

VISIONS FOR A SEA CHANGE

Report of the First International Workshop on Marine Spatial Planning

Intergovernmental Oceanographic Commission
and the Man and the Biosphere Programme

UNESCO Headquarters
Paris, France

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United Nations
Educational, Scientific and
Cultural Organization



Intergovernmental
Oceanographic
Commission



Man and
Biosphere



ICAM

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Table OF CONTENTS

	Acknowledgements	4
	Foreword	5
1	Introduction to the Workshop on Marine Spatial Planning	7
2	Introduction to Ecosystem-based, Sea Use Management	15
3	Ecosystem-based, Sea Use Management and Marine Spatial Planning	23
4	Key Scientific Issues for Ecosystem-based, Marine Spatial Planning	29
5	Legislation and Policy Framework for Marine Spatial Planning	35
6	A Process for Marine Spatial Planning	45
7	Defining the Human Dimension of Marine Spatial Planning	53
8	Implementing Marine Spatial Planning	57
9	Monitoring, Evaluating, and Adapting Marine Spatial Planning	65
10	Conclusions and Next Steps	71
	References	73
	Annexes	
	Workshop Programme	78
	Workshop Participants	80

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The workshop would not have been possible without the contribution of an enthusiastic and experienced group of participants that included scientists and practitioners from 20 countries. Presentations were given by ten experts including Frank Maes, Elliott Norse, Larry Crowder, Paul Gilliland, Dan Lafolley, Kevin St. Martin, Cathy Plasman, Yves Auffret, Jon Day, and Antonio De Leon. Their continuing professional accomplishments in researching, developing, and implementing marine spatial planning in the context of ecosystem-based management was of major importance to the overall success of the workshop.

Financial support was provided by a broad range of donors and partners. Fourteen different governmental and non-governmental organizations made financial contributions to the workshop including: the Flemish Government; the Department of Fisheries and Oceans Canada; the National Oceanic and Atmospheric Administration (NOAA), USA; the Belgian Science Policy Office; the Belgian Federal Public Service (FPS) Health, Food Chain Safety, and Environment; Natural England; the European Commission Maritime Policy Task Force; the European Environment Agency; the Great Barrier Reef Marine Park Authority, Australia; the World Conservation Union/World Commission on Protected Areas (Marine); Conservation International; WWF International; The Nature Conservancy; and the Gordon and Betty Moore Foundation.

We prepared this technical report from expert presentations made at the workshop and subsequent discussions during and following the workshop, supplemented and updated with new information where appropriate. Marine spatial planning is a rapidly developing field, and we wanted to keep this report up to date. We take responsibility for any misinterpretation or misrepresentation of ideas in the original presentations or factual errors in the report.

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Workshop Co-chairs
Paris, France
May 2007

Foreword

"...The problems of ocean space are closely interrelated and need to be considered as a whole..."

Preamble to the United Nations Convention on the Law of the Sea, 1982

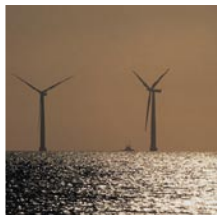
When the authors of the Preamble to the United Nations Convention on the Law of the Sea wrote this prescient phrase in 1982, few people recognized how relevant it would become to the marine world of today. Scientists are calling increasingly for ecosystem-based management of marine areas and considerable work has already been done on developing the conceptual aspects. In fact, conceptual work has dominated ecosystem-based management and the debate has often become academic for the lack of practical evidence of what works and what does not. Hopefully, this workshop moved the theoretical work forward by shifting the focus more toward putting marine ecosystem-based management into practice.

Marine spatial planning at the ecosystem level is a first step toward ecosystem-based management.

UNESCO is in a unique position through the international perspective of its programs, particularly the IOC and the MAB Programme, to evaluate and improve the effectiveness of marine spatial planning as a tool to secure both marine biodiversity and economic development. The workshop was a cooperative initiative between the Intergovernmental Oceanographic Commission (IOC) and the Man and the Biosphere Programme of the Ecological and Earth Sciences Division. In the longer run, these activities could provide an opportunity to develop broader partnerships both within and outside UNESCO, that could lead to better integration of spatial management of human activities in terrestrial areas, watersheds, coasts and oceans.

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and
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1 Introduction to the Workshop on **MARINE SPATIAL PLANNING**



What Is Marine Spatial Planning?

Marine spatial planning is a way of improving decision making and delivering an ecosystem-based approach to managing human activities in the marine environment. It is a planning process that enables integrated, forward looking, and consistent decision making on the human uses of the sea. Marine spatial planning is analogous to spatial or land use planning in terrestrial environments.

Ecosystem-based, marine spatial planning seeks to sustain the benefits of the ecological goods and services that the oceans provide to humans as well as all living organisms on the planet.

Why Was an International Workshop on Marine Spatial Planning Organized?

Rapid population growth and shifting consumer demands have considerably increased the need for more food, more energy and more trade from marine areas. Because of limited resources and space on land, an increasingly larger share of goods and services is coming from coastal and marine areas. This trend will continue, and more likely accelerate, in the next decades. Future outlooks, in particular for offshore aquaculture, offshore energy, maritime transport, and tourism, predict increasing uses of marine areas in the coming years. It is difficult to understate the value of the oceans to present and future economic prosperity.

However, other values of the oceans are also critically important, including the benefits of the ecological goods and services that the oceans provide to humans as well as all living organisms on the planet. In addition to the provisioning services provided by marine areas, including food, fiber, and medicine, the oceans provide regulating services (storm protection provided by coral reefs and wetlands), supporting services (carbon capture and nutrient recycling), and cultural services (including unique knowledge systems about marine resources). (Millennium Ecosystem Assessment, 2005).

Since marine resources are limited both in space and size, economic development has been devastating to marine biodiversity in many places. Essentially, increased development pressures on the marine

environment, have led to two types of conflict. First, this multitude of human activities (mostly uncoordinated among economic sectors) has resulted in a substantial and largely irreversible loss and damage to the diversity of life in marine and coastal areas (use-environment conflicts, e.g., habitat loss). Second, not all uses are compatible with one another and are competing for ocean space or have adverse effects on each other (use-use conflicts, between, e.g., shipping and offshore wind farms).

Historically, management approaches have focused on single sectors with little consideration of the potential conflicts across sectors. During the past decade, the traditional sectoral approach to natural resource

Table 1. Examples of the Human Use of Ocean Space

Commercial Fishing
Recreational Fishing
Aquaculture
Shipping
Oil & Gas Exploration and Production
Renewable Energy Production, e.g., wind, waves
Sand and Gravel Mining
Dredging
Dredged Material Disposal
Recreation and Tourism
Offshore Housing, Factories, Airports
Pipelines, Cables, Transmission Lines
Bio-prospecting
Desalinization
Military Activities
Scientific Research
Marine Protected Areas
Cultural and Historic Conservation, e.g., ship wrecks

1

The Convention of Biological Diversity defines the "ecosystem approach" as "... a strategy for integrated management of land, water, and living resources that promotes conservation and sustainable use in an equitable way. The ecosystem approach 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." Decision V/6 of the Conference of the Parties to the Convention on Biological Diversity. Available at: <http://www.biodiv.org>.

and environmental management has been recognized to be insufficient to address the cumulative effects of human activities on the marine environment and has shifted to a more holistic “ecosystem approach” that calls for comprehensive analysis of all dimensions of environmental problems.

Despite its general acceptance however, so far the ecosystem approach has been more a concept, widely discussed at scientific meetings, but with few examples of actual practice. It is increasingly clear that governments lack concrete tools to make an ecosystem approach operational in the marine environment. A key challenge today is to take the ecosystem approach beyond the conceptual level, and one practical way to do this is through marine spatial planning.

From 8-10 November 2006 the Intergovernmental Oceanographic Commission (IOC) and the Man and the Biosphere Programme (MAB) of the United Nations Educational, Scientific, and Cultural Organization (UNESCO) held the first international workshop on Marine Spatial Planning. The meeting was held at the UNESCO Headquarters in Paris, France.

What Was the Purpose of the Workshop?

The purpose of the workshop was to:

- Identify good practices that illustrate how marine spatial planning can help implement an ecosystem-based approach to sea use management;
- Develop an international community of scientists and planners that wants to put ecosystem-based management into practice;
- Share information and experience through new partnerships and the Internet; and
- Identify priorities for future action, including developing international guidelines and building new capacities for marine spatial planning.

Who Attended the Workshop?

About 50 policy makers, managers, and scientists from over 20 countries attended the workshop. Participants were invited based on their practical experience in sea use planning and management, partic-

ularly with marine spatial planning and zoning. A complete list of participants and their contact information is included as an annex to this report.

How Was the Meeting Organized?

The meeting was organized around some of the basic elements of management, i.e., authorization, research, planning and analysis, implementation, monitoring, evaluation, and capacity building. Case studies of particular geographic areas were used only to illustrate the importance and interconnectedness of each of these elements in an overall management framework. The workshop programme is included as an annex to this report.

What Happened at the Workshop?

After introductory comments by the co-chairs that framed the objectives of the workshop, its organization, and basic definitions, Frank Maes, University of Gent (Belgium) described the international, European and Belgian legal context of marine spatial planning—noting that legislation was a desirable, but not necessarily, critical prerequisite. Elliott Norse of the Marine Conservation Biology Institute (USA) and Larry Crowder of Duke University pointed out incompatibilities between some human uses (e.g., bottom trawling) and the maintenance of biodiversity and effectively argued the case for using marine spatial planning to protect and recover biodiversity and ecosystem functions. At the same time, they pointed out the need to keep the ecosystem in “ecosystem-based management” and marine spatial planning. Paul Gilliland and Dan Lafolley of Natural England presented an ecosystem-based process for marine spatial planning, emphasizing the importance of clear objectives, meaningful indicators, effective stakeholder involvement, and mitigating conflicts through planning. Kevin St. Martin of Rutgers University made a strong case for adding the “human dimension” and the “missing layer” to marine spatial planning, particularly by relating offshore activities to onshore communities, livelihoods, and cultures through community participation, incorporation of local knowledge, and geographic information systems. Yves Auffret of the European Commission’s Maritime Policy Task Force described the alternative institutional arrangements for

The origin of Biosphere Reserves goes back to the “Biosphere Conference organized by UNESCO in 1968, the first intergovernmental conference to seek to reconcile the conservation and use of natural resources, foreshadowing the current notion of sustainable development. The Man and the Biosphere Programme was officially launched in 1970. One of the MAB projects consisted of establishing a coordinated world network of new protected areas, to be designated as Biosphere Reserves. MAB’s programmatic goal is achieving a sustainable balance between the sometimes-conflicting goals of conserving biological diversity, promoting economic development, and maintaining associated cultural values.

marine spatial planning considered through the draft Maritime Policy of the EU. The realities of implementing marine spatial plans, especially the different evaluation criteria, were highlighted by a elected public official, Cathy Plasman of the Belgian Ministry of Mobility and North Sea Affairs. Jon Day of Australia’s Great Barrier Reef Marine Park emphasized the need for monitoring, evaluation, reporting and adaptive management, based a major re-zoning of the GBRMP after 30 years. Finally, Antonio Diaz de Leon, Director-General of Mexico’s Ministry of Environment and Natural Resources, focused on capacity building needed for effective sea use planning in the Gulf of Mexico and Gulf of California.

What Were Some of the Principal Findings of the Workshop?

Some of the principal findings of the workshop are that: (1) marine spatial planning is an important element of ecosystem-based sea use management; (2) marine spatial planning is only one part of the tool box of ecosystem-based, sea use management—actual applications will include a mix of control measures including regulatory and non-regulatory (e.g., economic) incentives; (2) early and continuing engagement of stakeholders in a clear management process is critical to success and engenders trust and ownership of the process; (3) monitoring and evaluation are critical elements of the MSP process; (4) integrating the human dimension into marine spatial planning requires the same diversity of disciplines/perspectives as does the ecosystem approach relative to the biophysical environment; (5) comprehensive, spatially-explicit data on ecosystem characteristics, human uses, and offshore jurisdictions are required—these data are not readily available for most marine areas, and can be expensive and time-consuming to collect; and (6) decision makers are unlikely to accept marine spatial planning until its benefits can be better documented. A more complete list of findings is included in the last chapter of this report.

