time Equivalent (FTE) and Production value (million Euro).

Data collection, analysis and writing

Data and information collection requires often more time than expected, mainly because of institutional barriers to information sharing, as well as technical issues such as readability of data formats, etc. Because technical teams usually do not produce primary data, they must acquire it from original sources, often in government agencies. Sometimes, the technical teams have to persuade government officials to get interested in the project and help in the data collection. Such discussions can delay the process.

Once the data is collected, it should be organized and verified. This involves checking the sources of the information to ensure that the data is reliable. Global and regional databases often are already quality controlled. A peer-review process or technical review step can also be added at this stage for both regional and global data to ensure it is fit for purpose.

The next step involves the analysis of the compiled data and information on the different sections of the assessment. The analysis is based upon the underlying conceptual DPSIR framework, which serves as the basis for sequencing the steps through an analytic process. The DPSIR framework is also reflected in the structure of the report. A basic outline is shown below:

Development by the technical team including a series of specialized meetings

- Chapter 1: Economic, social and institutional overview
- Chapter 2: Human pressures on the marine environment
- Chapter 3: Assessing the state and trends of the marine environment
- Chapter 4: Analysing policy responses
- Chapter 5: Analysing the impacts of environmental changes in the environment

Validation step by experts and stakeholders

- Chapter 6: Policy options and scenarios
- Chapter 7: Conclusions and policy recommendations

This basic outline provides a starting point for developing a SOME report, however the structure of a SOME report will have to be agreed upon by the technical team based upon relevance of parameters and priorities.

Certain aspects of the report will be sensitive in nature and may raise conflict between different stakeholders. It is important to identify an accepatble approach for reaching consensus between different stakeholders that will respect sensitive information.

An outline of the typical contents of each chapter is presented below:

Chapter 1. Economic, social and institutional overview

This section includes a high-level overview and analysis of the country's socio-economic and institutional conditions concerning the marine environment. It also identifies underlying driving forces (e.g. population growth, offshore industry development for export). These refer to underlying structural changes such as demographic trends, climate change etc.

It provides an overview on how the marine environment and national development are linked. The economic overview could include not only a description of key macroeconomic parameters, but also, for instance, the country's approach to international trade (e.g. fisheries agreements). The socio-economic aspects of the marine environment can be illustrated with information related to human well-being and poverty.

The section describes also the institutional framework for environmental and sustainable development, governance, including the underlying legal framework, key institutions and division of responsibilities among different layers of government.

Chapter 2. Human pressures on the marine environment

Pressures refer to human activities with direct influence on environmental conditions. Pressures are typically correlated with driving forces and may refer to processes such as emission of pollutants, industrial offshore development and its influence on the marine ecosystems, or e.g. unsustainable fisheries practices.

Pressures are often combined, e.g. offshore oil and gas activities can cause hydrocarbon pollution, as well as e.g. social disruption due to closure of fishing grounds near traditional fisheries communities.

Chapter 3. Assessing the state and trends of the environment

This section presents the actual condition and trends in the marine environment, resulting from the driving forces and pressures. One of the first decisions to be made about the state of the environment analysis is the way SOME issues should be categorized.

This stage involves the identification of key indicators and relevant data sources, acquiring the data, organizing the data on a suitable database, data analysis and interpretation.

Chapter 4. Assessing policy responses

The assessment of the current marine policy can either be integrated with or separated from the analysis. Both approaches have their strengths and advantages:

- separating the two sections leads to a more disjointed report where environmental state issues and their underlying policy causes are discussed separately;
- discussing policy responses together in one section may lead to a more coherent comparative analysis.

Policy analysis is a conceptually complex area and often requires either the collaboration of science-based and marine policy experts or experts well versed in analysing marine environmental issues on the interface of science and policy.

From the substantive point of view policy analysis involves the identification of public or private sector policy drivers that contributed to earlier demonstrated environmental change and assessing their effectiveness. It may also involve pointing out policy gaps.

Chapter 5. Analysing the impacts of environmental change

This step requires information on changes in socio-economic or ecological conditions that are significantly influenced by changes in the state of the marine environment.

The observed impacts are often a result of multiple forces, including short and long term changes, ranging from local (e.g.

*http://unstats.un.org/sdgs/indicators/

point pollution by industry) to global causes (e.g. sea level rise). The full range of impacts will need to be scanned and priorities will have to be identified for further analysis. It is also essential to separate human and non-human induced pressures (e.g. climate change).

Chapter 6. Policy options and scenarios

Scenario analysis is an essential component of marine assessments. The scenario section builds on the assessed state of the marine environment and the policy analysis and aims to address the following questions:

- If the current national marine policies remain, what will be the state of the marine environment (and the ecosystem services it is providing for society) in future?
- What policy actions should be undertaken for a more sustainable development of the marine environment?

The answers to these questions are essential for long-term planning and can support the precautionary approach to specific marine issues. By exploring these options, policy- and decision makers have a better insight of the consequences of policy options and choices, and what alternative scenarios might offer.

This step usually combines quantitative and qualitative elements.

The quantitative component requires modelling and may directly build on data and indicators. The qualitative component involves creating and refining descriptive narratives. Both require different methods and skills, as well as a procedure to combine them in coherent scenarios. The process also requires several iterative review cycles and interaction among stakeholders, thematic experts and writers.

This will consist of a list of actions and measures (menu of options). Details such as cost, effectiveness, social and environmental benefits, time frame, feasibility etc. cannot be done in detail in the report. These should be done as separate studies after the completion of the SOME report.

The different target audiences will require different strategies and messages dedicated to their specific audiences.

Chapter 7. Conclusions and recommendations

Preparing the recommendations section is the final analytic stage of the marine assessment process, but it is optional. In some cases, this is considered to be the task of the policy and decision makers and a separate, follow-up step. In other cases, the drafting of recommendations is explicitly requested by the policy and decision maker. This step requires the involvement of senior policymakers with experience in the matter. It is not essential that this group is involved in the earlier stages of the process.

The technical team may prepare draft recommendations that then become a starting point for a dialogue, leading to a final set. In order to be effective, recommendations would ideally be connected with strategic policy processes, such as budgeting or long-term strategic planning.

Step 7 – Communication

It is important to decide on a communication strategy early in the setup and planning of the development of the SOME assessment and this includes:

- determine the main elements for a communications and outreach strategy;
- determine target audiences;
- define an impact strategy.

The communication of the national SOME process, intermediary results and final outcomes should be organized in parallel with the development. The final products of the assessment are important to be communicated in the end, but there are many opportunities to convey key assumptions, questions or concerns during the development process. So communication is an ongoing activity running in parallel to the SOME process.

