1 Introduction

This Chapter first reviews the origins and mandate of the Assessment of Assessments and places its work in the context of major findings about the state of the oceans, highlighting the need for urgent and coordinated responses and briefly explaining the ocean governance system within which this process would function. It goes on to introduce how the Regular Process could help decision-makers find sound solutions to the oceans' problems. Finally, there is an overview of the content of the report and the linkages between the different chapters.

BACKGROUND AND MANDATE FOR THE GROUP OF EXPERTS

Process leading to the Assessment of Assessments

1.1 In Agenda 21, adopted at the Rio Conference on Environment and Development, states committed themselves to improve understanding of the marine environment in order to better assess present and future conditions (UN 1992). In 2001/02, work commenced to explore the feasibility of establishing a regular global process for assessing the marine environment. The feasibility study led the 2002 World Summit on Sustainable Development in Johannesburg to support actions at all levels to "*establish by 2004 a Regular Process under the United Nations for global reporting and assessment of the state of the marine environment, including socio-economic aspects, both current and foreseeable, building on existing regional assessments*". This was endorsed at the United Nations General Assembly (UNGA) later in 2002 (Resolution 57/141).

1.2 The General Assembly Resolution launched further preparatory work by UN bodies, member states and international organizations in 2003–2005, including two international workshops. In November 2005, UNGA launched the "Assessment of Assessments" (AoA) as a preparatory stage towards the establishment of the Regular Process (Resolution 60/30). An *Ad Hoc Steering Group* (AHSG) was established

to oversee implementation of the AoA[1] Among its first tasks was to establish a *Group of Experts* to undertake the actual work with support from a secretariat in the two lead agencies, the *United Nations Environment Programme (UNEP)* and the *Intergovernmental Oceanographic Commission (IOC) of UNESCO*. The work was to be completed within two years.

The mandate of the Assessment of Assessments

1.3 The mandate of the AoA was elaborated by the AHSG at its first meeting in 2006, based on the General Assembly's decisions in Resolution 60/30 (AHSG 2006). The essence of the mandate is to prepare a report for the General Assembly on its work to:

a. Assemble information about marine assessments relevant to the Regular Process, carried out under the purview of UN bodies, global treaty organizations, regional organizations, national governments and other relevant organizations where appropriate (see Chapter 3, Annexes IV and V and database).
b. Undertake a critical appraisal of the assessments in order to evaluate their scientific credibility, policy relevance, legitimacy and usefulness. The appraisal should in particular identify:
   (i) best practices and approaches (including assessment methodologies);
   (ii) thematic and geographic assessment gaps and needs;
   (iii) uncertainties in scientific knowledge, data gaps and research needs; and
   (iv) networking and capacity-building needs in developing countries and countries with economies in transition.

   (The analytical framework for this analysis is found in Chapter 2, evaluation of gaps and needs in Chapter 3 and best practices in Chapter 4.)
c. Identify a framework and options to build the Regular Process, including potential costs, based upon current relevant assessment processes and practices (see Chapter 5).

1.4 The Group of Experts has taken particular account of the conclusions of the Second International Workshop in June 2005

1 A good overview of the process and key decisions and recommendations up to this stage can be found in annex 2 of the UNEP-World Conservation Monitoring Centre (WCMC) report "Global Marine Assessments" (UNEP 2007b) , see: http://www.unep-wcmc.org/resources/publications/UNEP_WCMC_bio_series/27.htm

endorsed by Resolution 60/30 (UN 2005) which called for the preparatory process to:

a. Establish how assessments have been communicated to policy-makers at the national, regional and global levels;
b. Identify the usefulness and drawbacks of organizing assessment components of the Regular Process on different scales and the relevance of this to integrated assessments;
c. Evaluate the potential contribution of existing assessments to the Regular Process and how available data might be incorporated into it.

1.5 The AoA was not to produce any new assessments of the state of the oceans or any particular environmental component or human activity. The appraisal should essentially be science-based and subject to review by experts and governments.