What Will Happen As a Result of the Workshop?

A Website (<http://ioc3.unesco.org/marinesp>) that contains background documents, presentations, and links to other marine spatial planning sites, and preliminary conclusions of the workshop has already been prepared and will be modified substantially over the next year. The results of the workshop are documented in this UNESCO

technical report and a special issue of the international journal, *Marine Policy*, will summarize the themes of the workshop in more detail. Publication of the special issue is expected by early 2008. Longer-term activities include preparation of international guidelines on marine spatial management and training for building capacity. These results will be part of UNESCO’s contributions to the implementation of the work plan of the Convention on Biological Diversity. In the longer run, these activities could provide an opportunity to develop broader international and regional partnerships that could lead to better integration of spatial management of human activities in terrestrial areas, watersheds, coasts—and oceans.

Why UNESCO?

UNESCO is in a unique position through the international perspective of its programmes in the IOC and MAB, as well as its World Heritage Center and Coastal Areas and Small Islands Programme, to evaluate and improve the effectiveness of ecosystem-based management, especially through marine spatial planning and ocean zoning. For example, for the past 30 years the MAB Programme has pioneered the concept of spatial planning and zoning for biodiversity conservation through the Biosphere Reserve Programme² in almost 100 countries. Of 440 Biosphere Reserves established by 2006, 109 are coastal and/or marine.



The UNESCO Biosphere Reserve Programme (<http://www.unesco.org/mab>) is one of the first to use “core areas”, “buffer zones”, and “transition zones”—designations that are still relevant to marine biodiversity conservation today. Generally, each biosphere reserve is comprised of three areas: (1) one or more core areas that are securely protected sites for conserving biological diversity, monitoring minimally disturbed ecosystems, and undertaking non-destructive research and other low-impact uses, such as education; (2) a clearly identified buffer zone that usually surrounds or adjoins the core areas, and is used for cooperative activities compatible with sound ecological practices, including environmental education, recreation, ecotourism and applied and basic research; and (3) a flexible transition area, or “area of cooperation” that may contain a variety of activities, settlements, and other uses, and in which local communities, management agencies, scientists, non-governmental organizations, cultural groups, economic interests, and other stakeholders work together to manage and develop the area’s resources sustainably. Although originally envisioned as a series of concentric rings, the three zones have been implemented in many different ways to meet local needs and conditions. In fact, one of the greatest strengths of the Biosphere Reserve concept has been the flexibility and creativity with which it has been realized in various situations.

Some countries have enacted legislation specifically to establish Biosphere Reserves. In many others, the core areas and buffer zones are designated (in whole or in part) as protected areas under national law. A large number of Biosphere Reserves simultaneously belong to other national systems of protected areas, such as national parks or nature reserves, and/or other international networks, such as World Heritage or Ramsar sites³. Despite this wide coverage and depth of experience with spatial planning and zoning in protected areas, no systematic evaluation of the effectiveness of marine spatial planning and zoning as management strategies for biodiversity conservation has been undertaken.

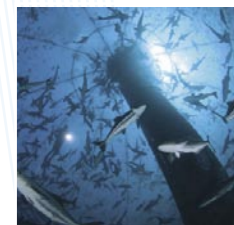
UNESCO’s World Heritage Centre (<http://whc.unesco.org>) encourages States Parties to the World Heritage Convention to nominate sites within their national territory for inclusion on the World Heritage List and to establish management plans and set up reporting systems on

the state of conservation of their World Heritage sites. There are 830 “properties” on the World Heritage list. Of these, 162 are natural sites, and only 18 sites (about 2% of the total) are “marine”. Marine areas that are currently listed include the Great Barrier Reef (Australia), the Galapagos Islands (Ecuador), the Belize Barrier- Reef Reserve System (Belize), the Sian Ka’an Biosphere Reserve (Mexico), and Tubbataha Reef Marine Park (Philippines) – all of which have employed a wide variety of zoning approaches in their management strategies.

UNESCO’s Intergovernmental Oceanographic Commission, through its Integrated Coastal Area Management (ICAM) Programme (<http://ioc.unesco.org/icam/>) is pioneering the use of indicators for evaluating the effectiveness of integrated coastal and ocean management, including zoning as a management measure⁴. At the same time, IOC’s Coastal-Global Ocean Observing System (C-GOOS) Programme (<http://www.ioc-goos.org/>) has developed an operational approach for monitoring many of the parameters of coastal areas that would be essential in populating a series of coastal and ocean indicators. Both the ICAM and C-GOOS programmes are important to an evaluation of spatial planning and zoning for marine biodiversity conservation.

Aren’t There Other International Programmes that Could Be Appropriate Partners for Marine Spatial Planning?

Yes—at least two others are obvious. The United Nations Environment Programme’s Regional Seas Programme and the International Maritime Organization’s areas that are designated as “Particularly Sensitive Sea Areas”. The Regional Seas Programme (www.unep.org/regionalseas/) addresses the accelerating degradation of the world’s oceans and coastal areas through the sustainable management and use of the marine and coastal environment, by engaging neighboring countries in comprehensive and specific actions to protect their shared marine environment. Today, more than 140 countries participate in 13 Regional Seas Programmes (RSPs): the Mediterranean Sea, the Caribbean Sea, West and Central Africa, Eastern Africa, East Asian Seas, the North West Pacific, the ROPME Sea Area, the South East Pacific, the North East Pacific, the Red Sea and Gulf of Aden, the South Pacific, the Black Sea, and the South



3 Out of 1651 Ramsar sites, 720 covering 485,000 km² globally are listed as coastal or marine. Only about 60% have any management planning process.

4 See Belfiore *et al.*, 2006

Fig 1.
The Regional Seas Programme

(Source: UNEP)



Asian Seas. While not officially designated as “Regional Seas”, five other programs characterize themselves as “partners” of the Regional Seas Programme: the Baltic Sea, the North East Atlantic, the Caspian Sea, the Arctic, and the Antarctic. Several of these Regional Seas Programmes, e.g., the Mediterranean and North East Atlantic, are developing networks of MPAs that will use spatial planning and zoning as a core management strategy.

5

In Annexes I, II and V, MARPOL 73/78 defines certain sea areas as «special areas» in which, for technical reasons relating to their oceanographic and ecological condition and to their sea traffic, the adoption of special mandatory methods for the prevention of sea pollution is required. Under the Convention, these special areas are provided with a higher level of protection than other areas of the sea.

6

The following PSSAs have been designated: the Great Barrier Reef, Australia (designated in 1990 and extended in 2005); the Sabana-Camaguey Archipelago, Cuba (1997); Malpelo Island, Columbia (2002), the sea around the Florida Keys, USA (2002); the Wadden Sea, Germany & The Netherlands (2002); Paracas National Reserve, Peru (2003); Western European Waters (2004); Canary Islands, Spain (2005), the Galapagos Archipelago, Ecuador (2005), and the Baltic Sea area, Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland and Sweden (2005).

The International Maritime Organization's (www.imo.org/Environment/) Marine Environment Protection Committee issues guidelines for the identification and designation of particularly sensitive sea areas (PSSAs)⁵. A PSSA is an area that needs special protection through action by IMO because of its significance for recognized ecological or socio-economic or scientific reasons and that may be vulnerable to damage by international maritime activities. The criteria for the identification of particularly sensitive sea areas and the criteria for the designation of special areas are not mutually exclusive. In many cases a Particularly Sensitive Sea Area may be identified within a Special Area and vice versa. IMO has approved the designation of 10 PSSAs⁶.

Table 2. Examples of Marine Spatial Planning and Ocean Zoning

Large, Integrated Sea Use Management Programs/Projects Using MSP

Australia	Great Barrier Reef Marine Park
Australia	Marine Bioregional Planning
Belgium	Belgian Part of the North Sea (GAUFRE Project)
Canada	Eastern Scotian Shelf Integrated Management Project
China	Territorial Sea Functional Zoning
Denmark, Germany & The Netherlands	Trilateral Wadden Sea Cooperation Area
Germany	EEZ and Territorial Sea Spatial Planning
Mexico	Ecological Ocean Use Planning in Gulf of California
New Zealand	Ocean Survey 20/20 and National Ocean Policy
The Netherlands	Integrated Management Plan for North Sea 2015
United Kingdom	MSP Pilot Project in Irish Sea and the Marine Bill

Examples of Marine Protected Areas Known to Use Zoning

Belize	Belize Barrier Reef
Ecuador	Galápagos Marine Resources Reserve and Galápagos Whale Sanctuary
Italy	Miramare Biosphere Reserve and Marine Reserve
Mexico	Sian Ka'an Biosphere Reserve
The Netherlands Antilles	Bonaire and Saba Marine Parks
Palau	Palau Marine Park
Russian Federation	Far East Marine and Commander Islands Biosphere Reserves
The Philippines	Tubbataha Marine Park
Tanzania	Mafia Island Marine Park
United States	Florida Keys National Marine Sanctuary
United States	Channel Islands National Marine Sanctuary
United States	California Marine Life Protection Act Initiative (California state waters)
Viet Nam	Ha Long Bay World Heritage Site and Hon Mun & Cu Lao Cham Marine Parks

Ecosystem-based Management

(1) Protects ecosystem structure, functioning, and processes; (2) Recognizes inter-connectedness within and among systems; (3) Integrates ecological, social, economic, and institutional perspectives; and (4) Is place-based or area-based (adapted from COMPASS, 2005).

Sea Use Management

(1) Works toward sustainable development, rather than simply conservation or environmental protection, and in doing so contributes to more general social and governmental objectives; (2) Provides a strategic, integrated and forward-looking framework for all uses of the sea to help achieve sustainable development, taking account of environmental as well as social and economic goals and objectives; (3) Applies an ecosystem approach to the regulation and management of development and activities in the marine environment by safeguarding ecological processes and overall resilience to ensure the environment has the capacity to support social and economic benefits (including those benefits derived directly from ecosystems);

(4) Identifies, safeguards, or where necessary and appropriate, recovers or restores important components of marine ecosystems including natural heritage and nature conservation resources; and (5) Allocates space in a rational manner that minimizes conflicts of interest and, where possible, maximizes synergy among sectors. Sea use management is an element of ecosystem-based management.

Marine Spatial Planning

A process of analyzing and allocating parts of three-dimensional marine spaces to specific uses, to achieve ecological, economic, and social objectives that are usually specified through the political process; the MSP process usually results in a comprehensive plan or vision for a marine region. MSP is an element of sea use management.

Ocean Zoning

A regulatory measure to implement MSP usually consisting of a zoning map and regulations for some or all areas of a marine region. Ocean zoning is an element of marine spatial planning.

Box 1. Definition of Some Important Terms

2 Introduction to Ecosystem-based **SEA USE MANAGEMENT**



Why Do We Need an Integrated Approach?

Natural resource managers today, whether working on the land or in the sea, face formidable problems. Demand for natural resources, including space, is accompanied by differing perceptions of their values, conflicts over their use, and concern about the natural and human environments affected. These problems are exacerbated by fragmented jurisdiction over the resource base, ambiguous government policies, lengthy review processes and weak regulations.

Natural resource planners, developers and managers are responding to these problems by seeking more integrated approaches that will enable their projects and programs to deliver as many benefits as possible, within acceptable limits of social and environmental impact, and with minimum conflict and cost.

See Ehler and Douvere workshop presentation (2006) at <http://ioc3.unesco.org/marinesp/>.

Why is Ecosystem-Based, Sea Use Management and Marine Spatial Planning Important?