The number and type of interactions depends on the scale and budget, but typically include a minimum of 2-3 meetings with 25-30 participants each. Smaller meetings with expert groups can also be organized, hereby focusing on parts of the assessment. For example, the Sierra Leone state of the marine environment report was developed by a group of 50 experts and involved a series of workshops. The workshops were organized by the Sierra Leone Environmental Protection Agency (EPA) with support of GRID-Arendal and the Abidjan Convention Secretariat in Freetown, Sierra Leone in February 2014.

Communication products include:

- The main report: a comprehensive report including the state of the marine environment, policy analysis and scenario components, etc. This can be communicated with hard copies as well as in digital format (online).
- Summary reports for a broad audience: these consist of a short report in an easily understandable language, intended for the interested broad public, under the form of a brochure or leaflet.
- Specialized reports: these are developed for stakeholder groups (e.g. tourism, fisheries sector, etc.).
- Associated products such as the underlying datasets.

Box 9. The development process for SOME reporting in Sierra Leone

In Sierra Leone, the SOME development process involved the establishment of thematic groups that contributed to the assessment document. Their contributions were put together by their group leaders who in turn submitted them to the Lead compiler. The draft document was then submitted to EPA-SL for comments. Stakeholder consultation was done via 2 stakeholder consultation workshops. The first workshop was aimed at gathering, expert judgment, views and opinions on various marine socio-economic and environmental parameters. The second workshop was aimed at seeking comments opinions and endorsement of the results of the assessment before finalizing the SOME report.

In order to be effective, the involvement of communication specialists is an advantage. These could include the government public relationship offices, which have often a close relationship with press and media. These should also include organisations that communicate at the lowest level (e.g. fishing villages), to communicate the results of the process to them as well.

The following guidelines are important to consider when communication events or products are developed:

- Making your messages understandable to your audiences.
- Make information relevant to your audiences.
- Shape the delivery system for the audience

Step 8 – Review and publication

The draft SOME report need to go through a review process before it is finalized and published. Adequate time and resources need to be factored into the planning stage for this step. The review may include a peer-review from experts not involved in the process. This step ensures the quality of the assessment and can identify any errors or missing information.

The draft report may also need to be reviewed by the relevant ministries and partners in the process to get their approval prior to release. It should be noted that this step is designed to ensure that the ministries and stakeholders accept the findings of the report, and if the process is sound and based on the best available data should not result in wholesale changes to the assessment or recommendations contained within the report.

Step 9 – Monitoring, evaluation and learning

The national SOME report is an essential component of Integrated Ocean Management. It is not to be seen as a one-time effort, but rather as the step in a cycle that will produce credible marine environmental and socio-economic information for sustainable marine development. This cycle typically ranges between 2–5 years. Continued cyclical reporting allows a better analysis of impacts and actions taken as well as the evolution of relationships between pressures, the state of the environment and impacts on ecosystem services and human well-being.

The evaluation of the impact is an important step in this reporting process. This can be done by documenting evidence of the SOME impacts or track the uptake of recommendations by policy makers and the public.

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ANNEX 1. EXPERT ELICITATION METHODOLOGY

Measuring the State of the Oceans and Coasts: Guidelines for the Production of State of Marine Environment Assessments and Reports Based on Expert Elicitation

A background paper by GRID-Arendal

1. Background

It is fundamental to marine environmental management that states have the capacity to assess and monitor the condition and trend of coastal and marine ecosystems within their jurisdiction. Undertaking integrated assessments can be expensive and time consuming, but sound information is critical to understand the State Of the Marine Environment (SOME) to underpin decision-making and achieve or maintain ocean health. Most importantly, large-scale integrated assessments must not be overly biased by information that is limited only to places or issues that are well studied, since this might result in outcomes that are not balanced or properly represent conditions across the whole of the area assessed.

Further, SOME assessments are a critical data source used by global assessments like the UN World Ocean Assessment (www.worldoceanassessment.org), or large regional assessments like the ones produced under the umbrella of UNEP's Regional Seas Programme.

In order to support the production of the first global ocean assessment a series of regional workshops have been conducted over the last 2 years to identify relevant assessments, regional experts and capacity gaps. At the workshops for the SE Asian Seas (Sanya City, China), the Caribbean (Miami, USA), Western Indian Ocean (Maputo, Mozambique), the South Atlantic (Abidjan, Côte d'Ivoire) and recently the Eastern Indian Ocean (Chennai, India), experts from developing states have articulated that, while there is no scarcity of marine environmental experts, the capability to undertake SOME assessments and reports is a major gap due to both the lack of systematic monitoring data and proficiency in environmental reporting.

With the intention of exploring options to bridge this gap, regional and national pilot capacity-building workshops have been held in Bangkok, Thailand, Sept. 2012 (Ward, 2012; Feary et al., 2014); Abidjan, Côte d'Ivoire, Oct. 2013; and in Freetown, Sierra Leone, Feb. 2014. The purpose of the workshops was threefold: i) to expose national or regional experts to the *expert elicitation** methodology; ii) to produce an initial expert elicitation assessment of the national or regional target areas; and iii) test the potential of the EE methodology and process for the production of SOME reports.

*Expert elicitation is the synthesis of opinions of experts on a subject where there is uncertainty due to insufficient data.

The process and methodology described in this paper is largely based upon the Australian SOME process and report developed in 2011 (State of the Environment 2011 Committee, 2011; Ward et al., 2014) and we acknowledge the authors of that report for a significant portion of the content presented below. The experience and lessons learnt from the pilot workshops have been used to optimize the process and the methodology to better match the needs and challenges raised by the experts from developing states participating in the World Ocean Assessment process and encountered during and after the workshops and the production of the actual reports. This paper is intended to provide background information for individuals or agencies interested in learning more about the State of the Marine Environment Expert Elicitation (SOME-EE) process, its advantages and disadvantages and the steps necessary in order to complete a SOME report. It also provides background and guidelines for experts who are intending to participate in a SOME-EE workshop; it explains the underlying concepts and the approach followed during the workshop so that experts can be prepared to fully participate at an optimum level of engagement.

2. The SOME Report Production Process

The expert elicitation methodology is essentially a scientific consensus methodology, aimed at generating an assessment of any chosen parameters by synthesising information available in existing assessments, scientific publications and data in conjunction with the subjective judgment of experts across a broad base of evidence related to those parameters. The method has been applied successfully in a range of situations, including the 2011 Australian SOME Report (State of the Environment 2011 Committee, 2011), and has the advantages that it is cost- and time-effective, it utilizes the existing knowledge of marine experts from the target region and it can incorporate non-conventional knowledge and information.