THE CONTEXT FOR THE REGULAR PROCESS

1.6 The oceans cover 71% of the Earth's surface. They are vital for the functioning of the planet and for human well being and development. Yet there is no systematic effort to assess the state of the oceans or the sustainability of human uses of the oceans. There is also no systematic coordination of assessments to support states and agencies concerned about the effectiveness of policies affecting the oceans and their uses.

Humans depend on oceans

1.7 Humans depend upon healthy oceans and marine ecosystems. Oceans provide food, medicines, energy and even shelter. They support and interact with major industries such as fisheries, petroleum, shipping and tourism. They are also vital for life supporting processes such as the climate, the water cycle, the circulation of nutrients and delivering oxygen to the air and absorbing carbon dioxide. As long as their natural capacity is not exceeded, they can purify waste and pollution. Culturally, marine life and landscapes have large spiritual, aesthetic and recreational values. Marine research and education underlie human understanding and appreciation of the oceans.

1.8 Many ocean services do not have a market value, despite their fundamental role in supporting human societies. However, maritime industries provide substantial employment and contribute a large proportion of gross domestic product in many countries. For instance,

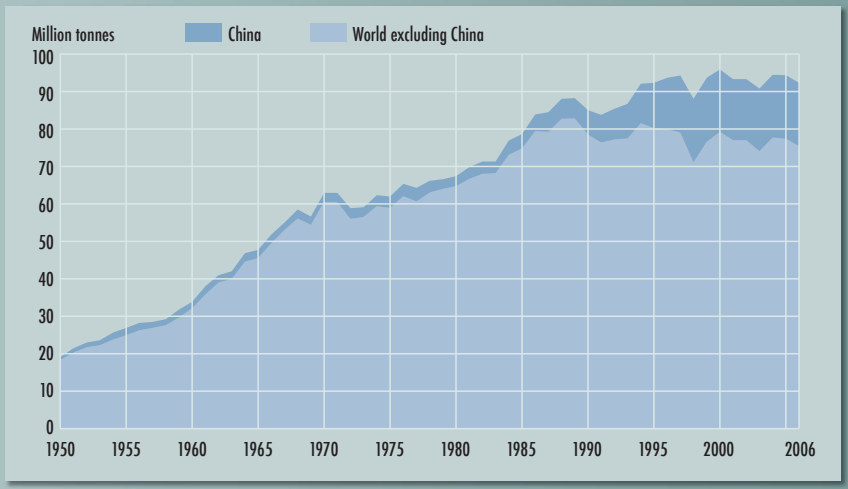
the value of marine industries in the EU-15 countries was estimated at 310 billion EUR in 2004; the largest proportion (239 billion EUR) from service sectors such as shipping and tourism (Marine Institute, 2005). Successful management of the oceans can also have other economic benefits by contributing to achievement of the UN Millennium Development Goals such as reducing poverty and water-borne diseases and improving food security.

Oceans are being depleted and disrupted

1.9 Oceans were for a long time perceived as being immense, inexhaustible and impervious to human influence – an enormous reservoir to be exploited and utilized. However, there are many signs that ocean ecosystems are experiencing unprecedented environmental changes driven by human activities (MA 2005, UNEP 2007, Nellemann, Hain and Alder, 2008):[2]

a. ***Fishing*** has an impact on target species but also affects other fish and invertebrates, birds, mammals and turtles through by-catch; it also affects marine habitats through gear impacts, and may change the trophic dynamics of marine ecosystems.

