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Implementing the Ecosystem Approach in Open Ocean and Deep Sea Environments

An Analysis of Stakeholders, their Interests and Existing Approaches

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Contents

Foreword

Stakeholder analysis is a tool for identifying underlying socioeconomic causes of environmental change and to bring together important information to solve adverse effects of it; ecosystem approaches are tools to develop, implement and monitor sectoral and multisectoral interventions in a comprehensive manner. Together, they represent powerful tools to better understand the problems that surround us and identify optimal solutions based on synergistic arrangements between different parts of society, at all levels.

Work aimed at identifying and analyzing stakeholders and their interests in terrestrial areas since the Seventies has proven very successful in mitigating and even anticipating conflicts over different uses of space and resources; there are numerous international successful experiences that can be listed in this respect. At the same time, the last ten years or so have seen an increase in the number of independent fora and policy processes that have promoted comprehensive approaches to the use of spaces and resources; in the case of the marine realm, this has been so especially in the coastal areas of the world, where integrated coastal management approaches have been tested, refined, implemented, monitored and enhanced.

On the other hand, the open ocean and deep sea environments – two areas that are extremely promising for the earth's economy, environmental balance and survival while also being under significant and increasing human pressure – have not been subject to any comprehensive analysis of who the stakeholders in these areas and what their interests are; neither have existing ecosystem approaches been fully tailored to the specific features of these open ocean and deep sea environments, which are characterized by their enormous size, remoteness and difficulties in monitoring them.

This study intends to emphasize that knowledge of who does what in the oceans, especially in the open ocean and deep sea environments, is a prerequisite for any constructive debate on ocean management and governance. The study also aims at elucidating the main 'ingredients' of ecosystem approaches and why they require an integration among sectoral policies and why they can also reinforce individual policies. Finally, the study intends to provide a first step towards a comprehensive survey and dialogue on mapping stakeholders' interests in these areas, with the ultimate goal of improved conservation, sustainable use and equitable sharing of the benefits derived from ocean spaces and their resources.

The United Nations University Institute of Advanced Studies (UNU-IAS) was established in 1996 as a research and training center of UNU to undertake research and postgraduate education on emerging issues of strategic importance for the United Nations and its Member States. Pursuant to its Statute, UNU-IAS undertakes its work in an independent, neutral and objective manner. A key purpose of the Institute is to provide interaction between the UN system and other bodies and sectors of society. Development of this study is part of the broader Biodiplomacy Initiative at the Institute, which also looks at bioprospecting in Antarctica and the deep seabed, issues related to access and benefit-sharing and training for developing country officials; it is also part of the growing collaboration between UNU and UNESCO in the area of ocean science and governance.

I hope that the readers of the study will find it a useful contribution to the wider debate on the implementation of ecosystem approaches to the oceans.

A.H. Zakri
Director, UNU-IAS
May 2006

Executive Summary

The status of resources and the biodiversity of the world's oceans and coastal areas continues to decline as a consequence of unsustainable human action. Exploitation of resources in marine areas beyond the limits of national jurisdiction continues to increase, and the management of these resources is made more complicated by the often conflicting interests and objectives of various stakeholders operating both outside and within the limits of national jurisdiction. At the same time, valuable experience has been gained in implementing ecosystem approaches in the coastal waters of the world. In open ocean and deep water environments, however, ecosystem approaches are little if at all applied.

Many different 'ecosystem approaches' exist. The ecosystem approach developed in the context of the Convention on Biological Diversity (CBD), the ecosystem approach to fisheries (EAF) and integrated marine and coastal area management (IMCAM) (or alternatively, 'integrated coastal area management' or 'integrated coastal zone management' – terms that are relatively equivalent, differing only in the amount of coastal or marine environment covered) represent three useful tools for making progress towards a more integrated and holistic management of ocean spaces and resources. In this context, experiences have demonstrated that integration among sectoral policies can be complementary to the reinforcement of individual sectors, hence the ecosystem approach teaches us that integration and sectoral reinforcement are not mutually exclusive; another of the basic premises of the ecosystem approach is that there is no 'correct' way to implement it, but that certain principles and guidance should apply.

The ecosystem approach, as defined in the CBD, is *"a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way."* It is based on the application of appropriate scientific methodologies focused on levels of biological organization, which encompass the essential processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of ecosystems – a recognition that makes the identification and involvement of stakeholders an essential component of implementing the ecosystem approach. Decisions of the CBD Conference of the Parties also acknowledge the value of other ecosystem approaches, such as those relating to the marine environment, and their potential consistency with, and value to, the CBD ecosystem approach.

The EAF presents a more holistic approach than traditional fisheries management methods, and strives to take into account the structure and functioning of ecosystems and their components, as well as the needs and desires of societies, in the context of sustainable use of marine resources. There is good consistency between the CBD ecosystem approach and the EAF. The EAF has a strong focus on sustainable use, and although the concept of equity is given prominence, there is no mention of conservation. The aim of the EAF is to use fisheries in a sustainable manner. However, considering the number of fisheries that are currently overexploited and in need of restoration, some focus on conservation could strengthen the EAF. Related to this is the lack of explicit consideration of the longer temporal scales that are required to rebuild many fisheries, as well as of adaptive management. The impacts of management actions taken in one ecosystem on adjacent ecosystems are also not explicitly considered. In the context of fisheries management, the maintenance and/or destruction of nursery habitat or spawning areas could be an important consideration. Finally, although the impacts on ecosystem structure and function are addressed with regard to fisheries, there is a lack of consideration concerning other organisms associated with the marine ecosystem. The EAF is much more specific and advanced than the CBD ecosystem approach in considering specific fisheries management strategies and data requirements. It is also more explicit in giving prominence to the precautionary approach.

Unlike IMCAM, the EAF is still a relatively new approach. Given this, it is not surprising that comprehensive information about its implementation is not yet available. Certainly the EAF has been applied in a number of countries, though its national application is far from being universal. The EAF has also been applied regionally, often within Large Marine Ecosystems. Within regional fisheries management organizations (RFMOs), the application of the ecosystem approach is still patchy. While the more recently concluded agreements, like those for highly migratory species of the western and central Pacific and for the South East Atlantic reflect the ecosystem and precautionary approaches of the UN Fish Stocks Agreement, other early agreements predate UNCLOS and do not reflect the ecosystem approach.

IMCAM has been practiced for approximately 40 years, making it the oldest integrated management approach applied in the marine environment. At the present time, IMCAM is commonly used around the world. In addition, the importance of IMCAM has been recognized under a number of international and regional instruments and programmes, including the Convention on Biological Diversity, the Barbados Plan of Action, the Global Programme of Action for the Protection of the Marine Environment from Land Based Activities (GPA), the FAO Code of Conduct for Responsible Fisheries, the Johannesburg Plan of Implementation and many Regional Seas Conventions and Action Plans.

The goals of IMCAM are: the sustainable development of coastal and marine areas; reducing vulnerability of coastal areas and their inhabitants to natural hazards; the sustainable well-being of coastal ecosystems; and the sustainable quality of life in coastal communities. There is very good consistency between the CBD ecosystem approach and IMCAM. As was the case with the EAF, IMCAM has a strong focus on sustainable use and on sustainable development. But unlike the EAF, IMCAM also recognizes the need for conservation. Existing IMCAM guidance does not address the equitable sharing of benefits to a great degree. The importance of equity is acknowledged in the EAF principles, though it is difficult

to say how well this principle is achieved in practice. Finally, the IMCAM principles and guidance are much more specific than the more general CBD ecosystem approach in addressing coastal issues, including, for example, the need to lessen the impacts of coastal hazards. There has also been substantial experience that has been gained through IMCAM in implementation of the ecosystem approach, in particular in relation to approaches related to stakeholder consultation, co-management, and conflict resolution techniques have been pioneered through the implementation of IMCAM.

For ocean areas, the challenge lies in integrating the various management approaches into a comprehensive and cohesive plan with the ecosystem approach as its central framework. Many countries and regions are starting to develop this type of integration for their EEZs through ocean policies. Consistent with the ecosystem approach, national and regional ocean policies may also need to extend their coverage into the high seas to take into account interlinkages between ecosystems. The elaboration, adoption and implementation of an ocean policy for areas beyond national jurisdiction faces substantial challenges, but remains a valuable long-term goal. In the meantime, much can be achieved through effective implementation of the EAF and/or through integrated oceans management. Management of oceans would need to be supported by information systems that integrate spatially referenced environmental data, stakeholder uses and jurisdictional boundaries.

Successful implementation of the ecosystem approach is dependent on the identification of the different stakeholders involved, their practices, expectations and interests, and then on managing human uses in a way that respects the complexities and limits of ecosystems and their functioning with a view to long-term sustainability. Therefore, involvement of stakeholders and the analysis of their interests and perspectives is a key aspect of the implementation process of the ecosystem approach. But in-depth knowledge about the various stakeholders in marine areas beyond national jurisdiction is seriously lacking.

The importance of the involvement of stakeholders is reflected in various principles of the CBD ecosystem approach: the objectives of management of land, water and living resources are a matter of societal choice (Principle 1); the ecosystem approach should be undertaken at the appropriate spatial and temporal scales (Principle 7); the ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices (Principle 11); and the ecosystem approach should involve all relevant sectors of society and scientific disciplines (Principle 12). However, neither the principles nor the operational guidelines of the ecosystem approach provide criteria for identifying and evaluating stakeholders (and their interests), despite the fact that this will be necessary in practice. Therefore, societal involvement requires a stakeholder analysis.

Stakeholder analysis refers to a range of tools for the identification and description of stakeholders, their interrelationships, current and potential future interests and objectives, and examines the question of how and to what extent they represent various segments of society. There are several reasons for carrying out a stakeholder analysis: better understanding of the complexity of the ecosystem; understanding of the human influence on the ecosystem and its management; examining the compatibility and/or potential conflicts of multiple use objectives; identifying, predicting and resolving areas of conflict; discovering existing patterns of interaction. Furthermore, stakeholder analysis allows the opportunity to deepen mutual understanding about the issues at hand, explore and integrate ideas together, generate new options and solutions that may not have been considered individually and ensure the long-term availability of resources to achieve mutual goals. In addition, stakeholder involvement can increase stability in a complex environment and expand capacity rather than diminish it under changing circumstances. This approach is increasingly important within the context of ocean use management and zoning so as to avoid incompatible uses, resolve conflicts and promote ecosystem-based management.

Stakeholders may include groups affected by management decisions, groups concerned about the management decisions, groups dependent upon the resources to be managed, groups with claims over the area or resources, groups with activities that impact on the area or resources and groups with, for example, special seasonal or geographic interests. Stakeholders often hold considerable political and/or economic influence over the resource, based on their geographical proximity to the resource, their historical dependence and association with it, institutional mandate, economic interest, or a variety of other concerns. Stakeholders can be of any form, size and capacity. They can be individuals, organizations, or unorganized groups.

One method to collect data on stakeholders and their attributes in a comprehensive and efficient manner is to conduct interviews with experts knowledgeable about stakeholders or directly with the stakeholders themselves. Such methodology is known as participatory research approach. This working method is the most commonly used in the field of stakeholder analysis and is considered as the best method for a successful outcome. However, it is important to note that the use of participatory research does not exclude conventional research methods. Contrary, the stakeholder analysis for marine areas beyond national jurisdiction will depart from an overview of existing resource uses and activities gained through conventional scientific research.

A preliminary analysis of stakeholders' uses of spaces and resources in open ocean and deep sea environments shows that these are: shipping; capture fisheries and aquaculture; marine scientific research (for research, monitoring, educational or bioprospecting purposes); tourism; oil and gas extraction; mining; deep sea cable and pipeline industry; disposal of nuclear waste or other substances and military uses: ocean uses by indigenous and local peoples.

There are specific issues involved in these uses and also potential or actual conflicts between them. For example:

- the capture fisheries sector continues being affected by shortage of resources, mainly due to unsustainable exploitation practices and underlying causes related to fisheries governance;
- illegal, unreported and unregulated (IUU) fishing has adverse ecological impacts, but also the economic and social costs of it are significant and result in increased costs, lower employment, lower incomes and lower export revenues for legal fishers and adverse effects on the livelihoods of developing country fishing communities due to the reduction of the resources on which those livelihood systems are based;
- there are difficulties in keeping track of scientific research and monitoring activities in the open ocean and deep sea environments;
- there are issues related to cruise ship wastes, whose disposal is generally unregulated, as well as to the adverse economic and social effects that cruise tourism can entail;
- in the marine environment, extractive activities for the purpose of energy development remain a major economic industry. In marine areas afar from the coastline, the main extractive activity related to energy production is offshore oil and natural gas. The occupation of certain areas for the purpose of energy production may conflict with other uses and also entail environmental effects in those areas;
- mining in the seabed, the ocean floor and subsoil beyond national jurisdiction ('the Area') is organized and controlled by the International Seabed Authority (ISA) according to relevant provisions under the United Nations Convention on the Law of the Sea. The Authority coordinates expert work on environmental effects of mining and on exploring linkages between non-living and living resources in the Area, but its mandate relates to non-living resources solely;
- despite their relatively limited direct uses of ocean's spaces and resources in areas beyond national jurisdiction, indigenous and local communities seem to have well-defined expectations as stakeholders (in the general sense of the term as including rightholder) with regard to marine biodiversity in areas beyond national jurisdiction.

The information collected in the study confirms that the main uses of ocean spaces and resources in areas beyond national jurisdiction are well known. However, reality is much more complex. In marine areas beyond national jurisdiction, a host of stakeholders may be concerned about a whole range of topics posed by the use of ocean space and resources, including issues driven by economic, social, environmental or cultural interests. For example, an important stakeholder in these areas is represented by civil society, particularly conservation groups. In addition, there may be different stakeholders operating at different spatial or temporal scales at the same time: for example, in the case of the exploitation of fish stocks, the stakeholders would be represented by the fishing industry, but there are at least three more stakeholders involved in this particular use of the ocean space and resources, i.e. national governments, RFMOs and consumers.

An integrated approach to the study and management of the ocean's spaces and resources would imply that all actual stakeholders, directly as well as indirectly involved, be identified and consulted in an appropriate manner. This seems to be particularly true for the open ocean, for which information on stakeholders and their interests is limited due to the out-of-reach nature of the area in question; there may be other reasons for the lack of knowledge about those stakeholders than the fact that this is a hard to reach area, such as the desire by some stakeholders to make themselves unknown, in order to continue carrying out their activities (which can be potentially or actually damaging). Such gap needs to be filled, if a meaningful debate on multistakeholder approaches to oceans is to take place and informed decisions made. In this regard, the process of stakeholder definition should be as open as possible, and newly identified stakeholders should be treated equally to existing ones.

Future work is needed in order to collect stakeholders' views on inter alia: their interests in marine areas beyond national jurisdiction; the way in which they represent these interests; what other interests should be taken into account when decisions are taken on marine areas beyond national jurisdiction; who could best represent these other interests and why; what the main problems related to marine areas beyond national jurisdiction are and what kind of cooperative solutions to these problems they would like to propose; what the key characteristics of an effective consultation on various interests in marine areas beyond national jurisdiction should be; and what their expected outcome of an effective consultation process would be.