In the absence of comprehensive regional or national indicator datasets, the SOME-EE process uses consultation with national and regional experts to gauge expert opinion about the condition of the marine and coastal ecosystems and dependent socio-economic sectors. There are commonly datasets from local areas, and there are many sub-regional scale studies and short-term datasets about various aspects of marine ecosystems, but these have often a too coarse resolution and are not part of a systematic collection of data and knowledge routinely synthesised for reporting purposes. The SOME-EE process draws upon these disparate datasets

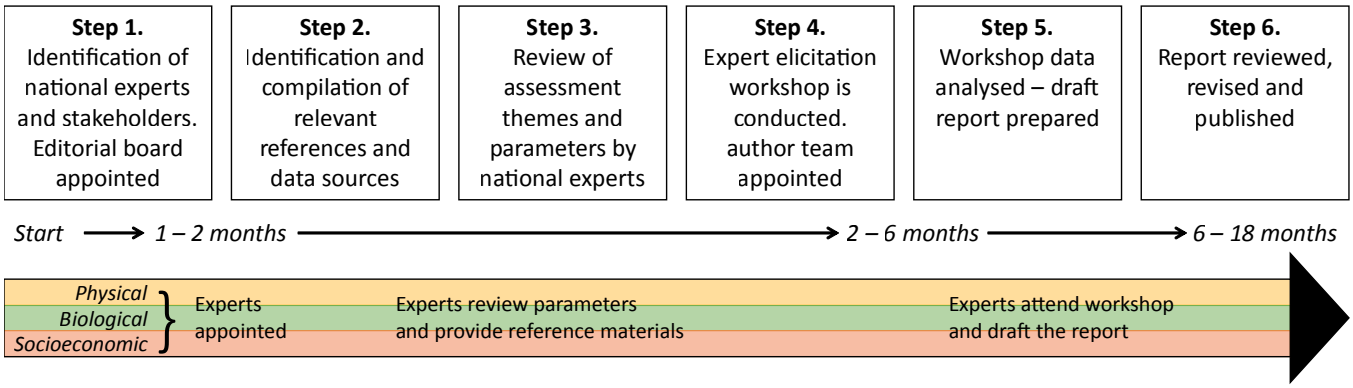

Figure 1. *Diagram illustrating the time-line for one complete cycle of the SOME-EE process. Between 6 and 18 months are needed to plan and execute the process.*

and the knowledge-base dispersed across a broad range of sources and institutions to capture a representative sample of existing expert knowledge about the condition of the national or regional marine and coastal environment in a manner that can be used for reporting purposes.

The ultimate success in the production and the legitimacy of a report ensuing from an expert elicitation process depends on the thoroughness of the steps leading to and after the elicitation has been carried out. An ideal procedure should include the following steps but of course this should be revised to ensure it matches the needs and constraints of the state or region for which the report is being produced (Fig. 1):

1. Identification of National Experts and Stakeholders: This step begins with the Identification and charting of the national and/or regional public and private bodies, agencies and organizations that, in addition to the one with the mandate of producing the report ("the reporting agency"), deal with the major aspects of marine and coastal environment research, monitoring, management and regulation ("the stakeholders"). In principle the steps following the stakeholder mapping should try to involve a representative fraction of the experts engaged by those bodies, agencies and organizations as this will improve the quality of the assessment and ensure the report holds a legitimate basis for decision-making. The reporting agency should announce the initiation of the report production process and invite the relevant stakeholders to participate in the process through the nomination of experts. The expert nomination should be confirmed by the reporting agency together with clarification on the mode and roles of involvement of the experts having due regard to time and budgetary constraints. An editorial board/committee for the report should be appointed by the reporting agency at this stage. This step is critical because if the experts invited are not representative of all aspects of the marine environment, or if they are skewed in number towards one particular discipline (eg. biology), then the assessment will be biased. In most cases a minimum representation of each of the key discipline areas (eg. ecology, biology, fisheries, physical sciences and socioeconomics) will be needed. Experts representing the full range of marine sectors are needed to produce a rigorous assessment. Upon acceptance, each participant should be provided with detailed background information on the assessment process.

2. Relevant information identification and compilation: The reporting agency, with the support of the experts nominated, should initiate the identification and collation of relevant information (publications, scientific papers, databases and data sets) and make it electronically available to all experts involved.

3. Expert review of the assessment themes and parameters: A suggested structure for the assessment built around a set of themes and parameters is included below. Of course not all may apply directly to a particular region, but they provide a guide for the design of the assessment to be carried out. Experts will be requested to review and make suggestions on the parameters for condition, threats and risk, and the elicitation procedures. They will also review the collated relevant information and suggest additions.

4. Expert Elicitation assessment: The EE assessment is carried out during a workshop or series of workshops, attended by the appointed experts. The scores assigned to the parameters (as described below) are recorded during the workshop. Notes are taken by a rapporteur on the discussion and the details of relevant reports, papers or other documents are recorded . The interaction and discussions during the workshop/s should allow the editorial board to identify potential authors to participate in the subsequent report-writing phase of the process.

5. Report drafting: The scores of the assessment parameters and any details are compiled, analyzed by the reporting agency and provided in a concise and organized way to the editorial committee. These are distributed to the different author/s appointed for the different themes/chapters who are tasked with producing draft chapters based on the outcomes of the EE assessment and any generic introductory insight they may want to bring in. The editorial committee should also produce text for any introductory chapters describing the scope, approach, process and methodology used to produce the report. The editorial committee should then compile and edit a first draft with focus on completeness and evenness of the different sections of the report.

6. Report reviewed, revised and published: Once the first draft is compiled by the Editorial Committee it should be circulated to all the experts involved in the EE assessment and writing of the report in order to be thoroughly reviewed. This review exercise could be done remotely but the organization of a validation workshop could bring added value as it would

provide the editorial committee a good sense of the overall endorsement of the whole of the report by the experts that have contributed to its production. Next, peer reviewed by an independent, geographically diverse, group of experts that have not been involved in its production is carried out and the report is revised by the authors taking into account the reviewers comments. The peer-reviewed, final version of the report may go through technical edition, graphic design and layout processes prior to publication.

This whole process may differ in duration depending on the natural and political heterogeneity of the assessment area, the amount of experts to be used for the assessment and the specific steps chosen from the ones suggested above. A reasonable duration would normally be between 6 and 18 months.

3. The SOME Assessment Expert Elicitation Method

3.1. Assessment Framework

The United Nations World Ocean Assessment (www.worldoceanassessment.org) uses the Drivers-Pressures-State-Impacts-Response (DPSIR) framework (Fig. 2) as a basis on which to build its structure and organize its content. The DPSIR, in turn, clearly identifies the place of assessment of environmental condition (the State) within a broad management framework. The purpose of SOME assessments is to fulfill the need of measuring the "State" and the "Impacts" in order to design new government policy "Responses" as well as to gauge the effectiveness of those already implemented.