The evolution of marine spatial planning is an important step toward making “ecosystem-based, sea-use management” a reality. While initially the idea was stimulated by international and national interests in developing marine protected areas, e.g., the Great Barrier Reef Marine Park⁷ more recent attention has been placed on managing the multiple use of marine space, particularly in areas where use conflicts are already clear, e.g., the North Sea.

Ocean space is a valuable resource—one that is increasingly over-used in many places of the world’s oceans (e.g., the North Sea) and often poorly managed.

What is an Ecosystem Approach to Management?

An ecosystem approach refers to “...the comprehensive integrated management of human activities based on the best available scientific knowledge about the ecosystem and its dynamics, in order to identify and take action on influences which are critical to the health of marine ecosystems, thereby

achieving sustainable use of eco-system goods and services and maintenance of ecosystem integrity” (HELCOM-OSPAR, 2003).

“Ecosystem approaches” are different things to different people and different disciplines. Although for some this variety is strength, overall it has probably neither increased the use nor the scientific respectability of ecosystem approaches.

Some key characteristics of ecosystem approaches would include:

- Describing parts, systems, environments and their interactions, i.e., a “systems” approach;
- Working through a holistic, comprehensive, trans-disciplinary approach;
- Defining the ecosystem naturally, e.g., bio-regionally, instead of politically;
- Looking at different levels/scales of system structure, process and function;
- Describing system dynamics, e.g., with concepts of homeostasis (i.e., the ability to maintain internal equilibrium by adjusting physiological processes), feedbacks, cause-and-effect relationships, self-organization, etc.);
- Including people and their activities in the ecosystem;
- Recognizing goals and taking an active, management orientation;
- Including actor-system dynamics and institutional factors in the analysis;
- Using an anticipatory, flexible research and planning process;
- Entailing an implicit or explicit ethics of quality, well-being and integrity; and
- Recognizing systemic limits to action—defining and seeking sustainability (Slocombe, 1993).

How Can an Ecosystem Approach Be Implemented?

Gill Shepherd, Thematic Leader of the Ecosystem Approach, in IUCN’s Commission on Ecosystem Management, has defined (from the Convention on Biological Diversity) the “ecosystem approach” as a strategy for the integrated management of land, water, and living resources that promotes conservation and sustainable use in an equitable way. She goes on to identify five steps to implementing the 15 principles of the ecosystem approach (Shepherd, 2004). See Box 2.

7

The Great Barrier Reef Marine Park was established in 1975. After 13 years its first zoning plan was implemented in 1988, and partially revised in 1998. A new comprehensive zoning approach, based on a Representative Areas Programme, was approved in 2004 (Day, 2006). The extent of no-take areas was increased from 5% to 33% of the GBRMP, including representative examples of each of the park’s 70 bioregions. Information on the RAP is available at: <http://www.gbrmpa.gov.au>. The area of the GBRMP is 345,200 km²; for comparison, the area of the North Sea is 750,000 km².

Step A. Determining the stakeholders and defining the ecosystem area

Principles

1. The objectives of management of land, water, and living resources are a matter of societal choice
2. The ecosystem approach should be undertaken at the appropriate spatial and temporal scales
3. The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations, and practice
4. The ecosystem approach should involve all relevant sectors of society and scientific disciplines

Step B. Ecosystem structure, function, and management **Management should be decentralized to the lowest appropriate level**

Principles

1. Conservation of ecosystem structure and functioning, to maintain ecosystem services, should be a priority target of the ecosystem approach
2. Ecosystems should be managed within the limits of their functioning
3. The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity

Step C. Economic Issues

Principles

Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context.

Any such ecosystem management program should:

1. Reduce those market distortions that adversely affect biological diversity;
2. Align incentives to promote biodiversity conservation and sustainable use; and
3. Internalize costs and benefits in the given ecosystem to the extent feasible

Step D. Adaptive management over space

Principles

1. Ecosystem managers should consider the effects (actual and potential) of their activities on adjacent and other ecosystems
2. The ecosystem approach should be undertaken at the appropriate spatial and temporal scales

Step E. Adaptive management over time

Principles

1. The ecosystem approach should be undertaken at the appropriate spatial and temporal scales
2. Recognizing the varying temporal and lag effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term
3. Management must recognize that change is inevitable

Box 2. **Implementing** **the Ecosystem** **Approach**

(Source: IUCN, 2004)

Most local jurisdictions in the US and Western Europe have a “comprehensive plan”, a long-range policy document that directs growth for the next 20–50 years and beyond. Especially in the US, these plans are implemented principally through zoning and subdivision ordinances and regulations. “Zoning” is the process by which a local jurisdiction legally controls the use of property and the physical configuration of development upon tracts of land within its jurisdiction. A zoning map is usually approved when a local jurisdiction adopts a zoning ordinance. This map divides the community into zoning districts (zones). Each district will carry a designation that refers to the zoning code regulations for that district. By referring to this map, it is possible to identify the use district within which any parcel of land is located. Then, by referring to the text of the zoning code, it is possible to discover the uses that are permitted within that district.

Sustainable development does not focus solely on environmental issues. More broadly, sustainable development policies encompass three general policy areas: economic, environmental and social. In support of this, several UN texts, most recently the 2005 World Summit Outcome Document, refer to the «interdependent and mutually reinforcing pillars» of sustainable development as economic development, social development, and environmental protection.

Why Use “Sea Use Management” Instead of Ecosystem Management?

Ecosystems and ecosystem components of marine areas cannot be managed in themselves. Only people and their behavior toward the use of ocean space and resources can be managed. Sea use management refers to the management of human uses of ocean resources, including the use of ocean space, in such a way that ecological, social, and economic objectives are achievable. Sea use management is used analogously to land use management in terrestrial environments.

So What’s the Problem? Aren’t Many Uses of the Ocean Compatible with One Another?

Many human uses of the sea can be—and are—compatible with one another, e.g., fishing and marine protected areas. On the other hand, however, human uses of ocean space often conflict with one another (use-use conflicts) and some human uses are entirely incompatible with maintaining critical ecosystem functions (use-environment conflicts).

Many of these conflicts can be avoided or reduced through marine spatial planning (MSP) by influencing the *location* of human activities in space and time; other tools are needed to manage the *performance* of human activities, e.g., to manage the quantity and quality of pollutant discharges from these activities

Don’t We Already Designate Zones for Many Places in the Ocean?

Yes. Most countries already designate ocean space for marine transportation, oil and gas development, wind farms, aquaculture, waste disposal, and so on, but on a case-by-case, sector-by-sector basis. Comprehensive MSP is rarely practiced today.

In many respects, ‘planning’ in the marine environment today resembles terrestrial planning in the 1970s⁸. With only a few exceptions, no clearly articulated spatial visions exist for the use of marine areas, no plan-based approach to management, and consequently, marine developers and users face a lack of certainty.

This situation is made worse by the sector-by-sector responsibilities for determining development applications in the marine environment. The time has come for a strategic and integrated plan-based approach for sea use management, instead of the piecemeal view, not the least so that commitments made in a number of important international and national marine policy declarations, including commitments to an “ecosystem approach,” can be fulfilled.

Why Manage Human Activities in the Sea?

Social demands for outputs (goods and services) usually exceed the capacity of the marine area to meet all of the demands simultaneously. Marine resources are often “common property resources” with open or free access to users. Free access often, if not typically, leads to excessive use of the resources, e.g., over fishing, and eventual exhaustion of the resources. Because not all of the outputs from marine areas can be expressed in monetary terms, free markets cannot perform the allocation tasks. Some process must be used to decide what mix of outputs from the marine area will be produced.

That process is sea use management—and marine spatial planning is one of its important elements.

What Is the Purpose of Ecosystem-based, Sea Use Management?

The overall purpose of sea-use management is to work toward sustainable development⁹ rather than simply conservation or environmental protection, and in doing so contribute to more general social and governmental objectives. Specifically, the purpose of sea use management is to:

- Provide a strategic, integrated and forward-looking framework for all uses of the sea to help achieve sustainable development, taking account environmental as well as social and economic objectives;
- Apply an ecosystem approach to the regulation and management of development and activities in the marine environment by safeguarding ecological processes and overall resilience to en-

sure the environment has the capacity to support social and economic benefits (including those benefits derived directly from ecosystems);

- Identify, safeguard, or where necessary and appropriate, recover or restore important components of marine ecosystems including natural heritage and nature conservation resources; and
- *Allocate space in a rational manner that minimizes conflicts of interest and, where possible, maximizes synergy among sectors* [emphasis added]¹⁰.

Why Should Sea Use Management Be Ecosystem-based?

The marine environment is both an ecosystem and an interlocking network of ecosystems. All the components of an ecosystem, including the human component, function together and interact to form an integrated network. Ensuring the integrity of the ecosystems, restoring when practicable and/or maintaining their characteristic structure and functioning, productivity and biological diversity, requires long-term integrated management of human activities, explicitly:

- Managing human activities to respect the capacity of ecosystems to fulfill human needs sustainably;
- Recognizing the values of ecosystems, both in their continuing unimpaired functioning and specifically in meeting those human needs; and
- Preserving or increasing their capacity to produce the desired benefits in the future (OSPAR, 2003).

Canada's first integrated ocean management plan is an example of this type of management approach. See Box 3.

What Are the Overall Goals of Sea Use Management?

Examples of the goals (that will obviously vary from place to place) could include the management of human activities in the marine environment in ways that:

- Sustain the long-run productivity of marine ecosystems that provide natural goods and services;

- Maintain or improve marine environmental quality;
- Result in sustained increases in human welfare (well being)¹¹.

What Are the Natural or Ecological Goods and Services that Come from Marine Ecosystems?

Ecological goods and services (EG&S) are the benefits arising from the ecological functions of healthy ecosystems. These benefits accrue to all living organisms, including animals and plants, not only to humans alone. However, there is a growing recognition of the importance to society that the ecological goods and services provide for health, cultural, social, and economic needs.

The Millennium Ecosystem Assessment (2005) identified four categories of EG&S's:

- "Provisioning services" are products and services harvested or passively provided by ecosystems, including wildlife and plant products for food, fiber, and medicines, water, extracted minerals, and genetic resources;
- "Regulating services" regulate overall environmental conditions on the Earth, such as maintenance of air and water quality, erosion control, and storm protection provided by coral reefs and wetlands;
- "Cultural services" are the non-material benefits from ecosystems, including spiritual and cultural benefits, unique knowledge systems, diversity of cultures, languages, understandings, recreational demands; and
- "Supporting services," maintain conditions for life on Earth, such as the production of oxygen and capture of carbon and nutrient cycling.

Isn't Ecosystem-based, Sea Use Management Simply Another Term for Marine Protected Area Management?

No. Ecosystem-based management is comprehensive and integrates across all economic sectors, including nature conservation. A protected area is "an area of land and/or sea especially dedicated to the protection of biological diversity, and of natural and associated cultural resources, and managed through legal and other effective means." (IUCN, 1994). The goal of MPAs, as seen by IUCN, is to conserve biological diversity and productivity, including ecological "life support" systems, of the oceans.



10

Adapted from the UK County Agencies Interagency Working Group on MSP, 2005.

11

Human well being depends on material welfare, health, good social relations, security and freedom. All of these are affected by changes in ecosystem services, but also by the supply and quality of, for example, social capital and technology. When the supply of ecosystem services exceeds the demand, an increase in supply tends to enhance human well being only marginally. In contrast, when the service is in short supply, a small decrease can substantially reduce well being. The degradation of ecosystem services is harming many of the world's poorest people, and is sometimes the principal factor causing poverty. For example, the declining state of capture fisheries is reducing a cheap source of protein in developing countries.