Important criteria that allow the importance of the stakeholders to be weighed include those that relate to their: (i) rights and continuity of the relationship to the resource; (ii) historical and cultural relation to the resource; (iii) unique knowledge and skills for the management of the resource; (iv) losses and damage incurred in the management process; (v) degree of economic and social reliance on the resource; (vi) degree of effort and interest in the management of the resource; (vii) concern about equity in the access to and distribution of benefits from the resource; (viii) compatibility of their activities and interests; and (ix) present and potential impact of their activities on the resource.

Any stakeholder analysis will have a certain level of uncertainty. Whenever and however the stakeholder analysis is conducted and used for the effective involvement of stakeholders, the participating representatives will always have their own characteristics. Organizations, as well as the individuals who represent them, belong to social networks and have certain personalities that will influence the involvement of stakeholders. This is a difficult, if not impossible, factor to control.

After such a stakeholder analysis is completed, it will be useful to evaluate the specific methods through which the ecosystem approach can be implemented in these areas. Although the focus of this study is on marine areas beyond national jurisdiction, the approaches described here are not exclusive to that region of the ocean. After all, legal definitions (such as those of EEZs, the high seas and the Area) do not respect the unique characteristics and interconnections of the marine environment. It is clear that the ecosystem approach needs to be implemented across different maritime areas in a manner that takes into account the complex relationships between ecosystems and the species that inhabit them. The preamble to the United Nations Convention on the Law of the Sea highlights this very issue when it states *"Conscious that the problems of ocean space are closely interrelated and need to be considered as a whole."*

One key issue of implementing ecosystem approaches to oceans is the related policy implications and particularly how to provide the right incentives to specific sectors so that sectoral policies are better coordinated and integrated. This would include providing appropriate incentives within specific economic sectors that must be tailored to specific situations. For example, in certain situations, some stakeholders such as those representing the fisheries sector and RFMOs may need to be strengthened, while incentives to other sectors may not be necessary. In other cases, the application of ecosystem approaches to oceans may require modification of the policies directed towards several sectors. Another issue that will require further discussions is who would monitor developments and enforce compliance related to the implementation of ecosystem approaches to oceans.

The ecosystem approach to fisheries (EAF) and integrated marine and coastal area management (IMCAM) hold promise for improved management of the oceans in the future. As the EAF and IMCAM are being more widely applied, the lessons learned, if properly analyzed and documented, can assist in better implementation of the ecosystem approach in the oceans, including in areas beyond national jurisdiction.

Further steps towards the application of the ecosystem approach in marine areas beyond national jurisdiction can be taken through a comprehensive analysis of practical experiences in marine and coastal areas. For example, the lessons learned from approximately 40 years of IMCAM implementation can contribute towards making the ecosystem approach a viable management practice in the world's oceans. Stakeholder participation and the resolution of conflicts among various user groups are central components of IMCAM. Moreover, methodologies are being developed aimed at evaluating the performance of private companies against standards of best practices in biodiversity management. We need to learn from both the successes and failures of the EAF and IMCAM, and from the initial experiences with implementing integrated oceans policies. These lessons learned can be transferred into the emerging field of ecosystem-based integrated oceans management. There is also a need for decision-support tools, such as comprehensive Geographic Information Systems of ocean areas that combine spatial and temporal information on ecosystems as well as species, stakeholder uses, jurisdictional boundaries, and a range of special management measures.

In areas beyond national jurisdiction where the ecosystem approach has been used only in a very limited manner, if at all, the need for further research is critical. As the decline in biodiversity continues throughout the world's oceans, the ecosystem approach provides us with the best available framework for managing multiple threats, ecological uncertainties, human uses and interests. The first step towards implementing ecosystem approaches to oceans will however remain mapping stakeholders and their expectations – a task which has become urgently needed and in which all stakeholders will hopefully participate actively.

1. The ecosystem approach and its relevance to management of ocean spaces, resources and biodiversity

1.1 The importance of integrated management of ocean spaces and resources and of stakeholders' involvement

The results of the recent Millennium Ecosystem Assessment, as well as other global and regional assessments of the marine environment, confirm that biodiversity in the world's oceans and coastal areas continues to decline. Coastal waters are affected by development, habitat modification and nutrient runoff, while overexploitation of fisheries continues unabated both nearshore and offshore. Fishing also affects non-target species through by-catch, causes physical damage to habitats, and affects trophic structures. Finally, the effects of climate change will only continue to escalate in the future, and will combine with other human impacts to increase pressures on the marine environment.

Clearly, traditional management methods and techniques have not been successful in reducing biodiversity loss in the marine environment. Many management actions have been uncoordinated, and focused on a single species, issue or impact. While the need for integrated management approaches, and specifically, for the ecosystem approach, is widely acknowledged, its application is still limited. This may, in part, be due to limited understanding of what exactly constitutes the ecosystem approach, including its provisions for broad participation of all stakeholders. However, the implementation of the ecosystem approach can enable us to better manage the multiple impacts on the marine environment; and provides the best strategy for reducing the rate of biodiversity loss in the world's oceans and for maximizing long-term economic, social and cultural benefits.

While some experience has now been gained in implementing the ecosystem approach in the coastal waters of the world, there have been few attempts to do so in open ocean and deep water environments. In particular, exploitation of resources in marine areas beyond the limits of national jurisdiction has increased considerably during recent years. Management of these resources is made more complicated by the often conflicting interests and objectives of various stakeholders operating both outside and within the limits of national jurisdiction. Successful implementation of the ecosystem approach is dependent on the identification of the different stakeholders, their practices, expectations and interests, and then on managing human uses in a way that respects the complexities and limits of ecosystems and their functioning with a view to long-term sustainability.

This study aims to provide an analysis of stakeholders and their interests in marine areas beyond national jurisdiction [1]. Despite the focus on this specific area, the study is conscious of the interconnected nature of the marine environment, which does not respect artificial lines drawn on a map. Therefore, much of what is contained in the study also applies to areas within national jurisdiction, and the study draws on lessons learned in these areas. The study also recognizes that the scale of application of the ecosystem approach is determined by the nature of the ocean environment, including taking into account ocean gyres, currents and Large Marine Ecosystems (LMEs), and the often long migratory routes of marine species. The decision to focus the study on marine areas beyond national jurisdiction arose from the limited information available about the various stakeholders, their interests, and existing approaches in these remote areas. This information gap needs to be filled if a meaningful and informed debate about multi-stakeholder approaches to ocean management is to take place.

The study emphasizes that 'mapping' stakeholders and their interests is a key aspect of the implementation process of the ecosystem approach. It also shows that in-depth knowledge about the various stakeholders in marine areas beyond national jurisdiction is seriously lacking. Central to this study is the provision of methods to 'map' the various stakeholders in this area, and to analyze their interests and comparative importance. In addition, the study aims to reveal overlapping interests, conflicts and possibilities for synergy among the stakeholders. It should be noted that this study is the result of preliminary research, and was inspired by examples of successful stakeholder involvement in resource management in coastal areas and even in terrestrial areas. Despite the fact that stakeholder participation is a key aspect of successful implementation of the ecosystem approach, stakeholders are not involved in management activities in marine areas beyond national jurisdiction at any significant level. In any event, there is a clear lack of an inclusive approach to the involvement of stakeholders in these areas.

The study recalls relevant definitions of stakeholders; it describes uses of spaces and resources in open ocean and deep sea environments based on publicly-available information, and derives a preliminary assessment of stakeholders on the basis of those uses. The study further examines what methods are available to manage oceans consistently with the ecosystem approach. It examines in depth three existing concepts and practices of the ecosystem approach: the ecosystem approach of the Convention on Biological Diversity (CBD), the ecosystem approach to fisheries, and integrated marine and coastal area management. The complementarity of these approaches is evaluated, the extent of their implementation considered, and, finally, some thoughts are offered about a way forward towards an ecosystem-based and integrated approach to oceans management.

For the purpose of this study, different terms are used while referring to the physical area under consideration. 'Open ocean and deep sea environments' and 'areas beyond national jurisdiction' are used as equivalent terms, as the former are usually characteristics of the latter, and so as to avoid specific legal considerations that may apply to specific parts of the study. Rather, the informa-

tion in the study is meant to deal with the open ocean and the deep seabed in a broad sense of the term without dwelling in detail with any of the uncertainties with regard to the legal status of those areas and the resources therein.

1.2 What is the ecosystem approach and how is it applied in marine areas?

The ecosystem approach is central to the implementation of a number of international and regional agreements, such as the CBD, the Food and Agriculture Organization of the United Nations (FAO) Code of Conduct for Responsible Fisheries, the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR), the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) and the Helsinki Commission (HELCOM) – among others. The United Nations Convention on the Law of the Sea (UNCLOS) and its 1995 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 (UN Fish Stocks Agreement) also contains provisions of relevance to the ecosystem approach. The UN Fish Stocks Agreement calls on participating states to, inter alia, adopt an ecosystems approach, whereby dependent or associated species are taken into account. Demonstrating the international commitment to the ecosystem approach, the 2002 World Summit on Sustainable Development in Johannesburg encouraged the application by 2010 of the ecosystem approach, noting the Reykjavik Declaration on Responsible Fisheries and decision V/6 of the Conference of the Parties to the Convention on Biological Diversity.

During the past years, the international community has started to gain experience in implementing the ecosystem approach. Many sectors, in particular the fisheries sector, are developing guidelines and methods for applying the ecosystem approach in resource management. There is much to be learned from the way the ecosystem approach is being implemented by different sectors and in various biomes. In the marine environment, experience has been gained at different scales ranging from the local to the national and regional, including through management on scales that have clear ecological boundaries, such as LMEs. All of this is consistent with the notion that there is no single correct way to apply the ecosystem approach.

In contrast to sector-specific management approaches, the ecosystem approach is an integrated approach. Integrated approaches provide for multiple uses and the needs of national, regional and local authorities as well as the general public and relevant coastal stakeholders. The most widely applied of these approaches is integrated marine and coastal area management (IMCAM). Integrated oceans management, which extends beyond coastal areas to cover the entirety of Exclusive Economic Zones (EEZs) (and could also cover high seas areas), is also a continuous, dynamic, iterative, adaptive and participatory process, similar to IMCAM. For a truly comprehensive approach, coastal management can be combined with oceans management for integrated coastal and ocean management. National and regional ocean policies can provide a policy framework for undertaking such management approaches.

The CBD provides perhaps the most complete definition for what is meant by the ecosystem approach. The ecosystem approach, as defined in the Convention on Biological Diversity, is *"a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way* .[2]*"* Application of the ecosystem approach will help to reach a balance of the three objectives of the Convention (biodiversity conservation, sustainable use and the equitable sharing of its benefits). It is based on the application of appropriate scientific methodologies focused on levels of biological organization, which encompass the essential processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of ecosystems – a recognition that makes the identification and involvement of stakeholders an essential component of implementing the ecosystem approach.

The ecosystem approach was adopted as the primary framework for action under the CBD in 1995. The CBD ecosystem approach is underpinned by twelve principles and five points of operational guidance, which are elaborated in section 1.3 of this study. The principles are all complementary and interlinked and should be applied together (although not all of them may be applicable to specific situations). They should be translated flexibly to address management issues in different social, economic and environmental contexts. Further work in the context of the CBD led to the development of implementation guidelines, a list of tools, and a case study database to support the implementation of the ecosystem approach. The decisions of the CBD Conference of the Parties also acknowledge the value of other ecosystem approaches, such as those relating to the marine environment mentioned above, and their potential consistency with, and value to, the CBD ecosystem approach [3]. The issue of complementarity between the various ecosystem approaches is examined in further detail in chapter 5.

The developments under the CBD were mirrored by similar developments elsewhere. The failure of traditional fisheries management approaches led the FAO Committee on Fisheries (COFI) to recommend in 1991 that new approaches to fisheries management, embracing conservation and environmental, as well as social and economic, considerations were urgently needed. The FAO was asked to develop the concept of responsible fisheries and elaborate a Code of Conduct to foster its application. This led to the development and adoption, in 1995, of the Code of Conduct for Responsible Fisheries. It also led to the development of technical guidelines to the ecosystem approach to fisheries in 2003 [4].

As already stated, there is no one correct way to apply the ecosystem approach. This study uses the CBD ecosystem approach as a basis for analyzing stakeholders, their interests and existing applications in open ocean and deep sea environments, due to its overarching scope and well-

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developed analytical framework. The CBD ecosystem approach brings together various methods and techniques that can be integrated to address current environmental, economic, social and political needs, while enabling future generations to meet their own needs. It does not preclude the use of other approaches, including the ecosystem approach to fisheries, and in fact acknowledges that such approaches can be complementary and supportive of its implementation. A key component of the CBD ecosystem approach is the need to provide for the participation of a broad range of stakeholders, and to take into account their aspirations, needs and concerns; this topic is subject to further analysis in the next chapters.

1.3 Why the application of an ecosystem approach requires mapping of the stakeholders and their interests

Gill Shepherd, Thematic Leader of the Ecosystem Approach in the IUCN-The World Conservation Union Commission of Ecosystem Management (CEM) has identified five steps to implement the 12 principles of the ecosystem approach:

1. Determining the stakeholders and defining the ecosystem area;
2. Defining the ecosystem structure, function and management;
3. Defining the economic issues;
4. Adaptive management over space;
5. Adaptive management over time [5].

The application of the ecosystem approach recognizes that humans, with their cultural diversity, are an integral component of many ecosystems. Due to the interdependency that exists between the resource and its users, successful resource management depends on the identification and understanding of different stakeholders, their practices, expectations and interests. The need for societal involvement is inspired by the fact that management of natural resources is influenced by many stakeholders and is critical in order to reveal conflicts, identify problems and options, promote cooperation, and enhance compliance [6].

As Shepherd points out, determining the stakeholders and their interests is the first step in making the strategy of the ecosystem approach operational and should be considered as a crucial step in establishing a balance between conservation and sustainable use of, and the equitable sharing of benefits arising from, biodiversity (which are the three objectives of the CBD).

The importance of the involvement of stakeholders is reflected in various principles of the ecosystem approach, as shown in the table below [7]:

CBD ecosystem approach principle	Rationale
Principle 1: The objectives of management of land, water and living resources are a matter of societal choice	Different sectors of society view ecosystems in terms of their own economic, cultural and society needs. Indigenous peoples and other local communities living on the land are important stakeholders and their rights and interests should be recognized. Both cultural and biological diversity are central components of the ecosystem approach, and management should take this into account. Societal choices should be expressed as clearly as possible. Ecosystems should be managed for their intrinsic values and for the tangible or intangible benefits for humans, in a fair and equitable way.
Principle 7: The ecosystem approach should be undertaken at the appropriate spatial and temporal scales	The approach should be bounded by spatial and temporal scales that are appropriate to the objectives. Boundaries for management will be defined operationally by users, managers, scientists and indigenous and local peoples. Connectivity between areas should be promoted where necessary. The ecosystem approach is based upon the hierarchical nature of biological diversity characterized by the interaction and integration of genes, species and ecosystems.
Principle 11: The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices	Information from all sources is critical to arriving at effective ecosystem management strategies. A much better knowledge of ecosystem functions and the impact of human use is desirable. All relevant information from any concerned area should be shared with all stakeholders and actors, taking into account, inter alia, any decision to be taken under Article 8(j) [8] of the Convention on Biological Diversity. Assumptions behind proposed management decisions should be made explicit and checked against available knowledge and views of stakeholders.
Principle 12: The ecosystem approach should involve all relevant sectors of society and scientific disciplines	Most problems of biodiversity management are complex, with many interactions, side effects and implications, and therefore should involve the necessary expertise and stakeholders at the local, national, regional and international level, as appropriate.