The DPSIR framework suggests at least three possible approaches for structuring any SOME assessment: i) Pressures; ii) Habitats; and iii) Ecosystem Services.

Using pressures to structure an assessment has the advantages that the associated human activities are commonly linked with data collection and reporting structures for regulatory compliance purposes. For instance, permits that are issued for offshore oil and gas development require specific monitoring and reporting obligations be met by operators. Pressures are linked to socioeconomic benefits that states derive from marine based industries and the inclusion of socioeconomic aspects is a key component of the World Ocean Assessment.

Using marine habitats to structure an assessment has the advantage that habitat is the property that inherently integrates many ecosystem features, including higher and lower trophic level species, water quality, oceanographic conditions and many types of anthropogenic pressures. The cumulative aspect of multiple pressures affecting the same habitat, that is often lost in sector-based environmental reporting, is captured by using habitats as reporting and assessment units.

Using ecosystem services to structure an assessment follows the approach of the Millennium Ecosystem Assessment. This has the key advantage of broad acceptance in environmental reporting. It includes provisioning services (food, construction materials, renewable energy, coastal protection) while highlighting regulating services and quality-of-life services that are not captured using a pressures or habitats approach to structure the assessment.

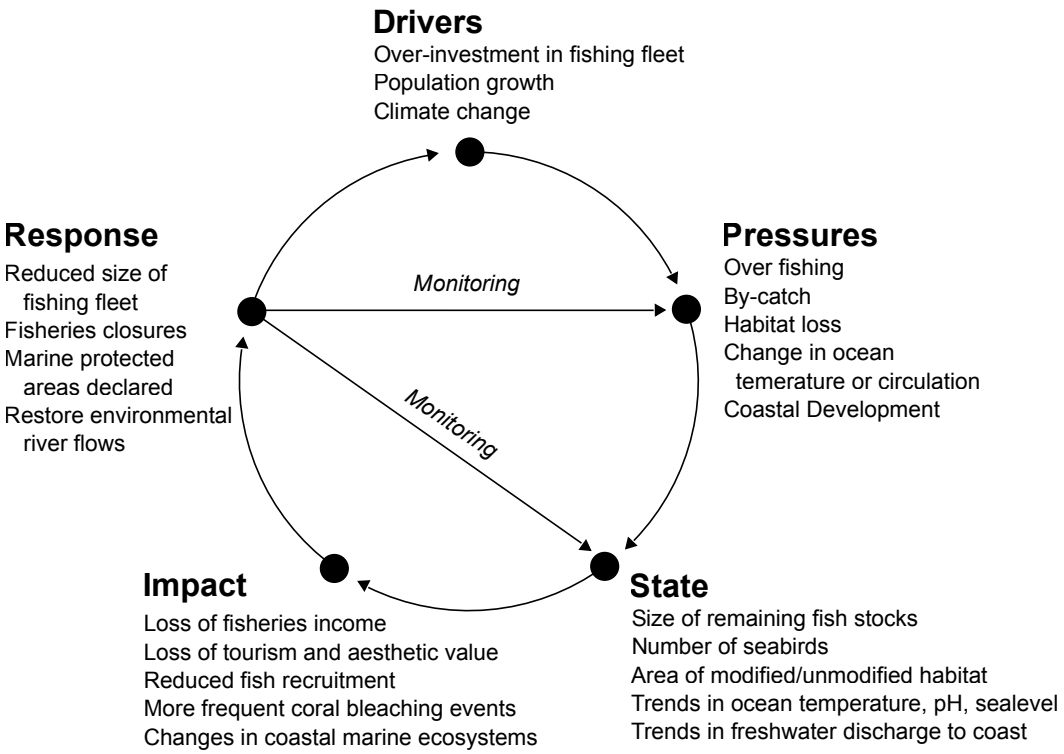

Figure 2. *Drivers-Pressures-State-Impact-Response (DPSIR) Framework as used by the UN World Ocean Assessment in relation to the ocean environment. Drivers result in Pressures that have an effect on the State of the environment (the assessment of which is the purpose of SOME reporting). The implementation of monitoring is required to gauge the effectiveness of policy Responses*

Given that all three approaches have their own particular advantages, all three approaches should be included in the structure of SOME Assessments as far as possible.

3.2. Assessment Parameters

Based on the approach adopted by the UN World Ocean Assessment, the present SOME-EE process will use the following condition parameters for the condition assessment: habitats and the species they support, ecosystem processes (and services) including physical and chemical processes, pressures and socioeconomic benefits.

Most condition parameters used in the SOME-EE process are the same between all assessments, regardless of country or region, because they are common to all marine environments. For example, the habitats that most assessments will need to consider include estuaries, bays, beaches, intertidal flats, etc. Many regions already have programs in place to monitor specific environmental indicators (see review by Johnson et al., 2013) that can provide input to the assessment and identify parameters for scoring. Other parameters can be added if they are viewed as being of particular importance to a given region. Using a standard set of parameters that have been widely considered in other regions enables direct comparisons to be made and eliminates any bias (or the appearance of bias) in the choice of parameters; for example, where a list of parameters might appear heavily slanted towards those that are at risk in a particular region from a particular pressure.

Parameters may be chosen from any level of the natural biophysical and taxonomic hierarchy of ecosystems and biodiversity of the region under consideration. However, participants should recognise that SOME reporting is of necessity a broad overview process. Each parameter will be the focus of an assessment, and so each parameter should be relevant to (or an important part of) the region as a whole.

In addition to the condition assessment, the SOME assessment also includes an assessment of the risks (risks assessment) faced by the components/parameters assessed. Risks are identified impending threats to the condition of the components/parameters assessed here. The risks are assessed over both short (5 year) and long (50 year) timescales.

3.3. Grading System

Grading scores for condition assessment

During the assessment workshop, scores will be assigned by the expert participants to each condition parameter on a scale from 1 to 8, where 1 is consistent with the poorest state of condition of the grading criterion, and 8 is the highest level. Scores are assigned on the basis of group consensus. Based on the scores agreed by the experts, four grades are derived as follows: 1 to 2 = Very Poor, 3 to 4 = Poor, 5 to 6 = Good and 7 to 8 = Very Good.

GRID-Arendal has created a web-based system to facilitate the capture and display of scores for the different parameters discussed here (see Appendix 1). The web site allows for the real-time capture and display of data (scores for parameters, confidence, risks) during the workshop and provides a template for the production of a State of the Marine Environment Report.