Figure 1.1: **World capture fisheries production**

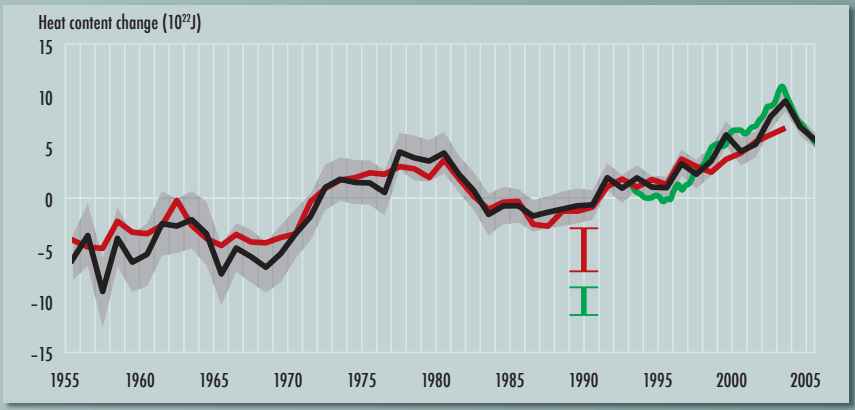


Source: FAO 2009

2 When no specific references are provided, the information in this section builds on these references.

Figure 1.2: **Time series of global annual ocean heat content (10^{22} J) for the 0 to 700 m layer**

The black curve is updated from Levitus et al. (2005), with the shading representing the 90% confidence interval. The red and green curves are updates of the analyses by Ishii et al. (2006) and Willis et al. (2004, over 0 to 750 m) respectively, with the error bars denoting the 90% confidence interval. The black and red curves denote the deviation from the 1961 to 1990 average and the shorter green curve denotes the deviation from the average of the black curve for the period 1993 to 2003.



Source: Bindoff and others 2007

Global fisheries catches peaked in the 1980s and are now declining slightly. Eighty percent of global fisheries are fully exploited or overexploited (FAO 2009) and pressure is increasing on less exploited areas like the deep seas and polar oceans.

b. *Pollution* is caused by contaminants, nutrients and sediment mobilization. More than 80% of marine pollution originates from land-based sources such as sewage, industrial waste, agricultural run-off and the consequences of deforestation. Many toxic substances accumulate in the food-chain and may cause detrimental effects to top predators and humans consuming seafood. Overload of nutrients can cause water quality alterations, algal blooms (that may even be toxic) and oxygen depletion; reports show that dead zones deprived of oxygen are increasing worldwide (Diaz and Rosenberg 2008).

c. *Loss of valuable habitats:* Almost 40% of the world's population lives in a narrow coastal zone covering 8% of the Earth's total land area. Heavy development has led to loss and

fragmentation of valuable habitats such as wetlands and mangroves. This has severe consequences for biodiversity and negative impacts on human settlements through, for example, increased risk of flooding and erosion. In the wider oceans, destructive fishing practices including bottom trawling on vulnerable marine ecosystems may damage highly productive habitats such as corals and seamounts.

d. ***Climate change:*** The average temperature of the global oceans to depths of at least 3,000 meters has increased since 1961, causing seawater to expand and rise (Climate Change 2007). Over the past 40 years, the ocean's capacity to absorb carbon has declined by 16% (GCOP 2008). Other marine climate effects are changes in waves, circulation patterns, ice cover, salinity, oxygen levels and water acidity. These can have dramatic impacts on sensitive marine organisms; tropical corals undergo bleaching and die when temperature exceeds their tolerance level. Increases in atmospheric CO_2 also contribute to ocean acidification, a major potential threat to all shell-forming organisms including phytoplankton responsible for a significant portion of the ocean's primary production. Alterations in species' distributions and abundances are already reported and can lead to regime shifts in some ecosystems. This will also change the geographic basis for existing fisheries management regimes.

e. ***Invasive species*** can be spread directly by human activities, primarily through shipping and aquaculture. They can have devastating consequences for ecosystems and society. For example, a North-American comb jelly that was accidentally introduced into the Black Sea in 1982 resulted in the destruction of 26 commercial fisheries within 10 years (Shiganova and Panov 2003). It has also spread to the Caspian, Western Mediterranean and Baltic Seas, probably through major shipping routes (EEA 2007). The direct negative economic impacts of aquatic invasive species are estimated to exceed US$100 billion globally per year (GEF/UNDP/IMO 2004).