Table 1. The principles, objectives and rationale of the ecosystem approach that reflect the need for stakeholder involvement.

Principles 1, 7, 11 and 12 stress the need for societal involvement in the choice of ecosystem and management objectives, and in the range of skills that will be required to implement these objectives. Moreover, the operational guidelines for the application of the ecosystem approach highlight the need and importance of a stakeholder involvement, in particular:

- **Guideline 2**
  "Enhance benefit-sharing, which encompasses that benefits flowing from the functions provided by biological diversity should benefit the stakeholders responsible for their production and management;"

- **Guideline 3**
  "'Use adaptive management practices, which recognizes the diversity of social and cultural factors affecting natural resource use;"

- **Guideline 4**
  "Carry out management actions at the scale appropriate for the issue being addressed, with decentralization at the lowest level, as appropriate, and considering that where common property resources are involved, the most appropriate scale for management decisions and actions would necessarily be large enough to encompass the effects of practices by all relevant stakeholders;"

- **Guideline 5**
  "Ensure intersectoral cooperation and call for increased intersectoral communication and cooperation at a range of levels (government ministries, management agencies, etc.)."

All of these guidelines and principles hold a strong need to know which actors and stakeholders are operating in the ecosystem area and what their interests and expectations are. Stakeholder involvement is accordingly an essential part of the ecosystem approach. However, neither the principles nor the operational guidelines of the ecosystem approach provide criteria for identifying and evaluating stakeholders (and their interests), despite the fact that this will be necessary in practice. Therefore, societal involvement requires a stakeholder analysis [9].

2. Mapping stakeholders and their interests by use of a stakeholder analysis

2.1 What is stakeholder analysis and why is it important

Stakeholder analysis can be defined as:

"An approach and procedure for gaining understanding of a system by means of identifying the key actors and stakeholders in the system, and assessing their respective interests in that system [10]*."*

Stakeholder analysis refers to a range of tools for the identification and description of stakeholders, their interrelationships, current and (potential) future interests and objectives [11], and examines the question of how and to what extent they represent various segments of society.

Stakeholder analysis originated in the management sciences. It has now evolved into a field that incorporates economics, political science, game and decision theory and environmental science [12]. Stakeholder analysis is also a central theme in conflict management [13].

As an approach to natural resource management, stakeholder analysis is essential in understanding the complexity and compatibility problems between stakeholders and their objective(s) vis-à-vis the resources of ecosystems [14]. In conflicts over natural resources, stakeholder analysis provides a framework for examining who is involved, where their interests lie, and how they relate to each other. Such an analysis can lead to a better understanding of who is affected and who would influence the way natural resources are managed [15].

There are several reasons for carrying out a stakeholder analysis:

1. Better understanding of the complexity of the ecosystem;
2. Understanding of the human influence on the ecosystem and its management;
3. Examining the compatibility and/or (potential) conflicts of multiple use objectives;
4. Identifying, predicting and resolving areas of conflict;
5. Discovering existing patterns of interaction [16].

Furthermore, stakeholder analysis provides an opportunity to deepen mutual understanding about the issues at hand, explore and integrate ideas together, generate new options and solutions that may not have been considered individually and ensure the long-term availability of resources to achieve mutual goals [17]. In addition, stakeholder involvement can increase stability in a complex environment and expand capacity rather than diminish it under changing circumstances. This approach is increasingly important within the context of ocean use management and zoning so as to avoid incompatible uses, resolve conflicts and promote ecosystem-based management.

Stakeholder analysis has been applied successfully in coastal areas to conserve biodiversity, enhance sustainable development, and improve a fair and equitable sharing of the benefits derived from the resources used. There are successful examples of stakeholder analysis for the management of coastal areas such as the Partnerships in Environmental Management for the Seas of East Asia or PEMSEA programme, sponsored by the United Nations Development Programme and the International Maritime Organization, which involves most of the countries bordering the seas of East Asia. The methodological considerations presented below therefore take into account the experience of stakeholder analysis in the coastal areas and the need to adapt such methodologies to the specific characteristics of marine areas beyond national jurisdiction.

2.2 Conceptual and methodological considerations when conducting a stakeholder analysis

2.2.1 Concepts and definitions

Definitions of, and distinctions among, community, actor, user, and stakeholder can be found throughout the public participation literature, although the terms are not applied consistently.

The term '**stakeholder**' is often associated with corporate management and was first recorded in 1708 as *"a person who holds the stake or stakes in a bet.* [18]*"* Freeman defines a stakeholder as *"any group or individual who can affect, or is affected by, the achievement of corporations' purposes.*[19]*"* In the context of natural resource management, however, Röling and Wagemakers define stakeholders as *"natural resource users and managers* [20]*."* In the more specific context of marine protected areas, stakeholders are described as *"anyone who has an interest in or who is affected by the establishment of a protected area* [21]*."*

Pomeroy provides a more holistic definition of stakeholders and describes them as *"individuals, groups or organizations who are in one way or another interested, involved or affected (positively or negatively) by a particular project or action toward resource use.* [22]*"* Stakeholders may include groups affected by management decisions, groups concerned about the management decisions, groups dependent upon the resources to be managed, groups with claims over the area or resources, groups with activities that impact on the area or resources and groups with, for example, special seasonal or geographic interests. Pomeroy continues by stating that stakeholders often hold considerable political and/or economic influence over the resource, based on their geographical proximity to the resource, their historical dependence and association with it, institutional mandate, economic interest, or a variety of other concerns [23].

Another commonly used term is '**community**.' Communities are social actors in themselves and provide the most natural and effective unit of identity, integration and defense for many underprivileged groups and individuals. Yet, communities are not homogeneous entities, and their internal subdivisions should be recognized. In other

words, while keeping their basic cohesion and identity, a plurality of values, interests and concerns should be recognized within any community [24].

However, Pomeroy identifies communities as entities that include a variety of stakeholders, who can be classified into four categories:

1. Resource users (for example: fishers, oil and gas exploiters, etc.);
2. Government stakeholders (international, national, regional, local);
3. Other stakeholders (civil society members, equipment builders, business people, users/consumers, etc.)
4. Change agents (non-governmental organizations (NGOs), academic and research institutions, development agencies, donors etc.) [25] .

Stakeholders can be of any form, size and capacity. They can be individuals, organizations, or unorganized groups. In most cases, stakeholders fall into one or more of the categories mentioned above.

Other terms are used interchangeably with stakeholder in colloquial language, but with slightly different connotations. For example, systems analysts refer to an '**actor**' as *"a person who carries out one or more of the activities in the system* [26]*,"* while others refer to '**institutional actors**', describing them as *"a community, a public entity, a group or an individual who organizes itself, takes action to gain social recognition of its own interests and concerns and is willing to assume some task and responsibility for a given natural resource management unit"* or '**social actors**', which include *"governmental and non-governmental institutions, groups and private individuals, local communities and outsiders with entitlements to local resources, bearing important complementary capacities for natural resource management* [27]*."*

2.2.2 Methodological considerations

2.2.2.1 General considerations

Stakeholder analysis seeks to differentiate and study stakeholders. Seven major attributes are important for stakeholder analysis in natural resource management:

1. The various stakeholders related to the natural resource;
2. The group/coalition which they belong to and can reasonably be associated with;
3. The kind and level of interest (and concerns) they have in the natural resource;
4. The importance and influence that each stakeholder has;
5. The stakeholders' position towards the use or conservation of the natural resource;
6. The multiple 'hats' they wear;
7. The networks to which they belong [28].

Once key stakeholder groups are identified, it is important to find out what their interests and concerns are and how they are positioned towards the resource. The interests, concerns and positions of the various stakeholders will differ as a result of factors including tenure, ownership, history of use, social organization, values and perceptions, and pattern or type of use [29].

Although stakeholders must be defined broadly in order to capture a wide range of groups and individuals [30] , it is important to emphasize that they are also often oversimplified, suggesting that interests, experiences, needs and expectations are homogenous among a given group of people. The reality is far more complex. For example, one reviewer of this study referred to the wide variety of views, interests and stakes within the fishing community, depending on their location, target fish, gear type, size of vessel, etc. Therefore, methods used in stakeholder identification and analysis must at least address and at best reveal this complexity, by describing and interpreting the many differences that exist among a certain group of stakeholders [31]. Moreover, due to the complexity of the ecosystem, some stakeholders can also easily be missed, as for example illegal harvesters [32].

After key stakeholders with interests in the proposed ecosystem are identified, they should be weighed as primary, secondary or tertiary stakeholders [33]. In this regard, some stakeholders may be weighed as more important than others, based on considerations and criteria such as:

1. Existing rights to marine and coastal resources;
2. Continuity of relationship to the resource (for example: resident fisher versus migratory fisher);
3. Unique knowledge and skills for the management of the resources at stake;
4. Losses and damage incurred in the management process;
5. Historical and cultural relations to the resources;
6. Degree of economic and social reliance on the resources;
7. Degree of effort and interest in management;
8. Equity in the access to the resources and the distribution of benefits from their use;
9. Compatibility of the interests and activities of the stakeholders;
10. Present or potential impact of the activities of the stakeholders on the resource base [34].

Those who score high on several of these considerations and criteria may be considered 'primary' stakeholders. Secondary and tertiary stakeholders may score on only one or two of them and be involved in a less important way [35]. In the context of terrestrial and coastal management, Shepherd describes primary stakeholders as *"those who are most dependent upon the resource, and most likely to take an active part in managing it,"* while secondary and tertiary stakeholders are overpowerful voices that may include local government officials and those who live near the resource but do not greatly depend on it (secondary); and national level government officials and international conservation organizations (tertiary) [36]. The extent to which this framework applies in areas beyond national jurisdiction should be based on an analysis of the considerations and criteria described above.

2.2.2.2 Research issues

A reliable stakeholder analysis requires research. Due to its nature, the differentiation and distinction among stakeholders will often be based on qualitative criteria that are difficult to generalize. Often, this kind of information will be difficult to collect through conventional research done by outside scientists and specialists.

One method to collect data on stakeholders and their attributes in a comprehensive and efficient manner is to conduct interviews with experts knowledgeable about stakeholders or directly with the stakeholders themselves. Such methodology is known as participatory research approach. This working method is the most commonly used in the field of stakeholder analysis and is considered as the best method for a successful outcome [37]. However, it is important to note that the use of participatory research does not exclude conventional research methods[38]. Contrary, the stakeholder analysis for marine areas beyond national jurisdiction will depart from an overview of existing resource uses and activities gained through conventional scientific research [39].

2.3 Stakeholder mapping

A common way to present the results of a stakeholder analysis is by use of a matrix. For all identified space and resource uses (for example shipping, fisheries, mining and drilling, oil and gas exploitation), the matrix provides an overview of the various stakeholders, their interests, influence, importance, etc. Such a matrix is the product of a stakeholder analysis and can be referred to as 'stakeholder mapping' as it maps who is doing what and where. Chapter 3 illustrates the main uses of ocean spaces and resources, while chapter 4 attempts at producing a stakeholder map based on such uses.

3. Who are the stakeholders in marine areas beyond national jurisdiction? A preliminary analysis of stakeholders' uses of the ocean spaces and resources

3.1 The importance of defining uses of ocean spaces and resources

An important step towards defining ocean stakeholders is to identify and analyze their uses of ocean spaces and resources. The report of the Secretary-General on oceans and the law of the sea at the Sixty-first session of the United Nations General Assembly suggests that, in general, the application of an ecosystem approach includes inter alia that human activities that affect or might affect the ecosystem be identified and managed in an integrated manner that takes account of synergistic and cumulative effects on the physical and biological components of the ecosystem and their interaction [40].

The report of the Secretary-General on oceans and the law of the sea lists the following activities that should be managed, and that should be subject to environmental impact assessments to determine their effects on marine ecosystems and to enable mitigation measures to be taken: land-based industries using or producing hazardous substances; agricultural runoff that could result in eutrophication; coastal developments; port construction and operation; construction and placement of installations and structures on the seabed; extraction of marine aggregates, such as sand and gravel; dredging of harbors and channels and disposal; offshore oil and gas exploration and production; seabed mining; waste disposal; scientific research; carbon sequestration; maritime transport activities; tourism; the laying of pipelines and cables; capture fisheries, aquaculture and shellfish harvesting.

Although the ocean constitutes in principle a three-dimensional continuum between shallower and deeper and between coastal and marine areas, scientific studies have demonstrated that certain uses of ocean spaces and resources pertain (not exclusively, but quite specifically) to marine areas beyond national jurisdiction and affect these areas more than other uses. This chapter will therefore focus on those uses (both current and planned uses) the impacts of which concern mostly areas beyond national jurisdiction.

3.2 Current human uses of marine areas beyond national jurisdiction

3.2.1 Shipping

Shipping, intended as sea transport and related activities, is central to the world trade economy as it represents the main means for transporting goods. Related activities include ship-building, ship-owning and ship-operating (including the supply of sea-going manpower), port services, ship-repair, and recycling. Other activities less directly related to shipping are ensuring the safety of life at sea, ensuring the safety of navigation and ensuring the protection of the marine environment [41].

According to the United Nations Conference on Trade and Development (UNCTAD) Review of Maritime Transport 2005 [42], trends in shipping are positive as a consequence of an increase in the world seaborne trade. In 2004, there was an increase of 4.5 percent in the world merchant fleet, the total of which corresponded to 895.8 deadweight tons. The merchant fleet registered in developed countries expanded by 4.9 percent, and that registered in major open-registry countries by 11.5 percent. Twenty-seven percent of all ships were registered in developed countries, 45.1 percent in major open-registry countries. In developing countries, the merchant fleet also expanded (there was a 14.6 percent increase in Asian countries alone).

The UNCTAD Review states that 73.3 percent of the total world fleet is composed of oil tankers and dry bulk carriers and that these two fleets increased by 6.1 percent and 4.2 percent, respectively; the container ship fleet and that of liquefied gas increased by 8.4 and 7.6 percent, respectively.

The Review shows positive trends in seaborne trade, which increased by 4.3 percent (5.8 percent in 2003).

Trends in the productivity of the world fleet were steady, and there was a decrease in the world total surplus capacity.

The volume of seaborne crude oil trade increased by 4.2 percent; there also was an increase of 7.6 of the main bulks (iron ore and coal). Regionally, the Asia-Europe freight market increased significantly westward (10.2 percent), while increases in the trans-Pacific and trans-Atlantic routes were limited.

The world contained port traffic expanded by 9.6 percent in 2003. The overall costs of seaborne trade decreased to 5.4 of the world total freight payments as a proportion of total import value in 2003 (5.5 percent in 2002).

Overall, shipping is indeed a flourishing and very active industry.

3.2.2 Capture fisheries and aquaculture

The Food and Agriculture Organization of the United Nations (FAO) publishes every two years a compendium of information, data and policy advice on the status of capture fisheries and aquaculture in the world (The State of World Fisheries and Aquaculture, SOFIA).

The SOFIA 2004 report [43] states that the 2002 global production from capture fisheries and aquaculture was of about 101 million tons of food fish (76 percent of the total production), corresponding to a per capita supply of 16.2 kg. In that year more than 2.6 billion people derived at least 20 percent of their animal protein intake from fish.