Grading statements

A key part of the process is developing and applying a set of grading statements that have been uniquely derived for each major aspect of the assessment to represent the four grades of condition (Very Poor, Poor, Good, Very Good). Grading statements provide guidance to inform the experts about the thresholds they should use in determining a score. They are general, descriptive terms of the spatial extent, temporal extent, and magnitude of improvement or decline in condition of the parameters in relation to the selected benchmark (i.e. how to assess pressures, socioeconomic benefits, habitats, species, ecosystem processes, physical and chemical processes both in terms of condition and spatially). Each statement is associated with a range of numeric scores to guide the experts in reaching an agreed score for the parameter in question.

Confidence estimates

Each score is also assigned a confidence estimate (High, Medium or Low) based on the expert's current state of knowledge and judgement. In general terms, a high level of confidence implies that there are published peer-reviewed papers or refereed reports that support the scores attributed to the parameter in question. A medium level of confidence may be based on one or more expert's knowledge of unpublished data, un-refereed reports or other information. A low confidence score is given where the experts agree to assign a score based mainly on expert opinion and inference.

3.4. Benchmarks

In forming judgements about the condition of any parameter, a "benchmark" (a point of reference for the condition) is needed. Ideally, the benchmark is the condition of the parameter prior to the time when human impacts started to occur. In practice, benchmarks are mainly chosen for convenience and to represent times when data are available.

"Ideal" benchmarks will vary greatly from one part of the world to another; it may be the time of European settlement in one place, or before the Roman Empire in another. Humans may have had significant impacts on some ecosystems prior to the "benchmark" time and impacts may have accumulated gradually over a long time period afterwards. Where it is difficult to identify an appropriate benchmark we recommend that the year 1900 be used. This date (1900) has the advantage that most scientific observations of the marine environment are subsequent to it.

The use of a benchmark should not be confused with an objective for management; it is not the purpose of the SOME-EE process to make recommendations on national marine environmental goals or polices. The establishment of a benchmark is only for the purpose of quantifying environmental change relative to the present time.

4. Condition assessment

In the assessment workshop, grading scores are given for three aspects of each condition parameter: 1) the condition in the worst-impacted 10% of the region under consideration; 2) the condition in the least-impacted 10% of the region under consideration; and 3) the condition in most (the remaining 80%) of the region under consideration. The scores are given based on pre-agreed condition-specific grading statements.

The logic of selecting "10%" of an area for best and worst scores is justified for several reasons. Firstly, an area of 10% of the region under consideration has a higher predictive power than extreme examples of small spatial extent for detecting and/or resolving significant changes created by human activities. By looking at the worst and the best 10% of the region, both ends of the gradient are assessed, providing two independent measures and thereby constraining the "most" (80%) to a score within the identified range.

In addition to giving scores and confidence estimates, the experts will next judge the recent trend in each parameter as declining, stable or improving. The trends are assessed only for the last 5 years (and not in relation to the benchmark). The reason for this is to provide policy- and decision-makers with feedback on how policy responses have or have not had the desired effect. The choice of 5 years is based on the typical recurrence interval of SOME reporting in many states and also because it is unlikely that measurable differences in condition could be detected in less than 5 years following policy changes implemented by government. A confidence estimate is also assigned to trends agreed by the experts (High, Medium, Low).

4.1 Habitats

To score habitats, experts will follow these steps:

1. Estimate a consensus score for the condition of habitats in the Best 10% and Worst 10% of the habitat (eg. relative to 1900). Score both the area and condition of habitat; for example if it is estimated that 10% of the area of habitat has been destroyed since the benchmark date then the Worst 10% of that habitat will have a score of 1. Conversely, if 100% of the habitat area is in the same (pristine) condition that prevailed in relation to the benchmark, then the Worst 10% of that habitat will have a score of 8.
2. Estimate a consensus score for the condition of the habitats in Most areas of the habitat (eg. relative to 1900).
3. Assign a confidence grade for the each of the condition estimates (High, Medium, Low).
4. Estimate the trends for each of Best 10%, Worst 10%, Most (Improving, Declining, Stable) over the last 5 years.
5. Assign a confidence grade for the each of the trend estimates (High, Medium, Low).
6. Record the main anchor references, and any commentary/notes relevant for the assessment of the condition and trends of each habitat.

Grading statements for habitats that occur in the state and/or region under consideration:

Very Good (7–8)
The habitat type is essentially structurally and functionally intact and able to support all dependent species

Good (5–6)
There is some habitat loss or alteration in some small areas, leading to minimal degradation but no persistent substantial effects on populations of dependent species

Poor (3–4)
Habitat loss or alteration has occurred in a number of areas, leading to persistent substantial effects on populations of some dependent species

Very Poor (1–2)
There is widespread habitat loss or alteration, leading to persistent substantial effects on many populations of dependent species

4.2 Species

To score species, experts will follow these steps:

1. Estimate a consensus score for the condition of populations of the species in the Best 10% and Worst 10% of places where they occur (eg. relative to 1900). Score both the area and condition of species; for example if it is estimated that the species is no longer found in 10% or more of its rage relative to the benchmark date, then the Worst 10% of that species will have a score of 1.
2. Estimate a consensus score for the condition of the species in Most areas of the habitat (eg. relative to 1900).
3. Assign a confidence grade for each of the condition estimates (High, Medium, Low).
4. Estimate the trends for each of Best 10%, Worst 10%, Most (Improving, Declining, Stable) over the last 5 years.

5. Assign a confidence grade for each of the trend estimates (High, Medium, Low).
6. Record the main anchor references, and any commentary/ notes relevant for the assessment of the condition and trends of each the species.

Grading statements for different species assessed, given what is best understood about their status and trends expressed in terms of populations and groups of species including threatened, endangered or protected species:

Very Good (7–8)
Only a few, if any, species populations have declined as a result of human activities or declining environmental conditions

Good (5–6)
Populations of a number of significant species but no species groups have declined significantly as a result of human activities or declining environmental conditions

Poor (3–4)
Populations of many species or some species groups have declined significantly as a result of human activities or declining environmental conditions

Very Poor (1–2)
Populations of a large number of species or species groups have declined significantly as a result of human activities or declining environmental conditions

4.3 Ecological processes

To score ecological processes, experts will follow these steps:

1. Estimate a consensus score for the condition of ecological processes in the Best 10% and Worst 10% of the habitat (eg. relative to 1900). Score both the area and condition of ecological processes; for example if it is estimated that human activities have caused the ecological processes to no longer occur in 10% or more of the places where it did occur relative to the benchmark date, then the Worst 10% of that ecological process will have a score of 1.
2. Estimate a consensus score for the condition of the ecological process in Most areas (eg. relative to 1900).
3. Assign a confidence grade for each of the condition estimates (High, Medium, Low).
4. Estimate the trends for each of Best 10%, Worst 10%, Most (Improving, Declining, Stable) over the last 5 years.
5. Assign a Confidence grade for each of the trend estimates (High, Medium, Low).
6. Record the main anchor references, and any commentary/ notes relevant for the assessment of the condition and trends of each the ecological processes.