Box 3.
Canada's
First
Integrated
Ocean
Management
Plan

The Eastern Scotian Shelf Integrated Management (ESSIM) Initiative is a collaborative ocean planning process led and facilitated by Fisheries and Oceans Canada (DFO), Maritimes Region, under Canada's Oceans Act. The ESSIM Initiative was announced by the Minister of Fisheries and Oceans in December 1998 and followed the recommendation from the Sable Gully Conservation Strategy that integrated management approaches be applied to the offshore area around the Sable Gully Area of Interest (AOI) under DFO's Marine Protected Areas Program.

The 1997 Oceans Act and its supporting policy, *Canada's Oceans Strategy*, affirm DFO's mandate as the lead federal authority for oceans and provide the national context for the Initiative. The principles and approaches of the Initiative are rooted in developing international ocean governance processes and Canada's ocean-related international legal commitments. DFO's national Integrated Management Policy and Operational Framework provides further guidance on the development of integrated management plans and processes under the Oceans Act. Of particular importance is the commitment to establish Large Ocean Management Areas (LOMAs) for all of Canada's marine regions.

The ESSIM planning process considers the ecosystem and all of its users comprehensively. The Initiative brings regulatory authorities from all levels of government together with a wide array of ocean stakeholders to work collaboratively. This allows for a more coordinated, comprehensive and inclusive management approach and helps to prevent conflict among different ocean users and between humans and the environment. The primary aim of the Initiative is to develop and implement an Integrated Ocean Management Plan that will guide the sustainable use, conservation, and management of this large marine region.

In February 2005, the ESSIM Planning Office, housed in DFO Maritimes' Oceans and Coastal Management Division, presented an initial draft Integrated Ocean Management Plan to stakeholders for review. Based on the generally positive feedback received, the Planning Office launched a broad public review of the draft Plan over the spring, summer, and fall of 2005. Following the public review, a group of stakeholders representing all major ocean sectors and government agencies in the planning area was assembled to consider the feedback received and to work with the Planning Office to revise the draft Plan. In July 2006, this group, known as the Stakeholder Advisory Council, completed a final draft Plan that was released again for broader stakeholder and government discussion. In November 2006, the Stakeholder Advisory Council assembled a final set of amendments to the Plan and provided its endorsement of the document. In December 2006, the senior intergovernmental Regional Committee on Ocean Management similarly provided its endorsement of the Plan. In February 2007, the Minister of Fisheries and Oceans received letters from both groups endorsing the Plan and recommending that it be given status as an Integrated Management Plan under Section 31 of the Oceans Act. The Eastern Scotian Shelf Integrated Ocean Management Plan is the product of an extensive collaborative and inclusive planning process. It has been shaped and accepted by stakeholders, supported and endorsed by government authorities, and formally recognized as Canada's first Integrated Ocean Management Plan under the Oceans Act.

*Modified from DFO Canada's Website,
<http://www.mar.dfo-mpo.gc.ca/oceans/e/essim/essim-plan-e.html>.*

Box 4.
Categories
of Goals and
Objectives

■ **1. HEALTHY ECOSYSTEMS**

A. Biodiversity

- community diversity
- incidental mortality
- species at risk
- invasive species
- genetic integrity

B. Productivity

- primary and secondary productivity
- tropic structure
- population productivity

C. Marine Environmental Quality

- physical and chemical characteristics
- habitat
- noise
- wastes and debris
- overall atmospheric pollution

■ **2. SUSTAINABLE HUMAN USE**

A. Social and Cultural Well-being

- sustainable communities
- sustainable ocean/community relationships
- safe, healthy and secure oceans

B. Economic Well-being

- sustainable wealth generation from renewable ocean resources, non-renewable ocean resources, ocean infrastructure, and ocean-related activities

■ **3. COLLABORATIVE GOVERNANCE AND INTEGRATED MANAGEMENT**

A. Integrated Management

- building collaborative structures and processes
- appropriate legislation, policies, plans and programs
- fulfillment of legal obligations and commitments
- compliance and accountability of ocean users and regulators
- stewardship and best practices
- reduction of multi-sectoral resource use conflicts

B. Information and Knowledge

- natural and social science research being responsive to knowledge needs
- effective information management and communication
- timely monitoring and reporting

Adapted from Canada's ESSIM Project, 2006

While MPAs can be managed toward a range of goals, from strict nature protection (IUCN Category I) to sustainable, multiple use (IUCN Category VI), their principal goal will be nature conservation and protection. Ecosystem-based sea use management, including marine spatial planning, tries to integrate multiple objectives across sectors, including MPAs.

Isn't Ecosystem-based, Sea Use Management the Same as an Ecosystem Approach to Fisheries Management?

No. The goal of ecosystem-based management is to conserve the structure, diversity and functioning of ecosystems through management actions that focus on the biophysical components of ecosystems.

Fisheries management aims to meet the goals of satisfying societal and human needs for food and economic benefits through management actions that focus on the fishing activity and the target resource. The purpose of an ecosystem approach to fisheries 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 the marine ecosystem (FAO 2003).

Isn't Ecosystem-based, Sea Use Management the Same as Integrated Coastal Zone Management?

Yes and no. Both involve a strategic approach; both are concerned with the integration of different uses and activities—both aim to avoid conflict. However, the definition of the boundaries of coastal management has been limited in scope traditionally. In most places of the world, coastal management has focused on a narrow strip of coastline, typically within a kilometer or two from the shore and occasionally focusing on a water body such as an estuary. Rarely have the inland boundaries of coastal management included coastal watersheds or catchments areas, although that is changing in some places due to concerns about nonpoint source runoff, e.g., pollution from agriculture. Even more rarely does coastal management extend into the territorial sea and/or beyond to the exclusive economic zone.

Ecosystem-based, sea use management focuses on marine places in which the boundaries are ecologically meaningful and ensures integration with coastal and inland areas. Marine spatial planning is a critical element of sea use management.

3 Ecosystem-based Sea Use Management and **MARINE SPATIAL PLANNING**



What is Marine Spatial Planning?

Marine spatial planning (MSP) is a process for regulating, managing and protecting the marine environment that addresses the multiple, cumulative and potentially conflicting uses of the sea (Defra, 2005). MSP in its broadest sense is about analyzing and allocating parts of the three-dimensional marine space to specific uses, to achieve ecological, economic, and social objectives that are usually specified through the political process. MSP is place- or area-based and can provide a practical approach to long-term ecosystem-based management. MSP should be comprehensive and adaptive, and resolve conflicts among multiple uses and the ecosystem.

The overall aim of MSP is to create and establish a more rational organization of the use of marine space and the interactions between its uses, to balance demands for development with the need to protect the environment, and to achieve social and economic objectives in an open and planned way. A comprehensive plan, developed in consultation and agreement with relevant stakeholders, should provide a firm basis for rational and consistent decisions on permit applications, and allow users of the sea to make future decisions with greater knowledge and confidence (Defra, 2005).

Marine spatial planning is only one of the tools with which to establish ecosystem-based, sea-use management. Other tools include:

- Sea use management plans, including comprehensive marine spatial plans, as one element;
- Zoning maps and regulations;
- Site plans;
- Infrastructure investments/capital facilities siting;
- Special management areas;
- Regulations;
- Standards (ambient water quality standards, sediment quality standards);
- Permits (construction permits, pollution discharge permits, operating permits);
- Economic instruments (e.g., development charges, other user charges, license or permit fees, grants, subsidies, taxes, depletion allowances, tax credits);

- Guidelines, e.g., best environmental practices/codes of practice or conduct;
- Surveillance and enforcement sanctions (e.g., fines, cancellation of permits);
- Technical assistance; and
- Education and outreach.

What Can Marine Spatial Planning Do? And What Can't It Do?

Marine spatial planning can be used to analyze and assess the need for ocean space by current and future human activities. It can be used to assess the cumulative impacts in space and time of current and future economic developments on ecological processes in ocean areas and their resources. It can be used to identify compatibilities and conflicts among uses and between uses and the environment. It can be used to allocate space to different uses and therefore control the location of specific human activities in time and space.

However, it cannot be used to control the performance or behavior of human activities in terms of the production of goods and services. Other tools or management measures mentioned in the previous section must be used in conjunction with marine spatial planning.

Does Marine Spatial Planning Always Need Zoning?

There are a number of elements to marine spatial planning without proceeding as far as a comprehensive zoning plan and regulations. It is also clear that there is no prerequisite for marine spatial planning to proceed as far as prescribed spatial allocations. It might instead simply indicate preferences or priorities (such as 'indicative planning' would not prevent users from applying to use other areas including an area indicatively allocated to another use. Equally, zoning may not need to apply across the whole plan area in the sense that specific 'zones' might be identified, e.g., a conservation priority zone, among one general 'zone' that covers most of the area.

Don't We Already Have "Zones" in the Ocean?

Yes, at a global scale the UN Convention on the Law of the Sea (UNCLOS), which went into effect in 1994, provides an over-arching

framework for the allocation of marine spaces to nation states. It codified concepts such as the “territorial sea” of 12 nautical miles, the “exclusive economic zone” of 200 nautical miles, the contiguous zone, the continental shelves, and the high seas.

The surface area of the world’s oceans is 361,060,000 km². About 102,108,000 km² of that area is under the jurisdiction of nation states (WRI Earthtrends database). The high seas (areas beyond national jurisdiction) cover about 202,000,000 km².

According to the IUCN, less than one-half of one percent of the surface area of the ocean has some form of protected status, i.e., marine protected area designation, compared to four percent of terrestrial areas.

Don’t Most Coastal Countries Currently Allocate Ocean Space Today?

Yes, but on a single-sector basis (see Table 3). Current practice is not plan-based with little or no consideration of other uses that may be compatible or conflicting. Only a few examples of comprehensive marine spatial planning exist in the world today (see table in first chapter).

What Is Lacking in Current Practice?

Current practice often leads to conflicts among uses or among user objectives. Current practice often leads to conflicts between human use and the natural environment. Current practice does not account for the cumulative effects of current and future space use allocations.

In many countries the demand for ocean space exceeds the amount available. For example in Belgium, if space is allocated based on existing legal rights, the sum of all potential demand for ocean space would already be about 2.6 times larger than the amount available (see Fig. 2). And future requirements for space are expected to grow.

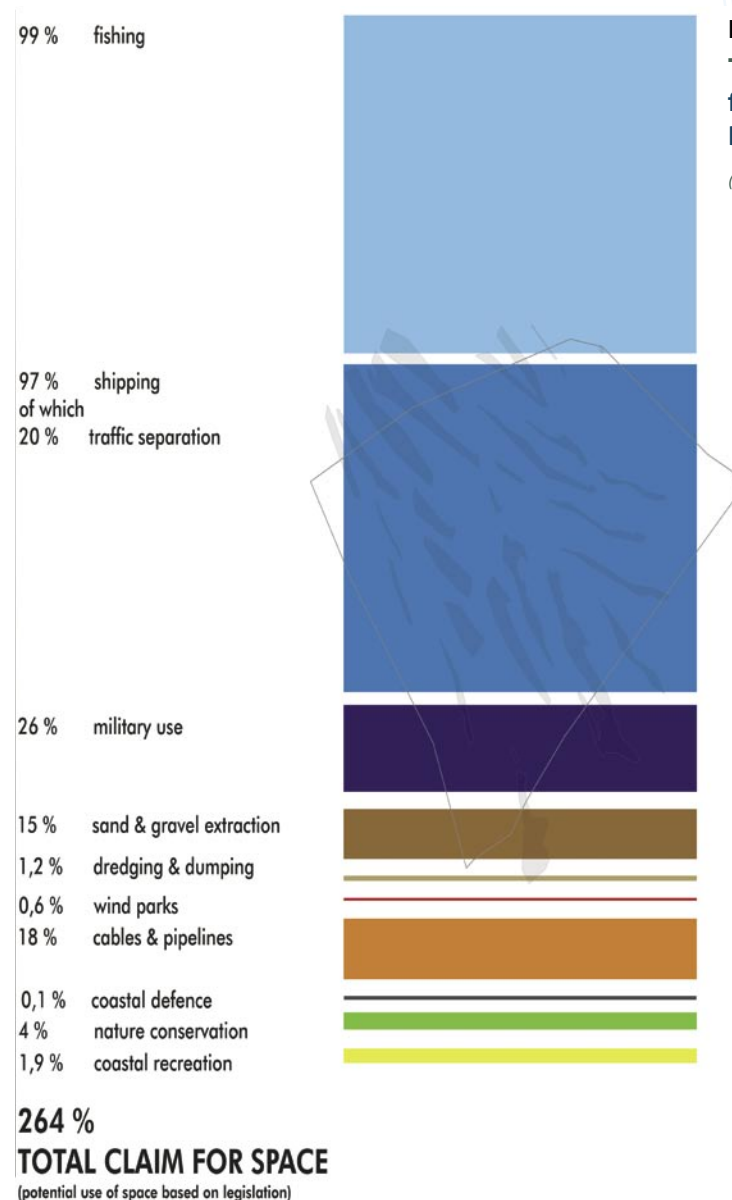


Fig 2.
Total Claims
for Ocean Space in
Belgium

(Source: Maes, et al., 2005)

How is Marine Spatial Planning Different?