The report shows that overall the reduction in fish capture has been compensated by an increase in aquaculture production. Regional patterns in capture fisheries were noted: a reduction in the Northwest and Southeast Pacific, Eastern Central and Southwest Atlantic; an increase in the tropical regions of the Indian and Pacific Oceans, Northwest Atlantic and in the Northeast Pacific; and steady capture values in the Northeast Atlantic and Mediterranean.

SOFIA 2004 confirms that the global potential for marine capture fisheries has been reached and that global production from aquaculture continues to grow (the 2002 aquaculture production was of 51.4 million tons and 6.1 percent higher than in 2000, but 57.7 percent of that production derived from freshwater aquaculture).

Trade based on fish and fish products increased by 5 percent from 2000 to a total of 58.2 billion USD, but according to the report this trend is unlikely to be repeated.

With specific regard to deep sea resources, statistics are not easy to establish due to contradictory technical delimitations of the areas where deep sea fish is to be found and the behavioral biology of many deep sea fish species.

Generally speaking, some of the past technological difficulties of deep sea fishing have been overcome, which has resulted in an increase of deep sea landings from 1.2 percent in 1952 to 4.7 percent in 2002, globally. The SOFIA 2004 report states that several deep sea fish are vulnerable to depletion. Most of the commercially-relevant fish species in the deep sea are exploited through bottom trawling in seamount, cold corals and ridge regions (which has both negative ecological effects and long-term economical impacts).

According to the report, in terms of fishing capacity, most of the world fishing fleet was to be found in Asia (about 85 percent of decked vessels, out of 1.3 million decked vessels worldwide, 50 percent of powered undecked vessels and 83 percent of non-powered vessels). Europe, with 8.9 percent of the world's decked vessels, North and Central America (4.5 percent), Africa (1 percent), South America (0.6 percent) and Oceania (0.2 percent) followed.

Large marine fishing vessels (more than 100 gross tons) remained stable (around 24,000 vessels). In 2003, such vessels were owned by the Russian Federation (24 percent), Japan (7 percent), the United States (7 percent), Spain (6 percent), Panama and Belize (which are open-registry countries) (6 percent), Norway (3.5 percent), Ukraine (3 percent) and 4.4 percent were of unknown flag. An overall negative trend in the size of the fishing fleet size of major fishing countries was reported; the report also refers to overcapacity in the world's industrial tuna fishing fleets.

The FAO maintains the High Seas Vessels Authorization Record, which as of mid-2004 counted 5,517 vessels. The SOFIA 2004 report states that only 19 of the 30 Parties to the Compliance Agreement (which is part of FAO's Code of Conduct for Responsible Fisheries) have provided the information required on vessels authorized to fish on the high seas.

An analysis of the fishing vessels that changed their flag state in 2003 confirmed that the flag of convenience practice continues.

According to SOFIA 2004, the world total demand for fish and fishery products will expand and reach 183 million tons by 2015, which would represent an annual growth rate of 2.1 percent compared with 3.1 percent during the previous 20 years. Almost half of the total increase in demand for food will depend from population growth and the rest by development demands. These demands will be largely met from and increase in the total world fish production up to 172 million tons in 2015, essentially thanks to an increase in world aquaculture production, which will account for almost 40 percent of the global fish production.

In trade-related terms, SOFIA 2004 indicates that developing countries will first increase their net fish exports up to 2010 (10.6 million tons), which will then stabilize as a consequence of the domestic demand. The largest fish net exporter will continue to be Latin America and the Caribbean, but Africa is expected to become an exporter by 2010. Asia will reduce its net imports, but within Asia, China is expected to become an exporter due to its expanding capacity in aquaculture production. North America will increase, Western Europe will reduce, and Japan will maintain their imports.

The report foresees that there will be a global shortage of supply of fish in the future, partly compensated by the rise in the price of fish. Global growth in world fish production will decrease from the rate of 2.9 percent per year (which is the rate recorded during the past two decades) to 2.1 percent per year up to 2015. Global fish production in developing countries will depend mostly on aquaculture, but the trend in capture fisheries is also expected to be positive (1 percent). These counties will increase their share in world fish production from 75 percent in 1999/2001 to 81 percent by 2015, while capture fisheries in developed countries will stagnate.

A specific subset of capture fisheries is illegal, unreported and unregulated fishing (IUU). The recently-published final report of the High Seas Task Force defines IUU as fishing that takes place where vessels operate in violation of the laws of a fishery (illegal); that has been unreported or misreported to the relevant national authority or regional organization (unreported), in contravention of applicable laws and regulations; and that is conducted by vessels without nationality flying the flag of a country that is not party to the regional organization governing the particular fishing area or species, or that is conducted in areas or for fish stocks where there are no conservation and management measures in place (unregulated) [44].

In addition to its adverse ecological impacts, the Task Force reports that the economic and social costs of IUU are significant and result in increased costs, lower employment, lower incomes and lower export revenues for legal fishers and adverse effects on the livelihoods of developing country fishing communities due to the reduction of the resources on which those livelihood systems are based.

Overall, the capture fisheries sector continues being affected by shortage of resources, mainly due to unsustainable exploitation practices and underlying causes related to fisheries governance.

Species Group		IUU Annual Value (US million estimated)	Legitimate Fishery Annual Value (US million estimated)	Gears Used	Areas
Tunas and tuna-like fish	Bluefin	33		Pelagic longline	Southern Pacific and Indian Oceans
	Skipjack, yellowfin, albacore, bigeye	548		Pelagic longline, seines	Worldwide
Sharks	Sharks	192		Pelagic longline	Worldwide
Groundfish	Toothfish	36	427	Demersal longline	Southern Ocean
	Cod high seas	220	1872*	Bottom trawl	North Atlantic
	Redfish	30	274	Bottom/semipelagic trawl	North Atlantic
	Orange roughy/alfonsino	32	453	Bottom/semipelagic trawl	Southern Indian and Pacific Oceans
Other pelagic resources	Jack mackerel	45		Seines and pelagic trawls	Southeast pacific
	Squid	108		Jig	South Atlantic and Pacific
Total		1244			

* Estimated from FAO 2003 catches of Atlantic cod (including high seas)
Table 2. Estimates of annual values of high seas IUU catches (source: High Seas Task Force).

3.2.3 Marine scientific research

In a recent paper on research vessels (RVs) as a tool for climate observations, Gould and Smith state that *"[r]emarkably, there is no systematic record of RV tracks."* The authors used proxies (about 80,000 meteorological reports) from 154 RVs in 1997 to demonstrate that the latter have an absolute global coverage (assuming that the 1997 year is typical) [45].

There seems to be a need for a comprehensive tool organizing information on vessels' tracks and the type and positions of observations made. Such a need is corroborated by the difficulty for global observing systems of keeping such benchmarks for global sustained operational observations, let alone individual research efforts [46]. Gould and Smith think that while releasing information about cruises before they take place can be a sensitive issue, releasing it after the cruise has taken place should not constitute a problem, hence filling this information gap should be feasible.

There are useful databases available that allow searching for information on research cruises around the world. One of these, maintained by the University of Delaware College of Marine Studies, provides information on research cruise schedules, ship specifications and contact information [47].

The website http://www.sailwx.info, hosted by a consortium of several research and operational oceanographic and meteorological facilities, allows live tracking of ships worldwide (these include oceanographic research ships, cruise ships and ocean liners, cruising yachts and tall ships) [48]. These ships contribute weather reports and track maps, reported via the World Meteorological Organization; the latter, hosts the Voluntary Observing Ship (VOS) system, which is a voluntary system of meteorological and oceanographic observations and therefore cannot be considered as a systematic record of RVs tracks [49].

A 2005 study on bioprospecting in the deep seabed showed that, according to information on research specifically devoted to the deep sea environment reported in the InterRidge Mid-Ocean Ridge Backarc Basin (MOR & BAB) Cruise Database, 432 cruises were recorded in the period 1992-2003; these cruises were led mainly by the US (196 cruises), France and Japan (67 cruises each), Germany (34 cruises), Canada (27 cruises), Russia (13 cruises) and Portu-

1997 ICOADS Meteorological Reports
Research Vessels by Call Sign

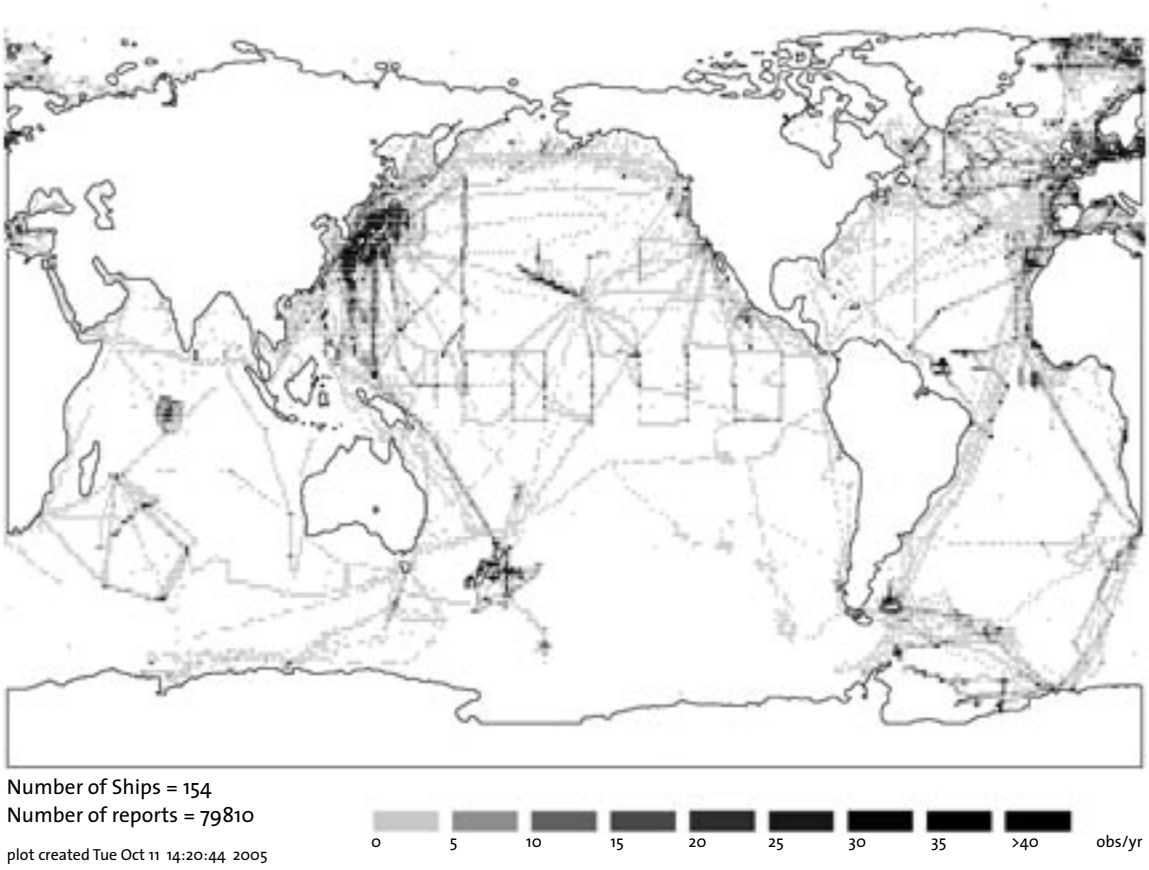

Figure 1. Number of marine reports from 154 research vessels in the International Comprehensive Ocean-Atmosphere Data Set in one-degree bins during 1997 *(courtesy of Gould and Smith).*

gal (11 cruises) [50]. Most likely, these were underestimates of marine scientific research focusing on the deep seabed, as participation in the InterRidge initiative is voluntary.

The above-mentioned scientific cruises for the purpose of ridge-related research were ubiquitously distributed: sites in the Northeast Pacific, the Mid-Atlantic and the Western Pacific were the ones most visited, while sites in the Indian Ocean and in the Arctic and the Antarctic were visited significantly less. Sites visited fell evenly within and beyond national jurisdiction.

Several international research programmes are being implemented or planned, examples of which are the Census of Marine Life, whose mission is to assess and explain the diversity, distribution and abundance of marine life [51] and the European Science Foundation-sponsored EUROMARGINS programme [52].

Scientific monitoring programmes are also being undertaken, including an international programme on Monitoring the Mid-Atlantic Ridge (MOMAR), sponsored by the European Commission [53], the North-East Pacific Time-series Undersea Networked Experiments (NEPTUNE)[54] , the European Sea Floor Observatory Network (ESONET)[55], the New Millennium Observatory (NEMO) [56], and Japan's Advanced Real-time Earth Monitoring Network in the Area (ARENA) [57].

Scientific educational expeditions also take place, for example, the American Museum of Natural History Black Smokers Expedition series [58] and the REVEL expedition [59].

A new area of applied marine scientific research is that of identification, development and commercialization of new products based on natural compounds or 'bioprospecting'. This area shows positive trends and calls for a clarification on the legal status of the resources being exploited, as well as on the relation between marine scientific research and bioprospecting [60].

Another area of research whose impacts on the seabed should be clarified relates to palaeoceanography, for example the extraction of cores.

The dramatic 26 December 2004 tsunami event in South Asia has boosted interest in seismic surveying, the set up of

tsunami early warning systems and related public education and outreach activities on the impacts of tsunamis and how to deal with a tsunami event.

3.2.4 Tourism

A 2003 report presenting an analysis by the Secretariat of the World Tourism Organization on cruise tourism activities highlights the changing nature of cruises, which have shifted from transport to 'floating hotels or resorts' (with the advantage of mobility) [61].

The report refers to a process of 'globalization of the North American cruise experience' because, when cruise tourism started in the Seventies, it targeted a North America and Caribbean clientele. In 2000, the business reached 10 million trips. In the next five years, the demand by North America alone was of 43.5 million trips, with Europe far behind at 2 million trips, and a small demand shared by other countries. From 1989 to 2000, the cruise demand has shown a continuous positive trend in the world as a whole, as well as in the three above-mentioned regions (North America, Europe, and rest of the world). Future growth rates of the cruise tourism sector account for 8 percent yearly.

Four main groups control the market: Carnival co., Royal Caribbean, P&O Princess and Star Cruises.

The growth of the cruise tourism industry is therefore expanding. However, there are issues related to cruise ship wastes, whose disposal is generally unregulated, as well as adverse economic, social and environmental impacts on the communities they visit. For instance, cruise tourists increase population massively on docking days and thereby affect the infrastructure of an area; however, they fail to put money into the community as they return to their ships for accommodation and some of the meals.

In addition to cruise tourism, new forms of tourism in marine areas beyond national jurisdiction are emerging, namely tourism in the deep sea [62]. This new but potentially growing tourism area was one of the subjects of a Workshop on Planning the Management of Deep-sea Hydrothermal Vent Fields Marine Protected Areas in the Azores Triple Junction, which took place in Horta, Portugal from 18 to 20 June 2002. One of the workshop objectives was to strike a balance between conservation of the sites and activities such as tourism and scientific research.

3.2.5 Oil and gas extraction

The British Petroleum 2005 Statistical Review of World Energy reports that the year 2004 showed the strongest growth rate for all fuels in global energy consumption (4.3 percent) since 1984 [63]. The fastest growing fuel was coal (6.3 percent), while the consumption of oil and natural gas increased by 3.4 percent and 3.3 percent, respectively. The International Energy Agency reports that in 2003 oil and natural gas accounted for 34.4 percent and 21.2 percent of the world total primary energy supply [64].