1.10 Each of these pressures has *direct effects* on the marine environment. *Indirect effects* can also occur whereby effects may be relayed to other parts of the ecosystem through predator-prey interactions and other ecological linkages and may sometimes be more serious than the original direct effects. Different human

activities and natural processes affect the same ecosystem components simultaneously, interacting and leading to *cumulative effects*. Science has a limited ability to detect both indirect and cumulative effects as they can be non-linear and manifest only after long time delays. As a consequence, they can be very difficult to predict.

1.11 One attempt to study cumulative effects from 17 human pressures, including fisheries, pollution, introduced species and climate change, concluded that 40% of the ocean area can be classified as strongly affected. No oceans are undisturbed but the best status can be found in the polar regions and deep seas (Halpern and others 2008). These parts of the oceans have so far been hardest to exploit and furthest from human influences. With increased changes to the global ocean environment and increased pressure on utilization of new resources, it is likely that these regions will be under greater pressure in the future.

1.12 The Millennium Ecosystem Assessment (MA) concluded that marine ecosystems are becoming depleted and disrupted. This makes them increasingly liable to major shifts in their properties, including loss of resilience. Such shifts can occur in association with perturbations that do not appear extreme compared to historical events and from which ecosystems normally would recover. The likelihood of abrupt changes is also increasing, due for example to recent climatic trends; this could have adverse impacts on the oceans' capacity to provide food and other goods and services vital for human wellbeing (MA 2005).

1.13 The UN General Assembly in 2006 concluded that the continued environmental degradation in many parts of the world, and the rise in competing demands, require an urgent response, and the setting of priorities for management interventions aimed at conserving ecosystem integrity (Resolution 61/222, see Box 2.2).

Ocean governance is complex

1.14 The existing ocean governance system is complex at all levels and continues to evolve. It forms the context within which a regular global marine assessment process would function. The international community and national governments have sought to respond to the increasing pressures on the oceans through numerous instruments.

a. At the *global* level, the UN Convention on the Law of the Sea (UNCLOS) with its two implementation agreements[3] provides a legal framework and basic principles for the management of the oceans. Ocean issues are considered in a comprehensive manner in the UNGA and its processes. More specialized global organizations like the Food and Agriculture Organization (FAO) and International Maritime Organization (IMO) serve as forums for governments to further develop the international rules and standards that implement UNCLOS provisions. The instruments can be both conventions (for example MARPOL 73/78) and other normative instruments such as the FAO Code of Conduct for Responsible Fisheries and related technical guidelines. A large number of multilateral environmental agreements also apply to the oceans, covering themes like climate change, hazardous substances, biodiversity and protection of species and habitats. For example, decisions under the Convention on Biological Diversity (CBD) and the Convention on Migratory Species (CMS) increasingly address marine issues. Intergovernmental organizations promote and coordinate ocean sciences (for example UNESCO-IOC and the International Council for Exploration of the Sea (ICES)) and provide assistance especially to developing countries in marine management (for example the Global Environment Facility (GEF), World Bank, United Nations Development Programme (UNDP), FAO and UNEP).
b. UNCLOS also provides the framework for *regional* oceans collaboration. The regional level is appropriate for responding to the many ocean problems that occur at larger than national scales. Regional organizations can bring together coastal states adjacent to the same oceans and seas, sometimes also other states that use the areas. Regional fishery bodies (RFBs), including Regional Fisheries Management Organizations (RFMOs) focus on development and/or management of one sector, whereas the regional seas conventions and organizations cover a broader range of issues. In some oceans and seas there are no strong instruments for regional

3 "Agreement relating to the implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982" (1994) about the regime for the deep seabed, and "Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks" (1995).

collaboration. In areas such as North America, bilateral cooperation can be especially appropriate.