MSP can be used to identify conflicts and compatibilities between human uses and the environment before they occur. It can be used to assess the cumulative effects of space use allocations. MSP can articulate a plan-driven approach to the management of marine areas and can articulate a clear vision for the human uses of space within marine areas. It can provide certainty to developers and other users of marine areas. It provides a process in which biodiversity commitments can be at the heart of planning and management. It can ensure “room” for biodiversity and nature conservation and provide a context for establishing network of protected areas (adapted from English Nature, 2005).

What Are Some of the Benefits of Marine Spatial Planning?

Most evidence of the economic benefits of MSP is qualitative rather than quantitative. (see Box 5). More quantitative evidence of benefits is likely to appear in the next few years as further spatial planning schemes are developed, and the consequences currently underway are documented.

What Are the Costs of Marine Spatial Planning?

MSP is not free. To be effective, MSP requires time, both to implement and to see real results, and resources, including trained personnel. MSP also requires spatially explicit information on ecosystem characteristics, human activities (current and future), including their social and economic characteristics, and offshore jurisdictions. This information is often not readily available for most areas and is expensive and time-consuming to collect.

Why Is Stakeholder Participation Critical?

Management of the ocean is a matter of political and societal choice. MSP will propose priorities among different uses of marine resources and may redistribute the costs and benefits of management strategies among different groups (see section on the “Human Dimension” in this report). Involving stakeholders in the development and implementation of MSP is essential to sustained implementation of spatial management plans.

Table 3. Examples of Existing Ocean Space Designations

Vessel Traffic Routes
Vessel Traffic Separation Zones & Precautionary Zones
Areas To Be Avoided (by vessels)
Safety Zones Around Vessels and Terminals
Anchoring & No-Anchoring Areas
Security Zones in Ports and Waterways
Oil & Gas Lease or Concession Areas
Wind Farm and Wave Park Lease or Concession Areas
Safety Zones Around Oil & Gas Installations, Wind Farms, Wave Parks, etc.
Military Operations or Exercise Zones
Dredging Sites or Areas
Designated Dredged Material Dumping Areas or Zones
Oil & Gas Pipeline Rights of Way
Submarine Communications Cable Rights of Way
Energy Transmission Line Rights of Way
Sand & Gravel (Aggregate) Extraction Areas
Fishery Closure Areas, including seasonal closures
No Trawl Areas
Critical Habitat Designations
Offshore Aquaculture Areas
Marine Protected Areas
Protected Archeological Areas, e.g., Ship Wrecks
Cultural or Religious Areas
Scientific Reference Sites

Box 5. The Benefits of Marine Spatial Planning

Facilitating Sector Growth—MSP can provide a framework that facilitates the sustainable development of different economic activities, therefore helping to enhance income and employment

Optimizing the Use of the Sea—MSP can help to ensure that maximum benefits are derived from the use of the sea by encouraging activities to take place where they bring most value and do not devalue other activities

Reducing Costs—MSP can reduce the costs of information, regulation, planning and decision-making.

These benefits arise through:

Strategic Planning—MSP provides a strategic planning framework that helps to facilitate sectoral development by guiding investment decisions. Oil and gas have benefited from strategic planning approaches at a sectoral level; there is reason to believe that other sectors such as ports and fisheries would also benefit from strategic planning. An integrated and cross-sectoral approach to marine spatial planning could provide significant further economic benefits by considering the different needs and opportunities of different users of marine areas and helping to resolve potential conflicts.

Conflict Resolution—The potential for conflicts between different marine sectors is increasing over time, particularly as developing sectors such as aquaculture and renewable energy grow in significance. MSP provides a means of avoiding and managing potential conflicts, and ensuring that the needs of different sectors are addressed in a coordinated way.

Sustainable Resource Use—MSP should facilitate the sustainable exploitation of natural resources—such as fisheries and aggregates—and thereby secure the long-term future of the industries that depend on them.

Provision of Development Space—MSP helps to ensure that all marine activities—including developing sectors such as renewable energy and aquaculture as well as more established ones—are fairly allocated space to develop.

Promoting Appropriate Uses—By considering the variety of uses appropriate to the area in question, the value of different activities, the potential conflicts of use, and the suitability of different areas for different uses, MSP should help to promote a mix of uses that are compatible with each other and the environment, and help to optimize the use of the marine area.

Supporting the Environmental Economy—By improving the conservation and management of the marine environment, MSP helps to promote activities that depend on environmental quality, such as recreation and fishing. This is particularly true in areas of high conservation value where activities such as diving and wildlife tourism are significant.

Improving Stakeholder Involvement—MSP can provide a transparent and structured mechanism in which the interests of different sectors can be represented and reconciled.

Information Efficiencies—By developing common approaches to the acquisition and dissemination of information, MSP can help to improve information provision and reduce duplication of effort, therefore bringing cost efficiencies.

Regulatory Efficiencies—By improving information exchange and providing a more certain environment in which regulatory decisions are made, MSP can be expected to reduce regulatory and compliance costs.

From: GHK Consulting Ltd., 2004. Potential Benefits of Marine Spatial Planning to Economic Activity in the UK. RSPB: Sandy, UK. 100 p.

4 Scientific Issues for Ecosystem-based **MARINE SPATIAL PLANNING**

What Is “Biodiversity”?

Biodiversity is the collection of genomes¹², species and ecosystems occurring in a geographically defined region (NRC, 1995). Biodiversity refers to a variety of life forms including plants, animals, and microorganisms, the genes that they contain and the ecosystems that they form. Biodiversity is composed of three main categories: (1) genetic diversity; (2) species diversity; and (3) ecosystem diversity.

The 1992 United Nations Earth Summit defined “biodiversity” as “the variability among living organisms from all sources, including, *inter alia*, terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are part. This includes diversity within species, between species and of ecosystems”.

See also Norse and Crowder workshop presentation (2006) at <http://ioc3.unesco.org/marinesp/>.

What is a Marine Ecosystem?

Ecosystems are subdivisions of the Earth’s surface, including marine areas, and lower atmosphere within which natural processes operate and biological communities perpetuate themselves. Often they do not have readily identifiable boundaries because many of the intrinsic processes (e.g., supply of water or nutrients) originate beyond any obvious habitat or structural limits and operate at a range of scales. (Lafolley et al, 2004).

In contrast to more readily definable ecosystems (e.g., a lake or a forest), the character of the sea appears relatively seamless with ecological processes operating over large scales and distances. Boundaries can be subtle, being defined by temperature, currents, depth, stratification and salinity. *In practice, the scale of the marine ecosystems most suitable for application of the ecosystem approach are the scales at which it is most appropriate to manage particular human activities.* Scales ranging from ocean to regional sea to estuary may all be equally appropriate.

The Convention on Biological Diversity defines a “marine ecosystem” as “dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit” (CBD, 1992). The World Wildlife Fund has defined “ecoregions” as a large area of land or water that contains a geographically distinct assemblage of natural communities that share a large majority of their species and ecological dynamics, share similar environmental conditions, and interact ecologically in ways that are critical for their long-term persistence.

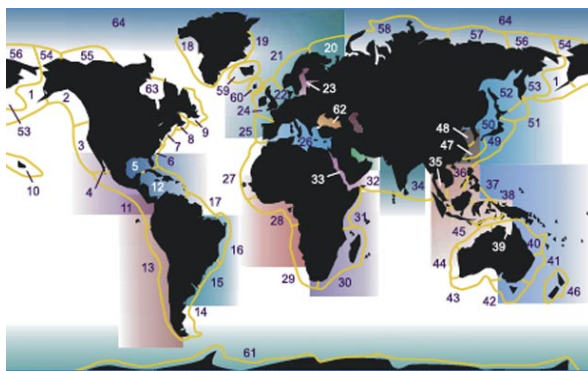
Conservation International uses the term “seascape” to define large, multiple use marine areas, e.g., the Sulu-Sulawesi Seascape, defined scientifically and strategically, in which government authorities, private organizations, and other stakeholders cooperate to conserve the diversity and abundance of marine life and to promote human well being (CI, no date).

NOAA (USA) has defined “large marine ecosystems” (LMEs) as natural regions of ocean space encompassing coastal waters from river basins and estuaries to the seaward boundary of continental shelves and the outer margins of coastal currents. LMEs are relatively large regions of 200,000 km² (77,000 mi²) or greater, with boundaries based on four criteria—bathymetry, hydrography, productivity, and trophic relationships—especially relevant for fisheries management. LMEs cover only the continental margins and not the deep ocean and oceanic islands (Sherman, 1991).

In the context of the EU Thematic Strategy for the Marine Environment, Europe used the concept of “ecoregions” to divide its seas into ecologically-meaningful management units. Eleven eco-regions have been defined based on bio-geographic features, oceanographic features,

Fig 3.
Large Marine
Ecosystems and
Regional Seas
Programmes

(source: UNEP)



and existing political, social, and management divisions. They include the Greenland and Iceland Seas, Barents Sea, Faroe Islands, Norwegian Sea, Celtic Sea, North Sea, South European Atlantic Shelf, Western Mediterranean Sea, Adriatic-Ionian Seas, Aegean-Levantine Seas, and the Oceanic Northeast Atlantic (EU Marine Strategy, 2005).

Are “Ecosystems” the Same as “Bioregions”?

Miller (1996) defines a bioregion as a geographical space that contains one whole or several nested ecosystems characterized by land-forms, vegetative cover, human culture and history as identified by local communities, governments and scientists. IUCN describes a bioregion as a land and water territory, the limits of which are not defined by political, but the geographical boundaries of human communities and ecological systems.

Berg (2002) defines a bioregion in terms of the unique overall pattern of natural characteristics that are found in a specific place. The boundaries of a bioregion are best described by the people who live within it, through human recognition of the realities of “living-in-places” (Miller, 1996);

There is no single right scale for a bioregion. It is important to note that bioregions can occur at any scale, as they are based on “bio-factors” that are not scale-dependent. Setting up the scale of the bioregion is essential to reaching shared individual and institutional goals. However, a program of dialogue, scientific trial and error and adaptation over time, is the best way to determine a bioregion’s boundaries. Thus, the right scale is determined by dialogue and informed by science, technology, information, and social considerations.

Are Marine Ecosystems Distinctly Different from Terrestrial Ecosystems?

Marine primary producers are represented by small and mobile phyla¹³. Terrestrial producers tend to be large and sessile. Marine producers are subject to fluid transport processes, can be spatially mixed, and can unexpectedly produce blooms that can be toxic.