Against this background of high demand for energy, and despite the strong growth of hydroelectric and nuclear energy (5 percent and 4.4 percent, respectively), extractive activities for the purpose of energy development remain a major economic industry.

In marine areas afar from the coastline, the main extractive activity related to energy production is offshore oil and natural gas. There is also potential for the extraction and exploitation of gas hydrates from the deep. However, these compounds (which, if used, would have a greenhouse effect much more powerful than that of CO2) are still mainly the object of marine scientific research.

In 1996, the International Energy Agency and the Organization for Economic Cooperation and Development published a review of global offshore oil prospect [65]. The report states that, between the end of the 1980s and the beginning of the 1990s, technological improvements, declining costs and increased efficiency of offshore oil exploration and production combined with changes in the relationships between companies and between these and governments have overturned the foreseen decline in oil production in non-OPEC countries and their dependence from OPEC ones, and concludes that no decline in non-OPEC countries would be observed by the end of the past century.

At the time when the report was published, the largest offshore oil producing area in the world was the North Sea, where production was estimated to reach 7.5 million barrel a day by 2000. According to the study, regional trends of offshore oil production were expected to be all positive (North America, South America, Persian Gulf, West Africa, East Asia, Australasia, Caspian Sea and South Asia – the latter, only slightly), with the exception of North Africa.

3.2.6 Mining

The second major extractive activity in the oceans is mining. Mining in the deep seabed concerns three main types of mineral resources: polymetallic nodules, polymetallic sulphides and cobalt-rich crusts. These resources are considered as common heritage of humankind and their exploration and exploitation are organized and controlled by the International Seabed Authority (ISA) and managed according to relevant provisions under the United Nations Convention on the Law of the Sea (under the Convention, the seabed and ocean floor and subsoil thereof beyond the limits of national jurisdiction are referred to as 'the Area').

Prospective miners must submit a plan of work for prior approval by the Council of the ISA, indicating two sites proposed for exploration and/or exploitation.

Since the entry into force in 1996 of the 1994 Agreement relating to Part XI of UNCLOS, which includes the regime applicable to the Area, contracts were issued to seven applicants sponsored by China, France, India, Japan, Korea, the Russian Federation, a consortium of several countries (Bulgaria, Cuba, the Czech Republic, Poland, the Russian Federation and Slovakia) and, most recently, Germany, which was granted a contract to explore an area of almost 150,000 square kilometers in the Northeast Pacific Ocean.[66] Contractors provide annual reports to the Authority. The

Authority's Central Data Repository, available at http://www.isa.org.jm, provides information related to on-going and planned mining activities in the Area.

The regime only covers polymetallic nodules, and work is in progress to develop a regime encompassing other mineral resources to be found in the Area. However, the Secretariat of the Authority recognizes that current activities on mining in the Area are essentially research and technology-driven in that deep sea mining so far conducted has proven not to be viable, economically [67, 68] .

The ISA is conducting work with regard to the impacts of mining on biodiversity as well as the relation between non-living and living resources of the Area, an example of which is the workshop on Cobalt-crusts and the Diversity and Distribution Patterns of Seamount Fauna that took place at ISA's headquarters in Kingston, Jamaica, in March 2006.

3.2.7 Deep sea cable and pipeline industry

Cables are normally used for telecommunications and transmission of electric power. The two types of cables are different, but the technology by which they are laid on the ocean bottom is similar. Specialized vessels are used to lay cables and pipelines, usually built to meet the specific needs of the customer. New information technologies and telecom services have resulted in a major demand for cabling, and it is estimated that globally more than 100,000 kilometers of cable are laid on the ocean floor annually. There is an obvious potential conflict between the cabling industry and fishing trawlers in areas where the ocean is less than 1,000 meters deep, which is why cables are normally buried below the ocean floor. [69]

3.2.8 Disposal of nuclear waste or other substances and military uses

Other uses of the ocean spaces are certainly to be accounted. Some are known, such as military uses of the oceans, which can be defined as deterrent in scope, although comprehensive studies on the environmental and other effects of military activities in the oceans are lacking. Others are being considered, such as disposal of nuclear waste, CO_2 [70] and other substances (for the purpose of this study, such experimental uses will not be considered).

One area which may deserve particular attention, for example in the context of a separate study, relates to atmospheric pollution and increasing CO_2 concentrations and their impacts on oceans. These forms of pollution are linked with the research and debate on ocean acidification and the impact that it has on marine life and the ability of the oceans to act as a carbon store. This might be an area where non-adjacent stakeholders need to be involved and in which there may be a need to explore the application of the precautionary approach/polluter pays principles.

3.2.9 Ocean uses by indigenous and local peoples

The main use of the ocean space by indigenous and local peoples in areas beyond national jurisdiction remains navigation. However, this particular use is to be looked at as part of broader cultural systems that do not separate in a clear-cut way or at all the ocean from its constituents (coastal versus marine, pelagic versus benthic, etc.).

In addition, a few traditional deep-water fisheries do exist, such as the drop-line fishery for black scabbard fish (Aphanopus carbo) in Madeira, Portugal [71].

Indigenous peoples and open ocean and deep sea environments: The case of CBD COP 8

At the eight meeting of the Conference of the Parties (COP 8) to the Convention on Biological Diversity in Curitiba, Brazil, in March 2006, the International Indigenous Forum on Biodiversity (IIFB) made two interventions as an input to negotiations on the agenda item related to deep seabed genetic resources and integrated marine and coastal area management.

On March 23, the IIFB representative, in the capacity of a participant from the Pacific caucus within the Indigenous Forum (it was declared beforehand that the statement would be quite specific to the situation of indigenous peoples from the Pacific Islands) stressed the following points: that 50 percent of all seamounts are found in the Pacific region; that volcanic islands where indigenous and local communities live are born from the sea floor; that many of the Northwest Hawaiian Islands are in this stage of life, as waning sea mounts; and that *"[w]e* [indigenous peoples] *often refer to these Northwest Hawaiian Islands as "kupuna," which is our term for elders and ancestors. This means that our island territories end their lives in the deep sea as well. Seamounts are, therefore, our children and our elders, whom we must protect."*

The IFFB representative stated that it supported action to address the very urgent need to conserve biodiversity in areas beyond national jurisdiction, including the prohibition of destructive fishing practices such as deep sea trawling, but declared that the Forum was very concerned about some Parties' underlying reasons for conserving and sustainably using deep seabed and high seas genetic resources by accessing and commercializing them. The Forum warned against the legal interpretation that such genetic resources belong to no one and everyone at the same time.

The IIFB representative informed the COP that *"many Indigenous peoples have always had a significant relationship and body of traditional knowledge related to marine areas, even in what is known under the United Nations Convention on the Law of the Sea (UNCLOS) as the "high seas"* and that *"[u]nlike the UN Law of the Sea, Indigenous peoples do not draw distinctions between*

different areas of the sea and assign different jurisdictions based on miles, such as the 'Exclusive Economic Zone' or the 'high seas'."

The IIFB representative concluded its intervention by stating that *"(...) Indigenous peoples' rights are not specifically or sufficiently recognized and protected within the context of that Convention [UNCLOS] and our participation within that Convention was almost zero. Therefore, we are not comfortable with UNCLOS being the primary regulatory body for this issue."*

With regards to integrated marine and coastal area management, the Forum highlighted that indigenous peoples worldwide are traditional owners of many coastal areas and therefore indigenous peoples are right holders rather than stakeholders and that their right of free prior informed consent must be recognized and protected [72].

The IIFB representative suggested specific language on lack of traditional knowledge of deep seabed biodiversity and the need to *"recognize and respect the traditional knowledge, innovations, and practices of indigenous and local communities relevant to conservation and sustainable use of marine biological diversity."* The Forum also suggested language on an invitation to indigenous and local communities (in addition to Parties, other Governments, research institutions and other relevant organizations) to make available information on traditional knowledge, innovations, and practices beyond national jurisdiction and ensure that the results of such marine traditional knowledge, innovations and practices, when available, are effectively disseminated through international channels, as appropriate, in accordance with international law, and to compile and further disseminate such information through the clearing-house mechanism of the Convention and indigenous and local communities' information networks.

On 28 March 2006, the IIFB representative made a statement aimed at clarifying the spirit of the earlier intervention. The new text referred specifically to *"facilitate and support the full and effective participation of indigenous and local communities in all future processes for the conservation of deep-sea bed genetic resources."* It also referred to a request to the Executive Secretary to *"[i]nvite indigenous and local communities to submit information on traditional knowledge, innovations and practices relevant for the conservation and sustainable use of deep-seabed genetic resources, with a view towards informing Parties, governments, regional and international regulatory bodies, research institutions, industry and all other relevant stakeholders of the ecological, social, cultural, and economic impacts of bottom-trawling, detrimental and destructive practices, extractive industries, and bioprospecting on deep-seabed genetic resources; and compile and analyze the information submitted in accordance with paragraph (a)* [the invitation to indigenous and local communities to submit information on traditional knowledge, innovations and practices relevant for the conservation and sustainable use of deep-seabed genetic resources] *for review by the fifth meeting of the Ad Hoc Open-ended Working Group on Article 8(j) and Related Provisions (...)" with a view to "make recommendations to the ninth Conference of the Parties relevant to the respect, preservation and maintenance of traditional knowledge, innovations and practices relevant for the conservation and sustainable use of deep-seabed genetic resources.* [73]*"*

Clearly, despite the limited direct uses of ocean's spaces and resources in areas beyond national jurisdiction, indigenous and local communities seem to have well-defined expectations as stakeholders (in the general sense of the term as including rightholder) with regard to marine biodiversity in areas beyond national jurisdiction.

Moreover, indigenous claims over resources situated in the deep seabed and possibly in the Area are emerging. Recently, in Fiji, where most of the land is reserved for use by natives, the Viti Landowners and Resources Association (VLRA) claimed rights over oil reserves located in the Bau Basin, Bligh Waters and the Kadavu Basin. This was an initiative of 215 tribal leaders, who met in Suva on 1 March 2006. Talks were intended to be pursued regarding the sovereignty of those resources [74].

3.2.10 Concluding remarks

The analysis presented above is preliminary and therefore purely indicative. There is a need to undertake a more in-depth search of relevant information and to also conduct comparisons of different information and data sets pertaining to similar uses of the ocean spaces and resources in areas beyond national jurisdiction. Some uses have surely been missed in the chapter, such as military uses of the marine space, which would merit a specific quest in itself, due to the historical presence and role of the military sector in the oceans.

Albeit preliminary, the information presented so far confirms that the main uses of ocean spaces and resources in areas beyond national jurisdiction are well known, notably shipping and capture fisheries. However, an integrated approach to the study and management of the ocean's spaces and resources would imply that all actual stakeholders, directly as well as indirectly involved, be identified and consulted in an appropriate manner. This seems to be particularly true for the open ocean, for which information on stakeholders and their interests are limited due to the out-of-reach nature of the area in question. There may be other reasons for the lack of knowledge about those stakeholders than the fact that this is a hard to reach area, such as the desire by some stakeholders to make themselves unknown, in order to continue carrying out their activities (which can be potentially or actually damaging); an example of which is the issue of re-flagging in the case of fisheries. Such gap needs to be filled, if a meaningful debate on multistakeholder approaches to oceans is to take place and informed decisions made.

4. Towards a realistic map of stakeholders' actions and expectations in marine areas beyond national jurisdiction

4.1 The identification of stakeholders and their interests

In coastal and terrestrial areas, stakeholders are often identified through a period of field research, typically using interviews with local individuals. In these areas, restrictions regarding access to the resources provide an important starting point when selecting which stakeholder groups should be contacted and which not.

In the high seas, the access to and exploitation of the resources is open to all states, under the regime of freedom of the high seas; moreover, mineral resources of the deep seabed and its subsoil are considered as a common heritage of mankind, while the legal regime for regulating the conservation and use of living resources in the Area is uncertain. Due to these specific characteristics of marine areas beyond national jurisdiction, there are numerous potential stakeholders who have an interest in these areas. Strictly seen, every individual is a potential stakeholder. However, such a level of detail is neither practical nor desirable: as we have seen in chapter 2, stakeholders are usually groups or organizations including those affected and/or concerned by the management decisions, those dependent upon the resources to be managed, those with claims over the area or resources, those with activities that affect the area or resources and those with special seasonal or geographic interests [75]. An efficient way to identify the stakeholders in marine areas beyond national jurisdiction is therefore to start from the activities and uses occurring in these areas, and which were presented in chapter 3.

It is obvious that the information collected thus far does not provide a comprehensive and in-depth overview of actual uses of, and interests in, ocean spaces and resources in open ocean and deep sea environments. A key question is therefore how to proceed so as to establish a realistic map of stakeholders' actions and expectations in marine areas beyond national jurisdiction.

Relevant literature suggests that stakeholder analysis is best conducted starting with a core group of stakeholders and/or key informants (knowledgeable or important individuals in the community). In practice, the participants of the core group would be asked to identify their own interests and representative characteristics associated with the resource or activity. The core group would also be questioned about who they perceive to be the other main stakeholders, and what the relations among different stakeholders are [76]. This exercise should be seen as a first, initiating step in the process of stakeholder analysis, providing a basis for their further and broader involvement in the following steps. Also, a step-by-step participatory method has the advantage of foreseeing an opportunity to verify the information already collected.

Information on the following issues should be obtained through the following questions:

1. How would you describe your organization's interest in marine areas beyond national jurisdiction?
2. How does your organization represent these interests?
3. What (other) interests should be taken into account when decisions are taken on marine areas beyond national jurisdiction?
4. Who could at best represent these other interests and why?
5. What are the main problems related to marine areas beyond national jurisdiction and what kind of (cooperative) solutions to these problems would you like to propose?
6. What are the key characteristics of an effective consultation on various interests in marine areas beyond national jurisdiction?
7. What would be your expected outcome of an effective consultation process?

An important lesson that should be taken into account is that similar exercises carried out in other areas found that a crucial feature of successful stakeholder analysis is to base it on individual interviews and to depart from the individual stakeholders' concerns instead of trying to gather information during group sessions [77].

The data derived from the questionnaires should make it possible to compile a list of all organizations and groups (or at least the main ones) who have an actual stake in areas beyond national jurisdiction. Further, it should describe what their interests, expectations and perspectives are and, where possible, it should reveal a preliminary view on existing and potential conflicts. Additionally, it should verify the initial set of stakeholders and provide insight on the relationships between them.

However, due to the vastness and complexity of the area under consideration, some stakeholders could easily be missed [78]. The process of stakeholder definition should therefore be as open as possible, and newly identified stakeholders should be treated equally to existing ones.

4.2 Mapping and weighing of stakeholders and their interests

The information derived from the questionnaires should be classified in an objective manner. After the main stakeholders, their actual uses, and interests are identified through the questionnaire, they should be weighed as primary, secondary and tertiary stakeholders. A common way to do this is by use of a matrix, which would also provide an overview of the various groups and stakeholders in the area under consideration.

Important criteria that allow the importance of the stakeholders to be weighed include those that relate to their:

1. Rights and continuity of the relationship to the resource;
2. Historical and cultural relation to the resource;
3. Unique knowledge and skills for the management of the resource;

4. Losses and damage incurred in the management process;
5. Degree of economic and social reliance on the resource;
6. Degree of effort and interest in the management of the resource;
7. Concern about equity in the access to and distribution of benefits from the resource;
8. Compatibility of their activities and interests; and
9. Present and potential impact of their activities on the resource.