Grading statements for the main ecological processes, and affects from human activities:

Very Good (7–8)
There are no significant changes in ecological processes or ecosystem services as a result of human activities

Good (5–6)
There are some significant changes in ecological processes as a result of human activities in some areas, but these are not to the extent that they are significantly affecting ecosystem functions

Poor (3–4)
There are substantial changes in ecological processes as a result of human activities, and these are significantly affecting ecosystem functions in some areas

Very Poor (1–2)
There are substantial changes in ecological processes across a wide area of the region as a result of human activities, and ecosystem function is seriously affected in much of the region

4.4 Physical and chemical processes

To score physical and chemical processes, experts will follow these steps:

1. Estimate a consensus score for the condition of physical and chemical processes in the Best 10% and Worst 10% of the habitat (eg. relative to 1900). Score both the area and condition of physical and chemical processes; for example if it is estimated that human activities have caused the physical and chemical process to no longer occur in 10% of the places where it did occur relative to the benchmark date, then the Worst 10% of that physical and chemical process will have a score of 1.
2. Estimate a consensus score for the condition of the physical and chemical process in Most areas (eg. relative to 1900).
3. Assign a confidence grade for the each of the condition estimates (High, Medium, Low).
4. Estimate the trends for each of Best 10%, Worst 10%, Most (Improving, Declining, Stable) over the last 5 years.
5. Assign a confidence grade for the each of the trend estimates (High, Medium, Low).
6. Record the main anchor references, and any commentary/ notes relevant for the assessment of the condition and trends of each the physical and chemical processes.

Grading statements for the main physical processes as modified by human activities:

Very Good (7–8)
There are no significant changes in physical or chemical processes or ecosystem services as a result of human activities

Good (5–6)
There are some significant changes in physical or chemical processes as a result of human activities in some areas, but these are not to the extent that they are significantly affecting ecosystem functions

Poor (3–4)
There are substantial changes in physical or chemical processes as a result of human activities, and these are significantly affecting ecosystem functions in some areas

Very Poor (1–2)
There are substantial changes in physical or chemical processes across a wide area of the region as a result of human activities, and ecosystem function is seriously affected in much of the region

4.5 Pests, Introduced Species, Diseases and Algal Blooms

Definitions of what constitutes Pests, Introduced Species, Diseases and Algal Blooms may need to be first agreed based on a review of regional and national studies. The term 'pest' generally refers to marine plants or animals that are not native to the region but have been introduced by human activities such as shipping; they have the potential to significantly impact marine industries and the environment. Any other non-indigenous species introduced to the marine environment by humans is considered to be an 'introduced species'. When considering the spatial frame of reference, it should be viewed from the perspective of the habitats affected. So if the pests, introduced species, diseases and algal blooms are confined to coastal and estuarine habitats, for example, then the best 10% would refer to coastal and estuarine habitats affected least and the worst 10% would refer to coastal and estuarine habitats affected most.

To score the pests, introduced species, diseases and algal blooms experts will follow these steps:

1. Estimate a consensus score for the impact of pests, introduced species, diseases and algal blooms in the Best 10% and Worst 10% of the relevant habitats (eg. relative to 1900). Score both the area and degree of impact caused by pests, introduced species, diseases and algal blooms; for example if it is estimated that pests, introduced species, diseases and algal blooms are not found in 10% of the habitats where they do occur elsewhere in the region, then the Best 10% will have a score of 8. Conversely, if it is estimated that an introduced species has completely displaced an indigenous species in 10% of the area of habitats where they previously occurred, then the Worst 10% will have a score of 1.
2. Estimate a consensus score for the impact of pests, introduced species, diseases and algal blooms in Most areas (eg. relative to 1900).
3. Assign a confidence grade for the each of the condition estimates (High, Medium, Low).
4. Estimate the trends for each of Best 10%, Worst 10%, Most (Improving, Declining, Stable) over the last 5 years.
5. Assign a confidence grade for the each of the trend estimates (High, Medium, Low).
6. Record the main anchor references, and any commentary/ notes relevant for the assessment of the impact of Pests, Introduced Species, Diseases and Algal Blooms .

Grading statements for Pests, Introduced Species, Diseases and Algal Blooms:

Very Good (7–8)

The incidence and extent of diseases and algal blooms are at expected natural levels, there are insignificant occurrences or numbers of pests, and the numbers and abundance of introduced species is minimal.

Good (5–6)

Incidences of diseases or algal blooms occur occasionally above expected occurrences or extent, and recovery is prompt with minimal affect on ecosystem function. Pests have been found, but there have been limited ecosystem impacts. The occurrence, distribution and abundance of introduced species are limited and have minimal impact on ecosystem function.

Poor (3–4)

Incidences of disease or algal blooms occur regularly in some areas. Occurrences of pests require significant intervention or have significant effects on ecosystem function. The occurrence, distribution and abundance of introduced species triggers management responses, or have resulted in significant impacts on ecosystem functions

Very Poor (1–2)

Disease or algal blooms occur regularly across the region. Occurrences of pests or introduced species are uncontrolled in some areas, have displaced indigenous species and are seriously affecting ecosystem function

4.6 Pressures and socioeconomic benefits

This part of the assessment is carried out in three steps. First, the pressures associated with separate industries that impact the condition of the marine environment are assessed. The total environmental footprint of the industry is examined and given a score based on the expert's judgement of the industries' impact on all aspects of the marine environment, including condition of habitat, species, ecosystem processes and physical-chemical processes.

To score environmental impact of marine-based industries (pressure), experts will follow these steps:

1. Estimate a consensus score for the condition of the environment that coincides with the spatial footprint (i.e. the space where the industry operates) of the industry (eg. relative to 1900). For Best 10% and Worst 10% areas, we focus on the spatial footprint of where the industry operates. For example if it is estimated that the condition of the environment has not changed within an area of 10% of the industry footprint (with reference to the benchmark), then the Best 10% of places will have a score of 8. Changes in condition of the environment should be attributable only to the industry under assessment. For example, if two or more industries are impacting on the same habitat we try to score only the impact of the one industry we are assessing.
2. Estimate a consensus score for the condition of the environment that coincides with the spatial footprint of the industry in Most areas (eg. relative to 1900).
3. Assign a confidence grade for the each of the condition estimates (High, Medium, Low). The confidence score may be influenced by uncertainty in attribution of impact where two or more industries are impacting on the same area.
4. Estimate the trend for the condition of the environment within the footprint of the industry (Improving, Declining, Stable) over the last 5 years that is attributable only to the industry under assessment (i.e. not including changes related to other, additional pressures, etc.).
5. Assign a confidence grade for the each of the trend estimates (High, Medium, Low).
6. Record the main anchor references, and any commentary/ notes relevant for the assessment of pressures.