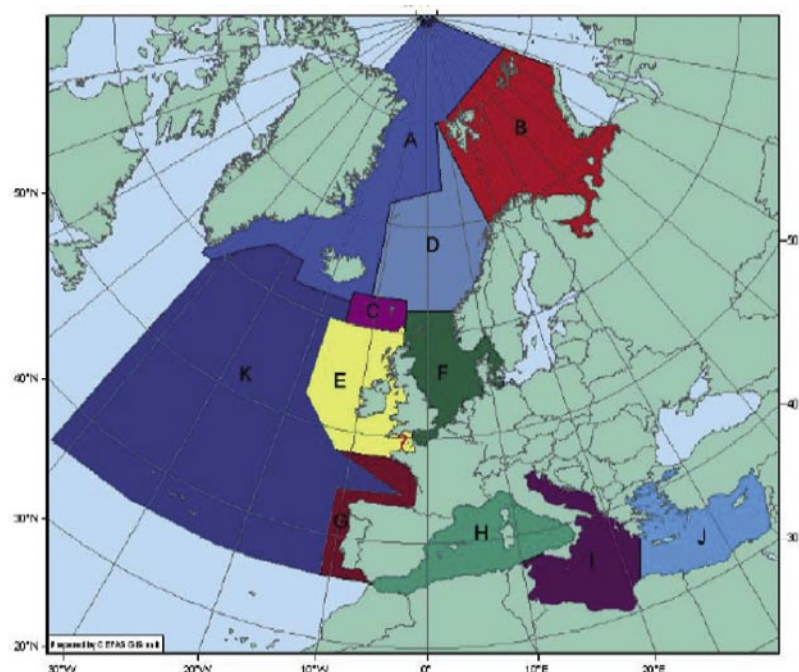


Fig 4.
European
Eco-regions

(Source: EU Marine Strategy)

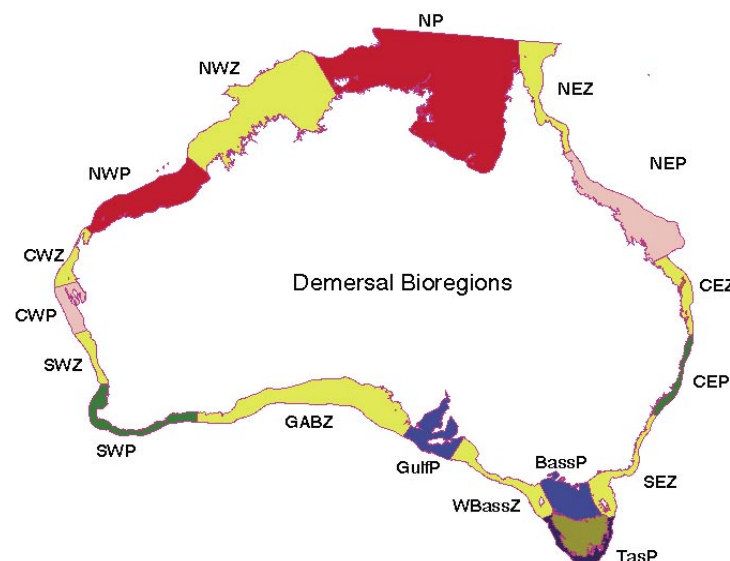


Fig 5.
Offshore
Provincial
Bioregions of
Australia

(Source: Australia Department of Environment and Heritage)

13

A phylum is a primary division of a kingdom. The taxonomic organization of species is hierarchical. Each species belongs to a genus, each genus belongs to a family, and so on through order, class, phylum, and kingdom.



Large marine carnivores and grazers—top predators such as fish and sea stars—have a greater range of life history characteristics than terrestrial counterparts. Most marine predators have planktonic and benthic life stages, each with unique environmental responses. Marine predators differ strikingly in their much higher reproductive output. This may buffer them from extinction due to overexploitation, but it also renders their populations far more variable and less predictable and makes them more vulnerable to threshold effects.

When ocean and continental (aquatic and terrestrial) systems are compared, biomass¹⁴ is found to be thousands, to hundreds of thousands of times more dilute in the oceans. Oceanic species interact trophically with more other species than continental species, the largest marine predators and prey are larger by one or two orders of magnitude, and the oceans are on average several to hundreds of times less productive than the continents.

Distant marine habitats can be linked through dispersing larvae. Such systems are “open”, and connections between benthic and planktonic life-history stages assume great significance, unlike most terrestrial systems.

The higher-order diversity of marine life is substantially richer. There are 13 unique marine animal phyla (as opposed to one unique land phylum). The existence of such a large number of unique phyla provides a compelling argument for the importance of the evolutionary history of the sea (NRC, 1995).

Are Some Areas of the Sea More Important than Others From an Ecological Viewpoint?

Yes. Some examples of important ecological areas include:

- Areas of high diversity
- Areas of high endemism (endemic species are ones with relatively narrow distributions)
- Areas of high productivity, e.g. upwelling areas
- Spawning areas that serve as sources of recruits
- Nursery grounds

- Migration stopover points (e.g., for whales, turtles, and billfishes) and bottlenecks (e.g., migratory shorebirds) (Norse, 1993).

What Factors Underlie Long-term Sustainability?

Historically, exploitation of marine resources has been localized. Users knew limitations of marine resources in their areas, and societies and communities decided who would fish where and enforced the privilege effectively.

The productivity of the sea was unharmed, and technological change was very slow.

What Are Some of the Indications of Problems in the Sea?

Fisheries are collapsing. The loss of marine biodiversity is profoundly reducing the ocean's ability to produce seafood, resist diseases, filter pollutants, and rebound from stresses like over fishing and climate change (Worm et al., 2006). Current global trends project the collapse of all species of wild seafood that are currently fished by the year 2050—collapse is defined as 90 percent depletion (Worm et al., 2006).

Megafauna are disappearing. Large predatory fish biomass today is only about 10% of pre-industrial levels—declines of large predators in coastal regions have extended throughout the global ocean, with potentially serious consequences for ecosystems (Myers & Worm, 2003).

Habitat-formers are vanishing. A report on the status of coral reefs of the world reports that 24% of the world's reefs are under imminent risk of collapse from human pressures, and a further 26% are under a longer-term threat of collapse (Wilkinson, 2004).

Noxious or alien species are proliferating.

What Are the Causes of these Problems?

There are many causes of the problems, including:

- Overexploitation of marine resources, e.g., over fishing
- Habitat loss¹⁵ and physical alterations to habitat¹⁶

14

Biomass is the total mass of living matter within a given unit of environmental area.

15

For example, Orth et al. (2006) report an almost 10-fold increase in the loss of seagrasses in tropical and temperate regions over the past 40 years world-wide. Threat include degraded water quality and rising water temperatures, as well as emergent threats from fish farming and aquaculture.

16

Sea-level rise and human development are together contributing to losses of coastal wetlands (IPCC, 2007).

- Chemical pollution and eutrophication
- Alien species (invasions of exotic species)¹⁷
- Climate change, including increased ultraviolet radiation, potential rising temperatures, resulting in potential changes to ocean circulation (NRC, 1995)

In addition, non-climate stresses can increase vulnerability to climate change by reducing resilience and can also reduce adaptive capacity because of resource deployment to competing needs. For example, current stresses on some coral reefs include marine pollution and chemical runoff from agriculture, as well as increases in water temperature and ocean acidification. Vulnerable regions face multiple stresses that affect their exposure and sensitivity as well as their capacity to adapt (IPCC, 2007).

Isn't Governance Part of the Problem as Well?

Unfortunately, yes. Our oceans are in trouble because governance is not yet configured to manage them. Decision-making is fragmented, with major overlaps and gaps in governing authority. Natural processes and governance often occur at different *spatial* scales. Additionally, natural

processes and governance happen on different temporal scales. Comprehensive ecosystem-based spatial management can alleviate these problems (Crowder et al., 2006)

Marine ecosystem-based management will take years to develop, but there are key steps that we can take now:

- We can work toward ecosystem-based management through marine spatial planning that could dramatically reduce harmful effects of open-access competition and spatial mismatches—endless conflicts, uncertainty, and high costs—by separating incompatible uses;
- Recognize that some human uses are incompatible with maintaining biodiversity, e.g., bottom trawling, and eliminate or reduce the impacts of those incompatible uses on the marine environment;
- Recognize that some human uses are incompatible with others and reduce those conflicts through effective marine spatial planning; and
- Acknowledge that some things only occur in one place, e.g., fish spawning aggregations, and ensure the effective protection of those areas through marine spatial planning and zoning.



17

Invasive species mean alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health. Invasive species represent the second leading cause of species extinction and loss of biodiversity in aquatic environments worldwide. Common sources of aquatic invasive species introduction include ballast water, aquaculture escapes, and accidental and/or intentional introductions, among others. For example, shipping moves 3–5 billion tonnes of ballast water internationally each year. It's estimated that at least 7,000 different species are carried in the ballast waters of ships worldwide. There are hundreds of examples of catastrophic introductions around the world, causing severe human health, economic and/or ecological impacts in their host environments (see Global Ballast Water Management Programme at <http://www.globallast.imo.org/>).

5 Legislative and Policy Context for **MARINE SPATIAL PLANNING**



What Are Some Early Examples of Authorities for MSP?

Initial MSP legislation focused on marine protected areas (MPAs) such as Australia's Great Barrier Reef and the Florida Keys in the USA—and MPAs continue to be a driving force in marine spatial planning today. For example, Member States of the European Union have to identify Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) and have a legal obligation to provide sufficient protection under Natura 2000. In addition, marine spatial planning was only occasionally an integral part of coastal management initiatives.

See also Maes workshop presentation available at <http://ioc3.unesco.org/marinesp/>.

Can MSP Be Influenced by International Law or Practice?

The United Nations Convention on the Law of the Sea (UNCLOS) acknowledges that the problems of ocean space are closely related and need to be considered as a whole. However, the legal boundaries set for maritime zones do not coincide with ecosystem boundaries.

In 1999 the UN established an informal consultative process on oceans and Law of the Sea, which has promoted to the UN General Assembly the requirement for an integrated, ecosystem-based approach to management for the world's oceans. Principle 7 of the Rio Declaration states that countries should cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the earth's ecosystems. The adoption of Agenda 21 provided for the management of the ecosystem as an entirety, including biotic and abiotic components.

Chapter 17 of Agenda 21 calls for coastal states to commit themselves to integrated management and sustainable development of coastal areas and the marine environment under their national jurisdiction.

Under the FAO's "Code of Conduct for Responsible Fisheries" countries are encouraged to conserve the biodiversity of aquatic habitats and ecosystems, taking into account the fragility of coastal ecosystems and integrated use of resources, and ensuring that conservation measures are applied to both target species and

species belonging to the same ecosystem or associated with the target species.

Following the successful inclusion of an ecosystem-based and precautionary approach in the work of the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR), the concept was incorporated into the Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean and the 1995 UN Fish Stock Assessment. In the past three years an ecosystem approach to fisheries management has been considered at an international level through the 2001 Reykjavik Conference on Responsible Fisheries in the Marine Ecosystem and the subsequent 2003 FAO Technical Guidelines on "The Ecosystem Approach to Fisheries".

While this sectoral-focused work has contributed to international, regional and domestic fisheries management, as a single-sector approach, it cannot provide a comprehensive ecosystem-based management approach. It cannot cover the full range of human activities within an ecosystem and does not account for the potentially cumulative and additive impacts that result from both fishing and non-fishing activities.

The Convention on Biological Diversity (CBD) considers that an ecosystem-based approach is the primary framework for the implementation of its international convention. The ecosystem approach is seen as a way to achieve the CBD's three objectives of conservation, sustainable use, and the equitable sharing of resources.

Finally, the UNEP Regional Seas Programme aims to address environmental problems in the management of marine and coastal areas. The 18 regional programmes that have been established adopt the principle of integrated management, with most also addressing trans-boundary issues through an ecosystem-based approach.

Can MSP Be Initiated through National Legislation?

Yes. For example the Great Barrier Reef Marine Park Act (1975) provides a framework for planning and management of the Marine Park, including zoning plans, plans of management, and permits.