Stakeholders that score high on several of these criteria may be considered as 'primary' stakeholders, while those who score on only one or two can be considered as secondary and tertiary stakeholders. Certain of these categories, for example, the ones regarding the dependence on the resource, can be valued as more important than others.

When all information is compiled and verified in the matrix, it may reveal overlapping interests, conflicts and possibilities for synergy development among the stakeholders. The identification of opportunities for synergies can be improved considerably by adding a spatial dimension (both vertical, throughout the water column, and horizontal, for the ocean surface and the deep seabed) to the analysis of the stakeholders' interests.

An example of how the results might be compiled in a stakeholder matrix is shown in the table below.

	Stakeholder Considerations and Criteria										Geographic Interests			
											Pelagic ecosystem			Benthic ecosystem
	Existing rights to high seas resources	Continuity of relationship to resource	Unique knowledge or skills for management of resources at stake	Losses and damages incurred in the management process	Historical and cultural relations to the resource	Degree of economic and social reliance on the resources	Degree of effort and interest in management	Equity in access to the resources and distribution of benefits from their use	Compatibility in interests and activities of stakeholders	Present or potential impact of activities of stakeholders on the resource base	Epipelagic or 'light' zone (surface to 150–200m)	Mesopelagic or 'twilight' zone (200–1,000m)	Bathypelagic or 'dark and cold' zone (from 1,000m downwards)	
Groups of Stakeholders														
Fishing Industry	?	H	H	H	H	H	H	L	L	H				
Seabed Mining Industry	M	L	H	M	L	L	H	L	L	H				
Telecommunications Industry	L	M	H	L	L	L		L	L	M				
Marine Transportation	M	H	H	L	M	H		L	L	L				
Oil & Gas Exploitation	L	M	H	?	L	L		L	L	M				
Pharmaceutical Industry	L	L	H	M	L	L		L	L	M				
Military	?	H	H	M	H	H	H	L	L	M				
Groups Concerned about the Management Decision														
Non-governmental Environmental Organizations	L	L	M	L	H	L	H	H	H	H				
Business Interest Organizations														
Donor Organizations														
National and International Development Agencies														
Groups with Interests Over the Area or Resources														
National Governments														
International Organizations, e.g., fisheries management														
Groups Dependent upon Resources to be Managed														
Research organizations	L	M	H	M	M	L	H	M	H	M				
Groups with Special Seasonal or Geographic Interests														

Table 3. The table above provides an example on how to organize the information available on the uses of spaces and resources of open ocean and deep sea environments, which are characteristic of marine areas beyond national jurisdiction, into the form of a matrix that aims at facilitating stakeholder involvement. The table above is filled on the basis of what the authors assume are the level of interest of the various stakeholders. The objective is to produce a matrix mapping the actual stakeholders, their interests and existing approaches in marine areas beyond national jurisdiction by use of a stakeholder analysis methodology described above. Such a stakeholder map would provide the information necessary for identifying and weighing selected stakeholders for rounds of consultations about, or for involving them in, the management of ocean spaces and resources
(H = high interest; M = medium interest; L = low interest).

The actual interests of the various stakeholders can be much more specific than the matrix above shows. For example, the main focus of bioprospecting activities with respect to deep seabed genetic resources has centered on the microbial communities associated with hydrothermal vents. Research in these environments and derived applications have focused mainly on development of novel enzymes for use in a range of industrial and manufacturing processes as well as of products of commercial interest for use in life sciences research and diagnostics, such as DNA polymerases. This more detailed information can be easily derived from the questionnaire described above and should be compiled in a database additionally to the matrix as a tool for further interpretation of the results collected [79].

However, any stakeholder analysis will have a certain level of uncertainty. Whenever and however the stakeholder analysis is conducted and used for the effective involvement of stakeholders, the participating representatives will always have their own characteristics. Organizations, as well as the individuals who represent them, belong to social networks and have certain personalities that will influence the involvement of stakeholders. This is a difficult, if not impossible, factor to control.

5. The CBD ecosystem approach and other ecosystem approaches used for the management of marine and coastal resources

5.1 Ecosystem approaches used for the management of marine and coastal resources

As described in chapters 2 and 4, the participation of all relevant stakeholders in planning and management processes is an essential prerequisite for successful implementation of the ecosystem approach. The previous chapters provide a first step towards an analysis of stakeholders in marine areas beyond national jurisdiction, and describe, although in a preliminary manner, their interests and expectations.

After such a stakeholder analysis is completed, it will be useful to evaluate the specific methods through which the ecosystem approach can be implemented in these areas. Although the focus of this study is on marine areas beyond national jurisdiction, the approaches described here are not exclusive to that region of the ocean. After all, legal definitions (such as those of EEZs, the high seas and the Area) do not respect the unique characteristics and interconnections of the marine environment. It is clear that the ecosystem approach needs to be implemented across different maritime areas in a manner that takes into account the complex relationships between ecosystems and the species that inhabit them. The preamble to the United Nations Convention on the Law of the Sea highlights this very issue when it states *"Conscious that the problems of ocean space are closely interrelated and need to be considered as a whole."*

Because many different 'ecosystem approaches' exist, it is also useful to look at how compatible they are. The following analysis uses the broad framework of the CBD ecosystem approach as a basis, and evaluates two approaches specific to the marine environment against it. These specific approaches are the ecosystem approach to fisheries and integrated marine and coastal area management. In doing this analysis, it should be kept in mind that one of the basic premises of the ecosystem approach is that there is no 'correct' way to implement it, but that certain principles and guidance should apply. In addition to the conceptual analysis, this chapter also provides information on how widely the two marine-specific approaches are used, and how they are integrated into international and regional agreements.

5.2 Ecosystem approach to fisheries

5.2.1 The ecosystem approach to fisheries and the CBD ecosystem approach

The ecosystem approach to fisheries (EAF) presents a more holistic approach than traditional fisheries management methods, and strives to take into account the structure and functioning of ecosystems and their components, as well as the needs and desires of societies, in the context of sustainable use of marine resources. The EAF was developed following the adoption of the Code of Conduct for Responsible Fisheries in 1995. The resolution through which the Code of Conduct was adopted also requested the FAO *inter alia* to elaborate appropriate technical guidelines in support of the implementation of the Code in collaboration with members and interested relevant organizations. The development of EAF benefited from the 2001 Reykjavik Conference on Responsible Fisheries in the Marine Ecosystem, and culminated in the development of a practical set of technical guidelines by the FAO in 2003 [80].

The EAF is defined as follows:

"The ecosystem approach to fisheries (EAF) strives to balance diverse societal objectives, by taking account of the knowledge and uncertainties of biotic, abiotic and human components of ecosystems and their interactions and applying an integrated approach to fisheries within ecologically meaningful boundaries."

The EAF definition is less comprehensive than the description of the CBD ecosystem approach. This is not surprising considering that the former is a sectoral approach, and the latter an overarching framework. Both take into account environmental interactions and societal issues, the need for knowledge about the ecosystem and its components, and the existence of scientific uncertainties. One primary difference is that while the CBD ecosystem approach is seen as a strategy to achieve conservation, sustainable use and the equitable sharing of benefits, the EAF definition only focuses on sustainable use.

Both the CBD ecosystem approach and the EAF are guided by a set of principles. In the case of EAF, these principles are concepts that have been expressed in various instruments and conventions, and in particular in the Code of Conduct for Responsible Fisheries. Accordingly, fisheries management should respect the following principles:

- Fisheries should be managed to limit their impact on the ecosystem to the extent possible;
- Ecological relationships between harvested, dependent and associated species should be maintained;
- Management measures should be compatible across the entire distribution of the resource (across jurisdictions and management plans);
- The precautionary approach should be applied because the knowledge on ecosystems is incomplete; and
- Governance should ensure both human and ecosystem well-being and equity.

The following table provides an analysis of the consistency between the principles of the CBD ecosystem approach, and the EAF. In considering the EAF, the entire content of the FAO technical guidelines relating to the EAF was taken into account [81].

CBD ecosystem approach principle	Consistency with the EAF
Principle 1: The objectives of management of land, water and living resources are a matter of societal choices.	One of the central components of EAF is the recognition of a wide range of societal objectives for, and values of, fishery resources within the context of sustainable development. The purpose of EAF is to plan, develop and manage fisheries in a manner that addresses the multiple needs and desires of societies, without jeopardizing the options for future generations to benefit from the full range of goods and services provided by marine ecosystems.
Principle 2: Management should be decentralized to the lowest appropriate level.	The FAO Technical Guidelines relating to EAF propose devolution of decision-making and management responsibility to organizations or groups lower than central national level (e.g. coastal communities) where feasible, in order to improve compliance, improve the cost-effectiveness of management, make use of traditional management practices and other such means. While some devolution is seen as desirable, this must be reconciled with the need to ensure that management decisions and actions are coordinated and consistent at the higher levels required by EAF in each case. This will require effective international structuring to coordinate decisions and actions at the broader and geographical fishery scales required by EAF.
Principle 3: Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.	While the EAF principles and technical guidelines consider the relationships between harvested, dependent and associated species, as well as the relationship between species and the ecosystems they exist in, the impacts of management actions on adjacent ecosystems are not specifically considered. However, the impacts of fisheries on the ecosystem and on non-target species are considered.
Principle 4: Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem-management programme should: a) Reduce those market distortions that adversely affect biological diversity; b) Align incentives to promote biodiversity conservation and sustainable use; c) Internalize costs and benefits in the given ecosystem to the extent feasible.	The overarching goal of EAF is to implement sustainable development, recognizing the wider economic, social and cultural benefits that can be derived from fisheries resources and the ecosystems in which they occur. The FAO Technical Guidelines relating to EAF contain specific information about quantitative valuation of ecosystem goods and services and about costs and benefits of EAF. The latter includes recognition of the fishing industry's responsibility for paying for some of the costs of fishery management. However, the discussion also includes broader consideration of the costs and benefits of fisheries. Finally, an annex (Annex 5) of the FAO technical guidelines is devoted to consideration of economic instruments for an ecosystem approach to fisheries. Much of this discussion is devoted to positive incentives (such as user rights) to promote sustainable fisheries. There is little discussion on reduction of market distortions and perverse incentives. The focus is sustainable fisheries rather than conservation and sustainable use of biodiversity in general.
Principle 5: Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.	The following two EAF principles relate directly to maintaining the capacity of an ecosystem to provide services: • Fisheries should be managed to limit their impact on the ecosystem to the extent possible • Ecological relationships between harvested, dependent and associated species should be maintained
Principle 6: Ecosystem must be managed within the limits of their functioning.	The FAO EAF guidelines recognize that our ability to predict ecosystem behavior is inadequate, and accept that all ecosystems have limits that, when exceeded can result in major, possibly irreversible, ecosystem change. Maintaining biological diversity is regarded as being of major importance to ecosystem functioning and productive fisheries, as well as providing flexibility for future uses.
Principle 7: The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.	The third EAF principle states that management measures should be compatible across the entire distribution of the resource (across jurisdictions and management plans). In addition, the guidance elaborates that EAF can be applied on the level of a fishery, an estuary, a large bay, a coastal zone, and EEZs or a Large Marine Ecosystem (LMEs).

CBD ecosystem approach principle	Consistency with the EAF
Principle 8: Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term.	The FAO fisheries management guidelines recognize timescales mainly in relation to fishery management processes: a policy cycle of about 5 years, a fishery management planning and strategy cycle of 3-5 years and a shorter cycle of management implementation and review at an operational level, usually occurring annually. These will also apply to EAF, although the coordination necessary to achieve EAF may mean that progress is slower in some more complicated areas. Longer time scales will need to be considered when dealing with issues such as climate change or the well-being of future fisheries generations. The EAF guidelines do not elaborate on the time required for the recovery of specific fisheries, and thus do not focus on the longer-term ecological time scales specified in the CBD ecosystem approach.
Principle 9: Management must recognize the change is inevitable.	Although the EAF does not explicitly talk about adaptive management, the guidelines do provide for considerable discussion about monitoring, including through the use of indicators. The results of monitoring inform management, and provide for improved management. The guidelines mention the need for developing adaptive management techniques to assist with data-poor situations. In addition, the EAF guidelines are more explicit than the CBD ecosystem approach in recognizing the need for implementing the precautionary approach.
Principle 10: The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.	The focus of EAF is on sustainable use. Even though the EAF guidelines state that *"maintaining biological diversity is regarded as being of major importance to ecosystem functioning and productive fisheries,"* they stop short of promoting conservation.
Principle 11: The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.	The EAF guidelines provide considerable detail relating to data and information for good management, including in relation to developing management plans and monitoring. Uncertainty and the role of research are recognized. Section 5 of the EAF guidelines is dedicated to a discussion of research for improved EAF, while Annex 4 looks at linkages between some basic data requirements, indicators and operational objectives of a hypothetical fishery. This information is much more specific than anything provided in the context of the CBD ecosystem approach. The EAF guidelines also recognize the use of ecosystem considerations in many traditional fisheries management practices, and endorses their strengthening.
Principle 12: The ecosystem approach should involve all relevant sectors of society and scientific disciplines.	According to the EAF guidelines, the implementation of EAF requires the identification of various direct and indirect uses and users of fisheries resources. It also requires an expansion of stakeholder groups and sectoral linkages, and broadening stakeholder participation in the management process.

Table 4. Comparison between the CBD ecosystem approach and the EAF.

In summary, there is good consistency between the CBD ecosystem approach and the EAF. The EAF has a strong focus on sustainable use, and although the concept of equity is given prominence, there is no mention of conservation. The aim of the EAF is to use fisheries in a sustainable manner. However, considering the number of fisheries that are currently overexploited and in need of restoration, some focus on conservation could strengthen the EAF. Related to this is the lack of explicit consideration of the longer temporal scales that are required to rebuild many fisheries, as well as of adaptive management. The impacts of management actions taken in one ecosystem on adjacent ecosystems are also not explicitly considered. In the context of fisheries management, the maintenance and/or destruction of nursery habitat or spawning areas could be an important consideration. Finally, although the impacts on ecosystem structure and function (CBD principle 5) are addressed with regard to fisheries, there is a lack of consideration concerning other organisms associated with the marine ecosystem such as birds (albatrosses and petrels), cetaceans and corals.

The EAF is much more specific and advanced than the CBD ecosystem approach in considering specific fisheries management strategies and data requirements. It is also more explicit in giving prominence to the precautionary approach. The precautionary approach, which is part of the CBD preamble, is considered in the annotations to the rationales of the ecosystem approach and in the implementation guidelines, but not in either the principles or the operational guidance.

5.2.2 How widely used is the EAF?

Unlike IMCAM, which is described in the next section, the EAF is still a relatively new approach. Given this, it is not surprising that comprehensive information about its implementation is not yet available. Certainly the EAF has been applied in a number of countries, though its national application is far from being universal. The EAF has also been applied regionally, often within Large Marine Ecosystems. Within regional fisheries management organizations (RFMOs), the application of the ecosystem approach is still patchy. While the more recently concluded agreements, like those for highly migratory species of the western and central Pacific and for the South East Atlantic reflect the ecosystem and precautionary approaches of the UN Fish Stocks Agreement, other early agreements predate UNCLOS and do not reflect the ecosystem approach [82]. The Commission of the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR), a component of the Antarctic Treaty System, was the first international body to adopt the ecosystem approach to management of living resources. The CCAMLR approach not only focuses on regulating fishing for certain species, it also aims to ensure that fishing does not impact adversely on other species that are related to, or dependent on, the target species. CCAMLR has also implemented the precautionary approach to minimize risk associated with unsustainable practices in conditions of uncertainty.