Grading statements for pressures - the environmental impact of marine-based industries:

Very good (7–8)

This industry has caused no significant changes in the overall environment (condition of habitat, species, ecosystem processes or physical and chemical processes) within its footprint.

Good (5–6)

This industry has caused some significant changes in some components of the overall environment, but these are not to the extent that they are significantly affecting ecosystem functions.

Poor (3–4)

This industry has caused substantial changes in many components of the overall environment, and these are significantly affecting ecosystem functions in some areas of its spatial footprint.

Very Poor (1–2)

This industry has caused substantial changes in many components of the overall environment across its spatial footprint and ecosystem function is seriously affected.

The second step is to assess the totality of all socioeconomic benefits that society receives from the industry. There are several aspects that must be evaluated, including:

- whether it is a major national employer, paying fair wages, either through direct employment or supporting industries;
- whether or not the state receives significant taxes, royalties and/or license fees and if a significant portion of profits remain in the country;
- whether the industry exploits a sustainably managed renewable resource;
- whether the industry contributes to education and training programs, human health or medical benefits for its employees;
- whether the industry creates national infrastructure such as roads, communication systems or other facilities;
- whether the industry is mainly or wholly owned by national interests (i.e. the profits from the industry remain in the country).

The industry is given a score of from 0 to 8 based on the expert's judgement.

To score socioeconomic benefits of marine-based industries, experts will follow these steps:

1. Estimate a consensus score for the socioeconomic benefits derived from the industry. Consider the spatial footprint of the industry and score the best and worst 10% of areas in terms of socioeconomic benefits received.
2. Estimate a consensus score for the socioeconomic benefits derived from the industry in Most areas (eg. relative to 1900).
3. Assign a confidence grade for each the benefits estimate (High, Medium, Low).
4. Estimate the trends for the socioeconomic benefits (Improving, Declining, Stable) over the last 5 years.
5. Assign a confidence grade for the each of the trend estimates (High, Medium, Low).
6. Record the main anchor references, and any commentary/ notes relevant for the assessment of socioeconomic benefits.

Grading statements for the benefits society receives from marine industries – this is the total benefit including employment, taxes, royalties and license fees paid to the state, education and training, human health benefits and infrastructure (buildings, roads, etc.). It includes both the direct employment benefits as well as dependent and supporting industries:

Very Good (7–8) – High benefits

The industry is mainly or wholly owned by national interests and is a major national employer both through direct employment as well as through supporting industries. The state receives significant taxes, royalties and/or license fees and a significant portion of profits remain in the country. The industry exploits a sustainably managed renewable resource and contributes to one or more of: education and training programs, human health and medical benefits and national infrastructure.

Good (5–6) – Significant benefits

The industry is an important national employer both through direct and indirect employment and the state receives taxes, royalties and/or license fees. The industry may contribute to education and training programs, human health or medical benefits.

Poor (3–4) – Some benefits

The industry is a minor employer both through direct and indirect employment and the state receives some taxes, royalties and/or license fees. The industry is partly or mainly foreign-owned.

Very Poor (1–2) – Few or no benefits

The industry is mainly or wholly foreign-owned and is not a nationally important employer, with most/all employment based overseas. The industry exploits a non-renewable resource (or an unsustainably managed renewable resource) and the state receives very little from taxes royalties or license fees from this industry.

The third step is to plot the environmental and socioeconomic scores for the industry on a graph to classify its overall rating (Fig. 3). Thus each industry will be rated as having either: 1) low environmental pressure and high socioeconomic benefit; 2) low environmental pressure and low socioeconomic benefit; 3) high environmental pressure and high socioeconomic benefit; or 4) high environmental pressure and low socioeconomic benefit.

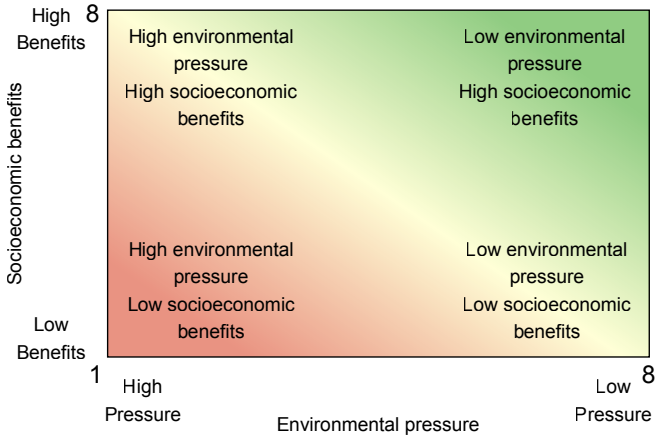

Figure 3. *Matrix for assessment of environmental pressures and economic benefits for marine-based industries. The optimum situation is for the combination of low environmental pressure (shown in green) to coincide with high socioeconomic benefits. The worst situation is for the combination of high environmental pressure (shown in red) to coincide with low socioeconomic benefits.*

5. Risk assessment

The condition, pressure and socioeconomic assessment part of the assessment methodology is backward-looking in time; it is essentially attempting to describe the state of the marine environment relative to a benchmark and recent trends in environmental condition manifested by changes in condition over the past 5 years. It is a statement of the current situation of the marine environment.

In contrast, the risk assessment part of the assessment methodology is forward-looking. Its purpose is to provide statements of the situation that the marine environment is likely to be in if current management of human activities is not changed. It is designed to provide policy- and decision-makers with feedback on the short-term (5 year) and long-term (50 year) consequences of current management and to highlight specific risks that are deemed by the workshop experts to warrant the greatest attention. It is emphasised that the experts are instructed to only consider what is likely to occur if there are no changes to current policies; experts are not allowed to second-guess what decisions governments may or may not take in the future.

The risk of any event is the sum of the likelihood of the event occurring and the consequences of the event should it occur. The likelihood and consequences associated with a given risk will be scored on a scale from 0 to 5. The correspondence between scores and likelihood and consequences is given in the Risks assessment section below.

As in the case of parameters selected for condition assessment, the risks assessed in the workshop will be a combination of those which are nearly universal to all maritime nations and others which are of particular significance to the nation or region considered in the workshop. An example list of standard risk scenarios is as follows:

- The risk that illegal and unreported fishing will continue or increase
- The risk that overfishing will cause fish stocks to collapse
- The risk that oil exploration will result in a blowout or major oil spill
- The risk that shipwrecks will cause a major oil spill
- The risk that global sea level rise will cause coastal inundation
- The risk that pollution will cause seafood poisoning
- The risk that tourism will cause environmental damage
- The risk that catchment disturbance will cause siltation of estuaries
- The risk that use of fertilizers will cause widespread eutrophication
- The risk that harmful algal blooms will occur

The risk assessment is a two-step process. Experts first assess the likelihood that an event will occur: a) in the next 5 years; and b) in the next 50 years. The experts are then asked to judge the consequences of an event occurring in terms of its overall impact on the marine environment. The addition of scores gives the risk as per Figure 4.