An integrated management plan for the Eastern Scotian Shelf has been drafted under Canada's Oceans Act (1997) that is expected to eventually lead to zoning. China's Sea Use Management Legislation (2002) requires the functional zoning of its territorial sea. The United Kingdom's proposed Marine Bill (2007) has marine spatial planning as one of its keystones. (See Box 6).

Can MSP Be Initiated through National Policy?

Yes. In 2005, the Dutch Ministry of Housing, Spatial Planning, and the Environment published for the first time a North Sea paragraph in its National Spatial Planning Policy Document for the Netherlands. The North Sea paragraph gives guidance through spatial planning for the management of human activities in the North Sea. An Integrated Plan for the North Sea 2015 was developed in which the strategy outlines how the Dutch part of the North Sea will be managed in the next decade. Core objectives of the management plan address the need for a healthy, safe, and profitable sea. (See Fig. 6).

Some other examples where national ocean policy statements have led to preliminary attempts toward marine spatial planning include:

- China's Ocean Agenda 21 (1996)
- Australia Ocean Policy (1998)
- New Zealand's Ocean Policy (2000)
- Canada's Oceans Strategy (2002)
- United Kingdom's Safeguarding Our Seas (2002)
- Korea's Ocean Policy (2004)
- Mexico's Ecological Sea Use Planning and Zoning, Gulf of California and Gulf of Mexico (2006)
- European Commission's Maritime Policy Green Paper (2006). (See Box 7)

Is there a Good Example of MSP with National Legislation?

Yes, Germany. The Federal Spatial Planning Act of Germany has recently been amended to extend national sectoral competencies for spatial planning to its EEZ. In German coastal areas (up to 12 nautical miles offshore), the Lander (states) can establish marine spatial planning on

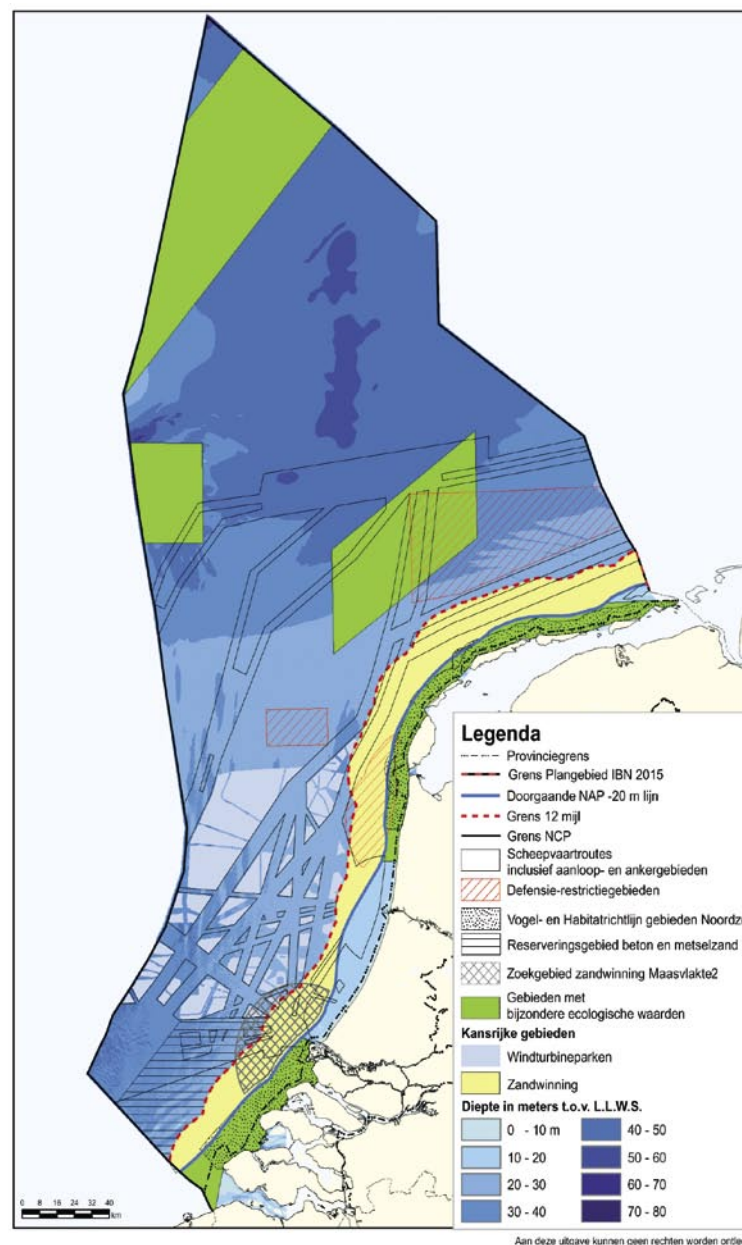


Fig 6.
Zoning Map for
the Dutch part of
the North Sea

(Source: Rijkswaterstaat
Noordzee)

Fig 7.
Policy Hierarchy
of Marine Spatial
Planning

(modified from MSPP
Consortium, 2006)



the basis of their terrestrial planning laws. The Lander Mecklenburg-Vorpommern (Baltic Sea) and Niedersachsen (Lower Saxony, North Sea) have expanded their existing land use plans to the coastal area. (See Box 8).

Some of the positive points with this approach include:

- A legally enforceable duty for governmental bodies;
- Public participation can not easily be offset due to legal procedures (access to courts);
- Legal enforcement tools besides administrative enforcement;
- A holistic legal basis for environmental impact assessment (EIA and SEA) or assessment of ecological effects;
- Better legal protection of user rights and nature; and
- Improved management on a long-time scale.

Some of the negative points associated with this approach include:

- Less flexibility to take into account new scientific data due to rigid procedures for planning adaptation and results of public participation; and
- Higher political and administrative resistance might result in a weak plan.

Is There a Good Example of MSP Without National Legislation or Policy?

Yes, Belgium is one of the first countries to actually implement marine spatial planning despite the fact that there is no specific legislation requiring it to do so. The development and implementation of a spatial plan for its waters is based on a strong Marine Protection Act (1999). Central to the Act is a licensing procedure and the obligation of an environmental impact assessment (EIA) for new human activities. (See Box 12).

The positive aspects of this approach include:

- Flexible allocation of activities based on demands;
- Flexible public or stakeholder participation depending on urgency; and
- Policy can easily be adapted based on new scientific knowledge

Some of the negative features of this approach include:

- Continuity of the future implementation of MSP is not guaranteed;
- Does not necessarily solve competition among different governmental bodies involved;
- No redistribution of competences if necessary for a holistic approach;
- Planning does not take into account user-user conflicts for a broader area; and
- No EIA or assessment of ecological effects for the whole planning area (SEA), i.e., only single use EIAs

What Are Some of the Other Key Legal Issues?

Some of the remaining legal issues include:

- Appropriate planning scale: regional or national or international?
- Boundaries: legal-administrative or ecosystems?
- Top down/bottom up approach or combined? How?
- Spatial planning based on a statutory or non-statutory plan?
- Conflict resolution by public participation or legal procedures?
- Enforcement: administrative or legal?
- Should there be a hierarchy in managing conflicting uses?
- Appropriate link with spatial planning on land, i.e., with integrated coastal management and watershed or catchment area management?

Box 6. The UK Marine Bill and Marine Spatial Planning

On 15 March 2007 the government of the United Kingdom released its Marine Bill White Paper. Five key areas are covered in the Marine Bill:

A new Marine Management Organization: The UK Government and Northern Ireland administration have decided that a new Marine Management Organization (MMO) is needed to help effectively deliver many marine policies. The MMO will be guided by a UK marine policy statement. It will deal with a range of functions (including marine planning, licensing and enforcement) that together provide a holistic approach to marine management.

Marine planning: The Marine Bill will introduce a new system of marine planning. This will provide a strategic approach to the use of marine space and the interactions between its uses. It will encompass all activities and deliver sustainable development by facilitating forward looking decision-making. Marine plans will guide decisions on license applications and other issues, and provide users of the sea with more certainty.

Licensing marine activities: The proposals will deliver a marine licensing system that is more efficient and transparent, leading to less risk, delay and cost to business. Some existing legislation will be replaced with a modern streamlined system. The changes will simplify marine licensing processes and provide for a rationalized and more integrated approach.

Marine nature conservation: The proposals will provide for new mechanisms that will supplement existing tools for the conservation of marine ecosystems and biodiversity. This will include a new approach to protected areas for important species and habitats.

Managing marine fisheries: The Marine Bill will modernize inshore fisheries management arrangements and enable a more active approach to managing recreational sea angling. It will strengthen fisheries enforcement powers and provide for recovery of the costs of fishing vessel license administration.

The UK wants to move towards a more integrated approach to marine management. For that reason, the first stage of the marine plan-

ning system should be the creation of a UK marine policy statement. The statement would set out both short and longer-term objectives for the marine environment and would be created with the clear purpose of contributing toward the sustainable use of the marine environment. It would provide general guidance to marine regulators and users, but would also be specifically implemented through marine plans and decisions, and would therefore help steer toward a vision for the marine environment.

The shared UK marine policy statement would apply throughout UK seas. However, use of marine space and resources varies widely in different areas. Therefore the second stage of the marine planning process should be the creation of a series of marine plans to cover the whole of UK waters, applying to specific geographic areas and providing a spatial context. Plans would need to represent the three-dimensional nature of the marine environment by addressing the seabed and area below it, the whole of the water column and area above it.

Policies plus sustainable development and environmental objectives will be clarified and applied through marine plans. This will help businesses to assess the potential impact of their developments on marine ecosystems and will inform subsequent decisions on licensing. Efficient, flexible planning arrangements that minimize bureaucracy will be introduced. Marine plans will provide targeted and relevant information to business to help reduce business costs and regulatory risks of exploiting marine resources, and will provide efficient decisionmaking through the licensing process. Marine planning will be an inclusive process for all interested stakeholders.

All decisions made in the marine area, or that could have implications for the marine area, to be made in accordance with the shared UK marine policy statement and any relevant marine plan. When taking decisions, public bodies would have to review the content of the policy statement, in addition to the content of any relevant marine plan, to ensure that their proposed course of action is in accordance with both.

Adapted from The Marine Bill White Paper, 2007.



On 7 June 2006, the EU launched its Green Paper, *Toward a Future Maritime Policy for the Union: A European vision for the oceans and seas*. The Commission is providing a wide public consultation on a future maritime policy for Europe that allows the development of well-balanced and coherent sea-based policies and activities that reassure mutual reinforcement of economic growth, social welfare (based on commitments of the Lisbon Strategy), and good status of the marine environment and its resources (based on the commitments of the Thematic Strategy for the Marine Environment). Marine spatial planning is seen as a key aspect to managing a growing and increasingly competing maritime economy, while at the same time safeguarding marine biodiversity. It describes marine spatial planning as a means to:

- Coordinate the spatial implementation of offshore renewable energy with other activities;
- Provide financial security for investment decisions;
- Manage the competition among various uses and objective of the marine environment;
- Develop a stable regulatory environment that ensures better and simpler regulation toward the location of economic activity;
- Ensure that individual decision on activities, taken at a national or regional level, but affecting the same ecosystem or cross-border activities (for example pipelines, shipping routes) are dealt with in a coherent manner;
- Ensure consistency between land and marine systems; and
- Ensure that the future development of offshore activities is consistent with the need to evolve multilateral rules.

The Maritime Policy concludes that a spatial planning system should be conducted on an ecosystem-based approach and established for maritime activities in all waters under jurisdiction of its member states.

The EU Marine Thematic Strategy (2005) provides a supportive framework for national marine spatial plans, particularly for achieving 'good environmental status' of EU waters by 2021. In the context of the Marine Strategy, Europe introduced the concept of 'eco-regions' based on which its seas are divided into ecologically-meaningful management units. Eleven eco-regions have been defined, based on bio-geographic features, oceanographic features, and existing political, social and management divisions. They include Greenland and Iceland Seas, Barents Sea, Faroe Islands, Norwegian Sea, Celtic Seas, North Sea, South European Atlantic Shelf, Western Mediterranean Sea Adriatic-Ionian Seas, Aegean-Levantine Seas and the Oceanic Northeast Atlantic. This division into eco-regions can be seen as a basic geographical requirement for implementing the ecosystem approach in European waters and builds further on the condition that ecosystem-based management is inherently place-based or area-based.