In practical terms, it may yet be too early to assess the overall effects of EAF, except in areas such as the Southern Ocean, where the ecosystem approach has been applied for a substantial amount of time under CCAMLR. However, even in the Southern Ocean, management efforts are threatened by illegal, unregulated and unreported (IUU) fishing, and according to all available data, the status of fisheries and associated habitats continue to decline worldwide. However, there is also reason for cautious optimism, as countries have taken action to protect fragile environments from the effects of fishing (for example, the closure of a large cold water coral reef to bottom trawling on the Sula ridge off the coast of Norway). Some regional fisheries organizations are slowly starting to undertake similar action, as demonstrated in 2004 by the North-east Atlantic Fisheries Commission (NEAFC), which closed five seamounts in the high seas to fishing activities. A number of RFMOs are also addressing by-catch and have put in place regulations towards this end.

5.3 Integrated marine and coastal area management

5.3.1 Integrated marine and coastal area management and the CBD ecosystem approach

Although the practice of integrated marine and coastal area management (IMCAM) is generally limited to nearshore marine waters (that part of the marine environment influenced by the land), the lessons learned from the application of IMCAM have the potential to inform and strengthen the emerging field of integrated oceans management. Therefore it is useful to review IMCAM practices, their compatibility with the ecosystem approach, and their degree of implementation.

Integrated marine and coastal area management (or alternatively, 'integrated coastal area management' or 'integrated coastal zone management' – terms which are relatively equivalent, differing only in the amount of coastal or marine environment covered) has been practiced for approximately 40 years, making it the oldest integrated management approach applied in the marine environment. Initially, IMCAM practices were undertaken in the United States, Australia and UNEP Regional Seas Programmes, with broader and escalating efforts taking place in the mid-1980s. At the present time, IMCAM is commonly used around the world [83]. In addition, the importance of IMCAM has been recognized under a number of international and regional instruments and programmes, including the Convention on Biological Diversity, the Barbados Plan of Action, the Global Programme of Action for the Protection of the Marine Environment from Land Based Activities (GPA), the FAO Code of Conduct for Responsible Fisheries, the Johannesburg Plan of Implementation and many Regional Seas Conventions and Action Plans.

Given its relatively long history, it is not surprising that a large number of guidance documents for IMCAM exist [84]. These documents elaborate definitions, goals, principles and objectives for IMCAM, and provide guidance on the development and implementation of IMCAM projects. A number of definitions for IMCAM also exist. For example, according to UNEP (1995), IMCAM is a continuous, proactive and adaptive process of resource management for environmentally sustainable development in coastal areas. A more comprehensive definition for IMCAM is provided by Sorensen (2002) as follows:

> *A multidisciplinary process that unites levels of government and the community, science and management, sectoral and public interests in preparing and implementing a programme for the protection and the sustainable development of coastal resources and environments. The overall goal of ICM is to improve the quality of life of the communities that depend on coastal resources as well as providing for needed development (particularly coastal dependent development) while maintaining the biological diversity and productivity of coastal ecosystems in order to achieve and maintain desired functional and/or quality levels of coastal systems, as well as to reduce the costs associated with coastal hazards to acceptable levels.*

This definition is relatively consistent with the description of the CBD ecosystem approach. Both put emphasis on integration, and on the need to maintain biodiversity and to take into account the well-being of coastal inhabitants. The IMCAM definition is focused primarily on sustainable use (and sustainable development), but also acknowledges the need for conservation. It does not take into account the equitable sharing of benefits. The IMCAM definition is also more specific, particularly in the need to prepare for coastal hazards.

The goals of IMCAM can be defined as follows [85]:

- Sustainable development of coastal and marine areas
- Reducing vulnerability of coastal areas and their inhabitants to natural hazards
- Sustainable well-being of coastal ecosystems
- Sustainable quality of life in coastal communities
- Improvement of governance processes

Some principles of IMCAM can be defined as follows [86]:

1. The coastal area is a unique resource system which requires special management and planning approaches
2. Water is the major integrating force in coastal resources systems
3. It is essential that land and sea uses be planned and managed in combination
4. The edge of the sea is the focal point of coastal management programmes
5. Coastal management boundaries should be issue-based and adaptive
6. A major emphasis of coastal resources management is to conserve common property resources
7. Prevention of damage from natural hazards and conservation of natural resources should be combined in IMCAM programmes
8. All levels of government within a country must be involved in coastal management and planning
9. The nature-synchronous approach to development is especially appropriate for the coast
10. Special forms of economic and social benefit evaluation and public participation are used in coastal management programmes
11. Conservation for sustainable use is a major goal of coastal resource management
12. Multiple-use management is appropriate for most coastal resource systems
13. Multiple sector involvement is essential to sustainable use of coastal resources
14. Traditional resource management should be respected
15. The environmental impact assessment approach is essential to effective coastal management

The following table provides an analysis of the consistency between the principles of the CBD ecosystem approach, and the guidance available for IMCAM.

CBD ecosystem approach principle	Consistency with IMCAM
Principle 1: The objectives of management of land, water and living resources are a matter of societal choices.	Even though not specifically elaborated in the principles, most ecosystem approach guidance notes that there is no single way to implement IMCAM, and that IMCAM programmes need to be tailored to particular political, governance and social conditions and needs.
Principle 2: Management should be decentralized to the lowest appropriate level.	Principle 8 states that all levels of government within a country must be involved in coastal management and planning. At the same time, many guidance documents recognize the value of decentralization, and the involvement of communities in planning and implementing IMCAM programmes. In many areas of the world co-management is becoming increasingly common. In a co-management system, local stakeholders share aspects of governance with the government, and community participation is an essential part of the management process.
Principle 3: Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.	The area addressed through integrated marine and coastal area management contains a number of different ecosystems, and activities on the coast impact the downstream marine environment. As stated in the third principle of IMCAM, it is essential that land and sea uses be planned and managed in combination. The second principle also touches on the connectedness of marine and coastal ecosystems by stating that water is the major integrating force in coastal resources systems.
Principle 4: Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem-management programme should: a) Reduce those market distortions that adversely affect biological diversity; b) Align incentives to promote biodiversity conservation and sustainable use; c) Internalize costs and benefits in the given ecosystem to the extent feasible.	Principle 10 of IMCAM states that special forms of economic and social benefit evaluation and public participation are used in coastal management programmes. A number of guidance documents elaborate on this principle by providing specific information about economic instruments, including valuation, incentives, subsidies, development taxes, etc.

CBD ecosystem approach principle	Consistency with the IMCAM
Principle 5: Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.	As stated above, one of the main objectives of IMCAM is preserving and protecting the productivity and biological diversity of coastal ecosystems. The existing IMCAM guidance acknowledges the important role of biodiversity conservation activities in providing for sustainable use of resources. Principle 11 of IMCAM states that conservation for sustainable use is a major goal of coastal resource management.
Principle 6: Ecosystem must be managed within the limits of their functioning.	Existing IMCAM guidance stress that coastal areas are complex and dynamic systems, which are under a multitude of human pressures, including habitat modification, exploitation of resources, pollution and climate change. Coastal systems can also be naturally variable. The limits of functioning of coastal ecosystems can therefore be difficult to predict, and the need for an adaptive management approach is recognized.
Principle 7: The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.	IMCAM principle 5 notes that coastal management boundaries should be issue-based and adaptive. IMCAM has been implemented on a number of scales ranging from local to regional. The principles do not specifically touch upon temporal scales. However, it is generally recognized that IMCAM is a long-term process. The IMCAM project cycle is generally 8 to 12 years, with a longer process required to achieve sustainable use of coastal resources.
Principle 8: Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term.	As elaborated under principle 7, the IMCAM principles do not touch upon temporal scales, but in practice the IMCAM process is a long-term one. IMCAM projects will often take years to demonstrate results that can be readily seen and appreciated by the public. Sustainability of IMCAM efforts can be threatened by lack of long-term financing (moving from a project to a programme) and political support, which may be tied to 4 to 5 year election cycles.
Principle 9: Management must recognize the change is inevitable.	As mentioned in the discussion under principle 6, coastal and marine ecosystems are dynamic and complex. Most newer IMCAM guidance recognizes the need for adaptive management. More detailed guidance is still rare, though it does exist, and some case studies are starting to emerge.
Principle 10: The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.	The focus of IMCAM is on sustainable use and sustainable development, but the need for conservation is also recognized. As stated in principle 11 of IMCAM, conservation for sustainable use is a major goal of coastal resource management. Therefore, IMCAM recognizes that the ability to use resources sustainably often depends on undertaking conservation measures in selected locations (for example through no-take marine protected areas, and/or the protection of nursery and spawning areas). This is also reinforced through principle 12, which states that multiple-use management is appropriate for most coastal resource systems.
Principle 11: The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.	Principle 14 of IMCAM states that traditional resource management should be respected. Although the principles of IMCAM do not specifically address scientific information, this aspect is well elaborated in the existing guidance. Best available scientific data and information provide an essential basis for implementing IMCAM, and help reduce the level of uncertainty to the extent possible. In practice, the incorporation of both scientific information and traditional knowledge has been faced with some impediments [87].
Principle 12: The ecosystem approach should involve all relevant sectors of society and scientific disciplines.	A central component of successful IMCAM is mediation between different stakeholders, as well as conflict resolution. Consequently, principle 13 of IMCAM states that multiple sector involvement is essential to sustainable use of coastal resources. Although not explicitly stated in the principles, most IMCAM guidance also recognizes the need for best available scientific information. The development of indicators to support IMCAM, for example, is relatively advanced.

Table 5. Comparison between the CBD ecosystem approach and IMCAM.

In summary, there is very good consistency between the CBD ecosystem approach and IMCAM. As was the case with the EAF, IMCAM has a strong focus on sustainable use and on sustainable development. But unlike the EAF, IMCAM also recognizes the need for conservation. Existing IMCAM guidance does not address the equitable sharing of benefits to a great degree. The importance of equity is acknowledged in the EAF principles, though it is difficult to say how well this principle is achieved in practice. The equitable sharing of benefits is an important issue for coastal communities, and it may be useful to elaborate on this topic in any future IMCAM guidance. Finally, the IMCAM principles and guidance are much more specific than the more general CBD ecosystem approach in addressing coastal issues, including, for example, the need to lessen the impacts of coastal hazards. There has also been substantial experience that has been gained through IMCAM in implementation of the ecosystem approach, in particular in relation to principle 12, where approaches related to stakeholder consultation, co-management, and conflict resolution techniques have been pioneered through the implementation of IMCAM.

5.3.2 How widely used is IMCAM?

A status report on IMCAM prepared by Sorensen (2000)[88] indicates that approximately 698 IMCAM efforts have been documented during the past 35 years. On the national level, these projects vary widely in geographic scope, the powers given to them, and the issues addressed. IMCAM projects have also been implemented in response to international and regional commitments and programmes, such as those under the CBD, the 13 Regional Seas Programmes and Action Plans and the GPA. The Regional Seas Programmes have been particularly effective in fostering international cooperation for the management of joint resources. In addition, international financial institutions, such as the World Bank, the Inter-American Development Bank, and the GEF have supported implementation of IMCAM, either nationally or regionally.

According to the national reports of the Convention on Biological Diversity (which has a total of 188 Parties), 35 percent of responding countries have IMCAM arrangements in place, 25 percent were in advanced stages of development of IMCAM, while 32 percent were in early stages of development as of May 2006. Only 9 percent of responding countries had not started implementing IMCAM. Similarly, 14 percent or responding countries have implemented ecosystem-based management of marine and coastal resources, for example through integration of coastal management and watershed management, or through integrated multidisciplinary coastal and ocean management. 25 percent were in advanced stages of implementing such management programmes, while 52 percent were at early stages of implementation. Only 9 percent of responding countries had not started implementing the ecosystem approach in this manner. These results demonstrate that IMCAM is widely implemented, and will become more so in the future. However, there is, as of yet, no comprehensive information available on the degree to which IMCAM programmes are achieving their objectives and producing measurable accomplishments. Indicators for IMCAM, under development by the IOC of UNESCO and UNEP among others, and in use by the European Union, should result in better information in this regard.

Given the complex nature of the pressures and the multiple users of the coastal zone, it is perhaps not surprising that the implementation of IMCAM continues to be faced with many constraints. Many IMCAM projects either have inadequate budgets, or have failed to become sustainable programmes once project funding has ended. Efforts to integrate all stakeholders, including sectors and levels of governments, as well as communities, into IMCAM planning and implementation have not always worked as well as they should have [89]. However, there is much to be learned from both the successes and failures of IMCAM, given its long history of practice in all parts of the world and at different scales. Certainly any efforts to implement the ecosystem approach further offshore through oceans management can be guided by the experiences of IMCAM.

5.4 Marine protected areas in areas beyond national jurisdiction

Marine protected areas have long been a component of IMCAM, and their application as part of EAF has also been considered. While in relatively common use in shallow-water marine environments, they have not been widely applied in deep sea and open ocean environments. Special management of marine areas beyond national jurisdiction is a subject of current debates.

Marine protected areas in the seabed do exist: the Endeavour Hydrothermal Vent Marine Protected Area is an example, established in 2003 and located on the Juan de Fuca Ridge, southwest of Vancouver Island, Canada, at the depth of 2250 meters. However, these areas are mostly located within national jurisdiction and can therefore only serve as examples of how to set protected areas in areas beyond national jurisdiction.

Under the 1973 International Convention for the Prevention of Pollution from Ships, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78), 'Special Areas' are given a special level of protection from marine pollution based on mandatory prevention methods. Within the same legal framework, Particularly Sensitive Sea Areas (PSSAs) are areas that are also considered as needing special protection based on their ecological, social, cultural, economic, scientific and educational criteria [90].

To date, designated PSSAs are mainly coastal, although not stricto sensu (examples are the Great Barrier Reef in Australia, the Sabana-Camagüey Archipelago in Cuba, Malpelo Island in Colombia, the sea around the Florida Keys in the United States); some of them are adjacent to open ocean or the deep sea environments (such as the Galapagos Archipelago in Ecuador and probably Torres Strait, Australia and Papua New Guinea).

The policy debate on marine protected areas in areas beyond national jurisdiction is intensifying with negotiations on-going on the necessity, possibility and modalities of such protected areas.

The Convention on Biological Diversity is conducting technical work in support of policy decisions related to protected areas beyond national jurisdiction by competent bodies, one of which possibly being the Convention itself. At its first meeting in February 2006, the recently-established United Nations Ad Hoc Open-ended Informal Working Group to study issues relating to the conservation and sustainable use of marine biodiversity beyond areas of national jurisdiction also discussed the issue of protected areas in the high seas and the Area, although preliminarily. Exchanges of information and consultations on this matter also took place at the Third Global Conference on Oceans, Coasts and Small Islands in Paris in January 2006, which was organized by the Global Forum on Oceans, Coasts and Small Islands (the Forum hosts multistakeholder dialogue sessions on oceans, coasts and small islands).