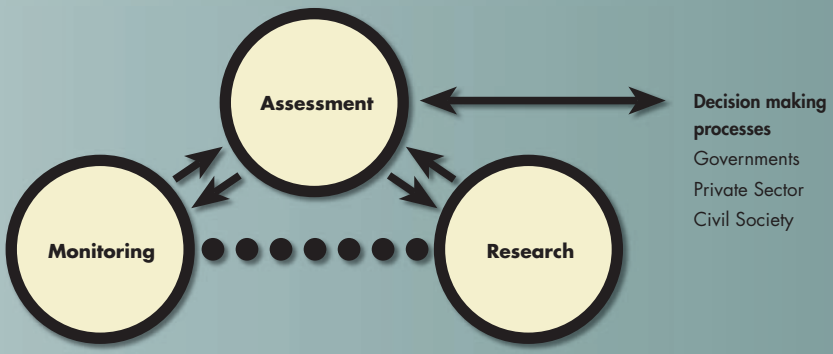
c. *States* play a fundamental role in the international order as they negotiate and decide upon international agreements and the functions of intergovernmental organizations, in addition to shaping customary international law. As sovereign states they are only bound by international obligations through their own consent, through ratification of or accession to international treaties and by customary international law. Implementation of agreed international instruments by states is not always consistent or comprehensive, reflecting different national priorities and interpretations as well as different capacities and resources.

1.15 The private sector and civil society also play an important role in governance. They not only provide input to intergovernmental processes but have distinct roles of their own. For example, both environmental organizations and professional societies have utilized market mechanisms to support sustainable ocean use by adopting certification schemes and tradable quotas/permits. Industrial organizations develop their own standards; for example the insurance industry has a substantial influence on marine activities. Civil society includes non-governmental organizations (NGOs) representing a variety of interests ranging from the international scientific community (e.g., Scientific Committee on Oceanic Research (SCOR)) to the conservation community (e.g., World Wide Fund for Nature (WWF)) and social welfare groups. They are active in areas like scientific research, shaping public understanding of marine issues, campaigning to influence politicians and policy-makers, funding and capacity building for sustainable ocean initiatives and supporting community-based resource management.

1.16 Dialogue about mechanisms to increase the coherence and effectiveness of the existing mosaic of instruments and institutions continues in many forums. New and emerging issues are also addressed, like adverse environmental impacts in marine areas beyond national jurisdiction and adaptation to climate change. A Regular Process for global marine assessment can be a valuable tool to support existing and future ocean governance.

Figure 1.3: **Assessments have a key role in informing decision-makers**

Key sources for the knowledge they provide are research and monitoring. Decision-making processes in turn feed back on the scope of future assessments and related monitoring and research needs.



ASSESSMENTS HAVE A MAJOR ROLE IN DEVELOPING SOUND RESPONSES

1.17 All the instruments, institutions and processes referred to above require knowledge about what the problems are, what causes them, and the relative significance of each in environmental and socio-economic terms. Decision-makers can be further informed by analyses of policy and management options that may address the problems and the likely outcomes and risks associated with the options (Figure 1.3).

1.18 There are continual improvements in understanding how the oceans behave. Research provides better insights into how natural processes and human activities affect the ocean and how to achieve sustainability in human uses of the sea. Monitoring makes it possible to detect changes over time and assess the effectiveness of policies previously adopted. But this knowledge needs to be gathered and evaluated on a regular basis if decision-makers are to develop appropriate and timely responses to threats to the oceans. This is a core role of assessments. When conducted according to recommended best practices (see Chapter 4), assessments can play a vital role in informing the general public and a variety of decision-makers (see para. 2.5).

1.19 This report reviews the coverage of existing marine assessments, how they are conducted and who uses them today. The insights from this review are intended to provide guidance to the UN General Assembly on a process to regularly assess the state of the marine environment and how humans are affected by it. Such a Regular Process could respond to many needs:

a. Ensure a global overview of the oceans, showing how different regions and processes are interlinked ecologically, economically and in governance;
b. Help to focus initiatives for improving our understanding of the oceans and feed this knowledge into policy development;
c. Help to identify the likely consequences of options for managing human activities that significantly affect the oceans, and the level and type of policy making necessary to implement them;
d. Guide development of capacities for monitoring, research, assessments and, consequently, capacities for oceans management;
e. Stimulate cooperation (networking and communication) among stakeholders and across disciplines at many levels;
f. Take full advantage of existing assessment activities, drawing on their results and facilitating their continuous development.