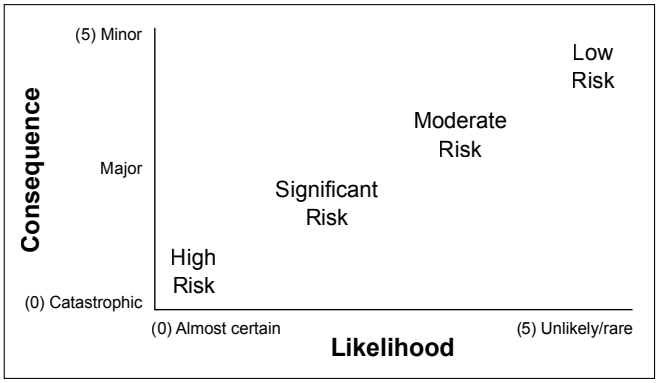

Figure 4. *The Inherent Risk Rating score for each risk is calculated by adding the Likelihood and Consequence ratings. This provides a risk score of between 0 and 10 that gives a risk rating of High (0-3), Significant (4-5), Moderate (6-7) or Low (8-10).*

Likelihood

This is the probability of the impact occurring over a 5-year or 50-year timescale, taking into account the effectiveness of present and recently implemented (not planned) management arrangements and activities.

Almost certain (score = 0)
Expected to occur often within 5 (50) years
Likely (score = 1–2)
Expected to occur at least once within 5 (50) years
Possible (score = 3–4)
Occurrence is not certain within 5 (50) years
Unlikely/Rare (score = 5)
Not expected to occur within a 5 (50) year period

Consequence/Impact

This is the extent and severity of the expected impact taking into account the effectiveness of present and recently implemented (not planned) management arrangements and activities.

Catastrophic (Score = 0)
Impact will seriously affect the ecosystem in the region, disrupting major ecosystem structure or function, and have recovery periods of more than 20 years (potentially irreversible)
Major (Score = 1-2)
Impact will seriously affect the ecosystem in the region, disrupting major ecosystem structure or function, and have recovery periods of less than 20 years
Moderate (Score = 3-4)
Impact will affect the ecosystem in the region, disrupting some aspects of ecosystem structure or function, and have recovery periods of less than 5 years
Minor (Score = 5)
Impact will be very limited and affect only minor components of the ecosystem in the region

6. Conclusions

The Production of State of Marine Environment Assessments and Reports based on Expert Elicitation provides an alternative to the classical data intensive environment reporting methods which may prove very useful to allow make most use of existing expert knowledge in regions where environmental data has not been recorded and reported in a systematic way. The existing expert knowledge may be enough and the only available means to draw an assessment that allows stakeholders taking decisions to initiate or improve environmental management without further delay in hope that enough systematic data is recorded. The Expert Elicitation approach if used to the full extent of its capacity may deliver a high quality report within a limited budget.

The pilot workshops conducted so far have proven to be very useful means of gathering available knowledge in the pilot regions and have received very good feedback for the experts participating in it as they allowed a quick and meaningful integration of the knowledge existing in a certain region. Ongoing efforts should lead to the finalization of the Reports emanating from these workshops in the near future.

Annex 1 Appendix 1. Web-based system for State of the Marine Environment reporting

GRID-Arendal has created a pilot, web-based system to capture and analyse workshop scores: http://some.grida.no, with the following main features:

- A core set of marine environmental and socio-economic parameters is included in the system. This set is based upon the WOA chapters. The set of parameters can easily be adapted with relevant parameters for a country or region identified by experts.

- Relevant data and information identification and compilation: the system allows the capture of relevant information sets. Important reference datasets and publications that are identified by the experts during the development process of the SOME reports can be added to the website, either as external links or uploaded to the web site in pdf, word or other formats.

- The website allows for the real-time capture and display of data and statistics (scores for parameters, confidence, risks) during the workshop.

- The website provides a template for the production of a State of Marine Environment Report. This outline is based upon the DPSIR system, the WOA outline and other relevant report templates (e.g. SOE report of Australia). The content and graphics can be exported and used as the basis for a national or regional SOME report or the contents can be adapted for use within other formats as required.

- The database allows direct correlation to the outline of the World Ocean Assessment, thereby permitting cross-referencing and combining outcomes of the assessment to optimize it as a contribution to the international effort.

- Another key aspect is that the diagrams and outputs that are produced by the web site are designed for easy communication of the workshop results to policy- and decision-makers. The diagrams are simple, jargon-free and clearly communicate the main findings of the judgments made by the experts.

The system allows the assignment of different roles to contributing experts during the development process of the SOME reports: main editors, contributors, reviewers, etc. Contributors can be made responsible for one or more chapters in the SOME outline. Draft versions of the report can be circulated to all participants for updating and review of the report and workshop outcomes, including recording of key references and anchors that may have been overlooked.

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ANNEX 2. FIVE MAJOR CONCERNS AND 21 ENVIRONMENTAL ISSUES ADDRESSED WITHIN THE GIWA FRAMEWORK

Major concerns	Environmental issues
Freshwater shortage	1. Modification of stream flow 2. Pollution of existing supplies 3. Changes in the water table
Pollution	4. Microbiological 5. Eutrophication 6. Chemical 7. Suspended solids 8. Solid wastes 9. Thermal 10. Radionuclide 11. Spills
Habitat and community modification	12. Loss of ecosystems 13. Modification of ecosystems or ecotones, including community structure and/or species composition
Unsustainable exploitation of fish and other living resources	14. Overexploitation 15. Excessive by-catch and discards 16. Destructive fishing practices 17. Decreased viability of stock through pollution and disease 18. Impact on biological and genetic diversity
Global change	19. Changes in hydrological cycle 20. Sea level change 21. Increased UV-b radiation as a result of ozone depletion 22. Changes in ocean CO2 source/sink function

To enhance comparability and remove biases in the Assessment, the results are reported as standardized scores according to a 4-point scale as follows:

0 = no known impact
1 = slight impact
2 = moderate impact
3 = severe impact

SOME

This document describes the general approach for the development of marine assessments or State of the Marine Environment reporting (SOME) in the Mami Wata project. The methodology follows the structure and approach described in the Integrated Environmental Assessment Training Manual (UNEP/IISD 2009) and offers, depending on availability of data and information, different options to develop SOME reports: literature-based, indicator-based or expert consultation approaches.

MAMI WATA

http://mamiwataproject.org