Several international competent bodies are starting to consider this issue more closely and in-depth than they did in the past. UNESCO's ecological sciences section and Intergovernmental Oceanographic Commission are engaging in activities aimed at clarifying the science of marine protected areas, including in areas beyond national jurisdiction. Initiatives are being developed, involving several governments and international organizations, which will aim at developing criteria for the identification and designation of protected areas in marine areas beyond national jurisdiction.

However, stakeholder involvement is an important but undervalued aspect in the development of criteria for the identification and designation of protected areas in marine areas beyond national jurisdiction [91].

5.5 Towards an ecosystem approach to the management of oceans

As is evident from the analysis above, both the EAF and IMCAM show good consistency with the CBD ecosystem approach. Therefore, the application of either of these approaches can also help apply the CBD ecosystem approach. The EAF can be applied anywhere in the oceans, but IMCAM is specific to coastal areas. However, 'integrated ocean and coastal management,' 'integrated ocean management' and 'ocean zoning' are emerging approaches that can help extend IMCAM offshore, and additionally also into the high seas.

For ocean areas, the challenge lies in integrating the various management approaches into a comprehensive and cohesive plan with the ecosystem approach as its central framework. Many countries and regions are starting to develop this type of integration for their EEZs through ocean policies. Consistent with the ecosystem approach, national and regional ocean policies may also need to extend their coverage into the high seas to take into account interlinkages between ecosystems. The elaboration, adoption and implementation of an ocean policy for areas beyond national jurisdiction faces substantial challenges, but remains a valuable long-term goal. In the meantime, much can be achieved through effective implementation of the EAF and/or through integrated oceans management. Management of oceans would need to be supported by information systems that integrate spatially referenced environmental data, stakeholder uses and jurisdictional boundaries.

6. Towards a vision for an ecosystem approach to the management of ocean spaces and resources

With the failure of many traditional single species management methods to reduce the rate of biodiversity loss in the world's oceans, the importance of the ecosystem approach is now broadly accepted. However, in practice, the application of the ecosystem approach to areas beyond national jurisdiction remains very limited. One major impediment has been the lack of knowledge about who the stakeholders in these areas are, and what their interests and expectations are regarding the use and management of ocean spaces and resources. Another limitation has been the lack of understanding about the available methods for applying the ecosystem approach in these areas, and the ways and means to integrate sectoral management strategies into a comprehensive, integrated management approach that addresses multiple threats and the often conflicting uses of ocean space and resources.

Virtually all the literature examined for the purpose of this study refers to stakeholders without defining them. For example, the High Seas Task Force report mentions the terms "range of stakeholders", "relevant stakeholders", "interested stakeholders", "all stakeholders", etc. but does not define either who they are nor at what scales they operate [92].

Deriving who the actual stakeholders are from an analysis of space and resource uses is a difficult endeavor. For example, based on the information contained in chapter 3 of the study, one may conclude that the main stakeholders are the owners and operators of the shipping, fishing, tourism, communication, and oil industries as well as scientists, indigenous and local peoples and that these stakeholders are motivated by interests of different nature (economic, cultural, quest for knowledge, etc.).

However, reality is much more complex. In marine areas beyond national jurisdiction, a host of stakeholders may be concerned about a whole range of topics posed by the use of ocean space and resources, including issues driven by economic, social, environmental or cultural interests. For example, an important stakeholder in these areas is represented by civil society, particularly conservation groups.

In addition, there is the issue of scale, i.e., there may be different stakeholders operating at different spatial or temporal scales at the same time. For example, in the case of the exploitation of fish stocks, the stakeholders would be represented by the fishing industry, but there are at least three more stakeholders involved in this particular use of the ocean space and resources, i.e. national governments, Regional Fisheries Management Organizations (RFMOs) and consumers.

Furthermore, attributing stakeholders' relative roles and weights is not a simple task. The conceptual framework of the Millennium Ecosystem Assessment illustrates that there is a difference between direct and indirect drivers of change affecting ecosystem services on which human well-being depends. A focus on stakeholders responsible for direct drivers of change (changes in local uses, species introductions or removal, technology adaptation and use, external inputs such as biological control in production systems, harvest and resources consumption, and climate change) would be misleading in the context of policy-making processes such as negotiations under the United Nations General Assembly in relation to the oceans and the law of the sea, the Convention on Biological Diversity's Jakarta Mandate on Marine and Coastal Biodiversity, the International Seabed Authority, relevant scientific work of the Intergovernmental Oceanographic Commission etc. It is important that stakeholders be identified taking into account the indirect, underlying drivers of change, i.e. demographic factors, economic drivers (globalization, trade market, ...), socio-political factors (governance-related issues, including the growing influence and participation of civil society, the international institutional and legal framework), science and technology and cultural factors (religious and other beliefs, consumption choices, traditional practices, ...) [93].

Mapping stakeholders against primary indirect drivers of change, space, time, uses, and with respect to each other is also a difficult task to accomplish. In December 2005, a workshop on "Mapping Human Activity in the Marine Environment: GIS Tools and Participatory Methods" was convened by the National Marine Protected Areas Center Science Institute in Pacific Grove, California. The workshop demonstrated how to characterize human use patterns in the marine environment by relying on Geographic Information System (GIS) technology, in support of marine protected area planning based on spatial data on actual human use patterns of the marine environment [94].

Another example of how GIS technology can assist in mapping human uses of ocean space and resources, and the distribution of those resources, is the map-based analysis of scientific information on biodiversity in marine areas beyond the limits of national jurisdiction that was developed for the first meeting of the Ad Hoc Open-ended Working Group on Protected Areas of the Convention on Biological Diversity [95].

Various initiatives are embarking on the task of defining stakeholders. Recently, a Landscape Level Planning Initiative (LLPI) was established by UNESCO with the aim of promoting, by means of research, advocacy and the development of models and tools the wider application of effective landscape-level planning, in keeping with the principles of sustainable development. The initiative is targeted at a broad range of stakeholders (national governments, private sector, and civil society organizations). The first step of the initiative was to launch a consultative process aimed at identifying stakeholders' expectations with respect to landscape level planning. Currently, the application of landscape planning and management experiences to the marine area is being tested [96].

The various initiatives that embark on the task of defining stakeholders commonly conclude that careful consultations with all stakeholders (whether direct or indirect, or related to different temporal and spatial

scales) is required to identify their interests and concerns and to integrate them into management strategies that articulate a common vision towards the sustainable use of ocean resources.

One key issue of implementing ecosystem approaches to oceans is the related policy implications and particularly how to provide the right incentives to specific sectors so that sectoral policies are better coordinated and integrated. This would include providing appropriate incentives within specific economic sectors that must be tailored to specific situations. For example, in certain situations, some stakeholders such as those representing the fisheries sector and RFMOs may need to be strengthened, while incentives to other sectors may not be necessary. In other cases, the application of ecosystem approaches to oceans may require modification of the policies directed towards several sectors [97]. Another issue that will require further discussions is who would monitor developments and enforce compliance related to the implementation of ecosystem approaches to oceans.

The ecosystem approach to fisheries (EAF) and integrated marine and coastal area management (IMCAM) hold promise for improved management of the oceans in the future. As the EAF and IMCAM are being more widely applied, the lessons learned, if properly analyzed and documented, can assist in better implementation of the ecosystem approach in the oceans, including in areas beyond national jurisdiction.

Further steps towards the application of the ecosystem approach in marine areas beyond national jurisdiction can be taken through a comprehensive analysis of practical experiences in marine and coastal areas. For example, the lessons learned from approximately 40 years of IMCAM implementation can contribute towards making the ecosystem approach a viable management practice in the world's oceans. Stakeholder participation and the resolution of conflicts among various user groups are central components of IMCAM. Moreover, methodologies are being developed aimed at evaluating the performance of private companies against standards of best practices in biodiversity management [98]. We need to learn from both the successes and failures of the EAF and IMCAM, and from the initial experiences with implementing integrated oceans policies. These lessons learned can be transferred into the emerging field of ecosystem-based integrated oceans management. There is also a need for decision-support tools, such as comprehensive Geographic Information Systems of ocean areas that combine spatial and temporal information on ecosystems as well as species, stakeholder uses, jurisdictional boundaries, and a range of special management measures.

However, this does not mean that progress cannot be made before such tools and analyses are in place. In fact, much is already being done, particularly in the context of Regional Seas Programmes and those RFMOs that have specific mandates for applying the ecosystem approach. Countries, individually or collectively, have undertaken activities towards implementing the ecosystem approach within their national waters, and within Large Marine Ecosystems. There is now an urgent need to expand these efforts in national EEZs and in particular in areas beyond national jurisdiction. These analyses could considerably strengthen the implementation of the ecosystem approach and make it more successful.

We hope that this study has succeeded in establishing the case for continuing work on a comprehensive survey about who the stakeholders are in marine areas beyond national jurisdiction, what their interests and expectations are, and the importance for mapping them, including in a dynamic manner. We also hope that it is self-explanatory that the study has confirmed the importance of this information in informing relevant policy decisions (including of a legal nature).

In areas beyond national jurisdiction where the ecosystem approach has been used only in a very limited manner, if at all, the need for further research is critical. As the decline in biodiversity continues throughout the world's oceans, the ecosystem approach provides us with the best available framework for managing multiple threats, ecological uncertainties, human uses and interests. As the Millennium Ecosystem Assessment states, human activities are the main drivers of ecosystem changes, therefore a key challenge is to understand better these drivers. The first step towards implementing ecosystem approaches to oceans will however remain mapping stakeholders and their expectations – a task which has become urgently needed and in which all stakeholders will hopefully participate actively.

Endnotes

1 Marine areas beyond national jurisdiction consist of the high seas and the Area. The high seas refer to the water column that is not included in the Exclusive Economic Zones (EEZs), the territorial sea or the internal waters of a State, or in the archipelagic waters of an archipelagic State. The Area refers to the seabed, the ocean floor and subsoil beyond national jurisdiction. Activities in the high seas fall under the regime of the freedom of the high seas, which includes freedom of navigation, freedom of overflight, freedom to lay submarine cables and pipelines, freedom to construct artificial islands and other installations, freedom of fishing, and freedom of marine scientific research; these freedoms must be exercised by all States with due regard for the interests of other States. In addition, high seas freedoms must be exercised under the conditions regarding conservation and management of living resources, the general obligations to protect and preserve the marine environment and by other rules of international law. The Area and its resources are considered as a common heritage of mankind (UN Secretary-General Report on oceans and law of the Sea, A/60/63/Add.1). Hence, not all marine areas beyond national jurisdiction fall under the regime of the high seas: this regime, as its name indicates, only applies to the high seas; the regime of the Area is different.

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46 Personal communication by the Director of the Global Ocean Observing System (GOOS), April 2006.

47 The database is available at http://www.researchvessels.org (last visited on 20 April 2006).

48 (last visited on 21 April 2006). According to a reviewer, this website has resulted in significant controversy among data providers to the Voluntary Observing Shipping (VOS) system of the World Meteorological Organization. Being a real-time display of ship location, some vessel operators consider this a security risk, and in a few cases this has resulted in ships removing their data from VOS. The distribution of real-time position information will continue to be a discussion topic in any effort to improve tracking of VOS or research vessel observations.

49 See http://www.wmo.ch/web/www/Earthwatch/wmo-marine-vos.html (last visited on 22 April 2006).

50 Arico, S. and Salpin, C. 2005. *Bioprospecting of Deep Seabed Genetic Resources: Scientific, Legal and Policy Aspects.* United Nations University Institute of Advanced Studies, Yokohama: 76 pp.

51 See http://www.coml.org.

52 See http://www.esf.org/esf_article.php?language=0&article=127&domain=3 (last visited on 22 April 2006).

53 See http://www.momar.org (last visited on 22 April 2006).

54 See http://www.neptune.washington.edu (last visited on 22 April 2006).

55 See http://www.oceanlab.abdn.ac.uk/research/esonet.shtml (last visited on 22 April 2006).

56 See http://www.pmel.noaa.gov/vents/nemo/index.html (last visited on 22 April 2006).

57 Copley, J. 2004. Oceanography: *All Wired Up*. Nature 427: 10-12.

58 See http://www.amnh.org/nationalcenter/expeditions/blacksmokers (last visited on 22 April 2006).

59 See http://www.ocean.washington.edu/outreach/revel (last visited on 22 April 2006).

60 Arico, S. and Salpin, C. 2005. *Bioprospecting of Deep Seabed Genetic Resources: Scientific, Legal and Policy Aspects.* United Nations University Institute of Advanced Studies, Yokohama: 76 pp.

61 World Tourism Organization 2003. *Worldwide Cruise Ship Activity.* WTO, Madrid: 216 pp.

62 In 2002, the Russian Academy of Sciences and the tour operator Deep Ocean Expeditions took tourists to visit deep seabed sites in the Azores in the context of official scientific missions, at the price of 55,000 USD per tourist (see Glowka, L., 2003. *Putting Marine Scientific Research on a Sustainable Footing at Hydrothermal Vents*. Marine Policy 27(4): 303-312).

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66 Statement by the Secretary-General of the International Seabed Authority to the 60th session of the United Nations General Assembly (released on 28 November 2005) (available at http://www.isa.org.jm).

67 Brochure on the International Seabed Authority (available at http://www.isa.org.jm).

68 In his statement to the Sixtieth session of the United Nations General Assembly in November 2005, the Secretary-General of the Authority informed the General Assembly about steps towards the creation for a voluntary trust fund for increasing the involvement of developing country scientists in marine scientific research in the deep ocean. The Secretary-General of the Authority also informed the General Assembly that there was a clear issue with the very limited (less than one half) participation of the Authority's Members States in sessions of its Assembly (statement by the Secretary-General of the International Seabed Authority to the 60th session of the United Nations General Assembly (released on 28 November 2005) (available at http://www.isa.org.jm)).

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72 This statement on the interpretation of right- versus stakeholder status may also apply, by extrapolation, to claims over marine areas beyond national jurisdiction and merits to be researched upon.

73 All the excerpts above come from the statements by the representative of the International Indigenous Forum on Biodiversity to the eight session of the Conference of the

Parties to the Convention on Biological Diversity (Curitiba, Brazil, 20-31 March 2006).

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81 Ibid.

82 Kimball, L.A. 2005. *The International Legal Regime of the High Seas and the Seabed Beyond the Limits of National Jurisdiction and Options for Cooperation for the Establishment of Marine Protected Areas (MPAs) in Marine Areas Beyond the Limits of National Jurisdiction.* Secretariat of the Convention on Biological Diversity, Montreal, Technical Series no. 19: 64 pp.

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90 See http://www.imo.org.

91 According to one reviewer, identification and designation of protected areas in marine areas beyond national jurisdiction is much broader than just the identification of criteria and includes participation in policy development and decision-making on marine protected areas and in fact is at the core of their effectiveness. The reviewer suggests that examples of lack of involvement of stakeholders at either the decision-making stage or at the implementation stage should be identified and that those two levels of involvement of stakeholders should be distinguished as, in practice, stakeholders may often be involved in implementation, by default, but may not have been consulted at the decision-making stage, leading to failure in adequate implementation and, by extension, to non-compliance. Yet other times, they may have been involved in decision-making, but their participation rendered so meaningless that the policy does not garner their support, and again, is not applied on the ground.

92 High Seas Task Force 2006. *Closing the net: Stopping illegal fishing on the high seas.* Governments of Australia, Canada, Chile, Namibia, New Zealand, and the United Kingdom, WWF, IUCN and the Earth Institute at Columbia University: 112 pp.

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