STRUCTURE OF THE REPORT

1.20 The report is organized in accordance with the main parts of the mandate of the Group of Experts outlined above.

Definitions and analytical framework

1.21 Chapter 2 presents the framework used by the Group of Experts in its work. The first part of the chapter describes the analytical framework used in Chapters 3 and 4. The framework evaluates how assessments come to be considered *relevant, legitimate* and *credible*, which are the three conditions considered necessary for an assessment to have *influence*. This is followed by a broad definition of assessment and a summary of the diverse types of assessments that have been examined as categorized in this report. The remaining portion of the chapter defines terms that are used in specific ways in the report. The emphasis is on providing consistent terminology for different types of assessments and consistent use of geographical terms.

Assemble and review information about marine assessments relevant to the Regular Process

1.22 Chapter 3 provides an overview of existing marine assessments and summarizes the main findings of the Group of Experts' review, in relation to both assessment *product* and assessment *process*. The assessments have been examined at three different levels: individual assessments, regional assessments and global and supra-regional assessments. Summaries of the regional and global/supra-regional assessments are found in the annexes (see Annex IV and Annex V). Information about individual assessments is included in the GRAME database (see Box 3.1). Chapter 3 considers strengths, gaps and needs within each region and at larger scales. In particular, it aims to clarify existing capacity and technical approaches for assessments and the range of processes currently used to plan and deliver assessments. It examines the various data types and methods used in assessments and describes the most common features of existing assessment processes. A final section summarizes capabilities for assessing ecological and multi-sectoral interactions and broad-scale patterns within and across regions.

Best practices and approaches

1.23 Chapter 4 of the report presents a normative analysis of best practices in assessment. It identifies three basic elements of an assessment process (principles, design features, and institutional arrangements). For eleven design features, it identifies best practices. For the twelfth design feature, institutional arrangements, three issues of particular significance are highlighted: the boundary between science and policy, stakeholder involvement and linking existing assessment processes. Institutional arrangements for a number of existing assessment processes are summarized in Annex II. The purpose of Chapter 4 is to provide guidance for the establishment and operation of a Regular Process. The chapter builds on the analysis and findings of Chapter 3 and uses the analytical framework set out in Chapter 2.

Framework and options for the Regular Process

1.24 Chapter 5 builds on the previous chapters to present a possible way forward for the Regular Process. It considers what the Regular Process can deliver and relates the content of a possible first cycle

of the Regular Process to forthcoming milestones relevant for oceans policy. It sets out a framework for the Regular Process consisting of (1) an overall objective, (2) a description of the overall scope within which Regular Process assessments will be designed, (3) a set of principles to guide the establishment and operation of the Regular Process and (4) best practice to be followed in designing and implementing key features of the Regular Process and applying the principles. Potential products from a first cycle are considered in relation to four fundamental building blocks: capacity building, improving knowledge and methods of analysis, enhancing networks among existing assessment processes and international monitoring and research programs and, lastly, creating communications tools and strategies for the products of the Regular Process. The next section of Chapter 5 considers six institutional aspects of the Regular Process, together with options: (1) the relationship of the Regular Process to the United Nations; (2) the establishment of a Management and Review Body (MRB) for the Regular Process; (3) a Panel of Experts for the Regular Process; (4) an additional Pool of Experts for the Regular Process to draw on; (5) a Secretariat for the Regular Process and (6) Focal Points within governments, international organizations (global and regional), the private sector and civil society organizations to facilitate interaction and collaboration with the Regular Process. A final section addresses options for financing the Regular Process, followed by an appendix which further develops how to implement the first cycle and provides an overall indication of the levels of financing that might be needed.

Supporting annexes

1.25 Background information supporting or elaborating topics covered in the report is included in a series of Annexes, specifically:

Annex 1: Table of the regions used in the Assessment of Assessments
Annex II: Institutional arrangements for selected assessment processes
Annex III: Profile and criteria for selection of experts for the Assessment of Assessments
Annex IV: Regional summaries
Annex V: Supra-regional summaries
Annex VI: Template used for regional summary of assessments
Annex VII: Template used for individual assessments

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