Toward a Future Maritime Policy for the Union: A European Vision for the Oceans and Seas, 7 June 2006. Available at:
<http://ec.europa.eu/maritimeaffairs/>

Box 7.

Marine Spatial Planning in the EU Maritime Policy

Box 8. Marine Spatial Planning in Germany

Marine spatial planning in Germany is still in an early stage. In July 2004 an amendment to the Federal Spatial Planning Act entered into force stating that the Federal Ministry of Transport, Building and Urban Affairs (Bundesministerium für Verkehr, Bau und Stadtentwicklung, former Federal Ministry of Transport, Building and Housing) should develop a legal instrument setting out the objectives and principles of spatial planning in the EEZ. The planning initiative for the EEZ started with the Federal Ministry setting up goals and principles for spatial planning in the framework of UNCLOS. Last year, the Federal Maritime and Hydrographic Agency (Bundesamt für Seeschifffahrt und Hydrographie) completed a draft spatial plan and an associated environmental report for the German EEZ in both the North Sea and the Baltic Sea. The aim of the spatial plan is to establish sustainable development of ocean space, in which social and economic demands for space are consistent with the ecological functions of space. The associated environmental report aims to identify and evaluate the likely significant effects on the environment that could result from implementing the spatial plan. The spatial plan will be open for public consultation (including international participation) during the second half of 2007.

The German spatial planning approach includes the possibility to designate areas as:

Priority Areas that are reserved for defined use in which other conflicting uses are excluded;

Reservation Areas in which defined uses have a priority; and

Suitable Areas in which defined uses are allowed inside, but excluded outside, the designated areas.

An important step toward allocation of marine space for specific uses was the designation of 'preferred areas' for wind energy in December 2005 for one area in the North Sea and two areas in the Baltic Sea. These 'preferred areas' will automatically turn into priority areas as soon as the spatial plan enters into force.

In the German territorial sea, the *Länder* (states) are responsible for spatial planning, which can be done in the framework of the State Planning Act. Mecklenburg-Vorpommern (Baltic Sea) and Niedersachsen (Lower Saxony, North Sea) already expanded their existing spatial plans from the landside to the coastal area. Mecklenburg-Vorpommern extended its 2005 Spatial Development Programme to "ensure conflict management between the demands of new technologies, tourism and nature protection and traditional sectors like shipping, fishing and defense at an early stage."¹⁸

In the framework of EU Natura 2000, Germany designated various protected areas in May 2004. An important step toward the decrease of fragmentation in national marine protected area management is that the coordinates of the German areas of the Dogger Bank and the Borkumse Stones have been used for the determination of the boundaries of the areas proposed for protection in the Dutch part of the North Sea.

Adapted from a personal communication from Nico Nolte, German Federal Maritime and Hydrographic Agency, 15 January 2007

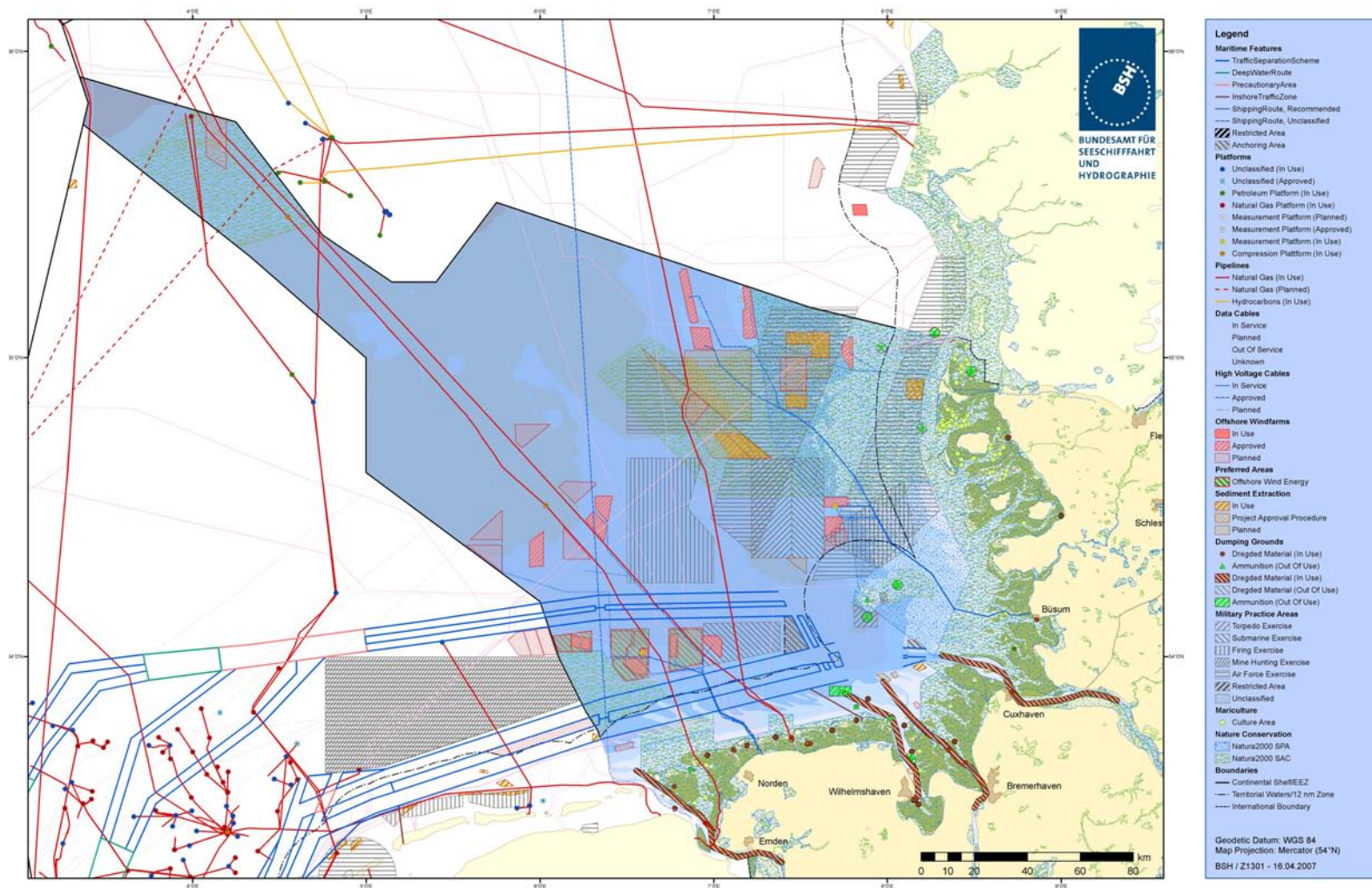
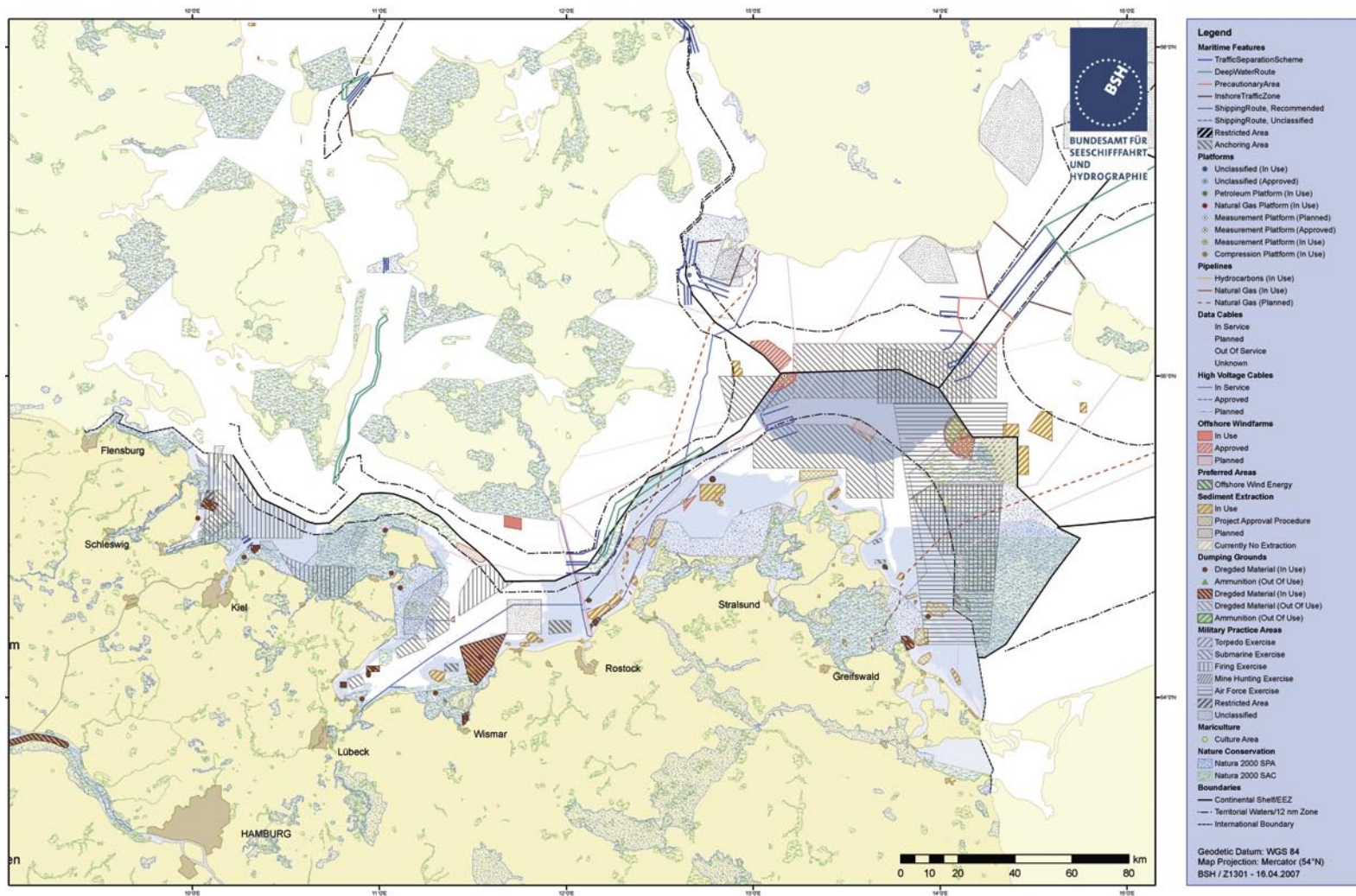


Fig 8.
Existing and
Future Uses
of Nature
Conservation
of the German
EEZ in the
North Sea

(Source: Bundesamt
für Seeschifffahrt und
Hydrographie)

Fig 9.
Existing and
Future Uses
of Nature
Conservation
of the German
EEZ in the
Baltic Sea

(Source: Bundesamt
für Seeschifffahrt und
Hydrographie)



6 A Process for **MARINE SPATIAL PLANNING**

What Is “Planning”?

Operationally, planning is the process of analyzing who gets what, when, and where, how, at what costs, and who pays the costs? Both the initiation of planning and the ultimate decisions as a result of planning are normally a function of the political process in a society.

Analysis is the activity that generates information for management decisions. In discussing planning it is essential to consider explicitly: (1) the process of planning, i.e., how the planning is organized; and (2) what analyses are essential to develop the information needed for management decisions?

Because the management of sea uses should be a continuous activity, the planning process must be organized to generate information at various points in time. There should be a continuous activity of analysis, as part of management, to generate information for development of strategies to respond to changing conditions and information (Bower, Ehler & Basta, 1994).

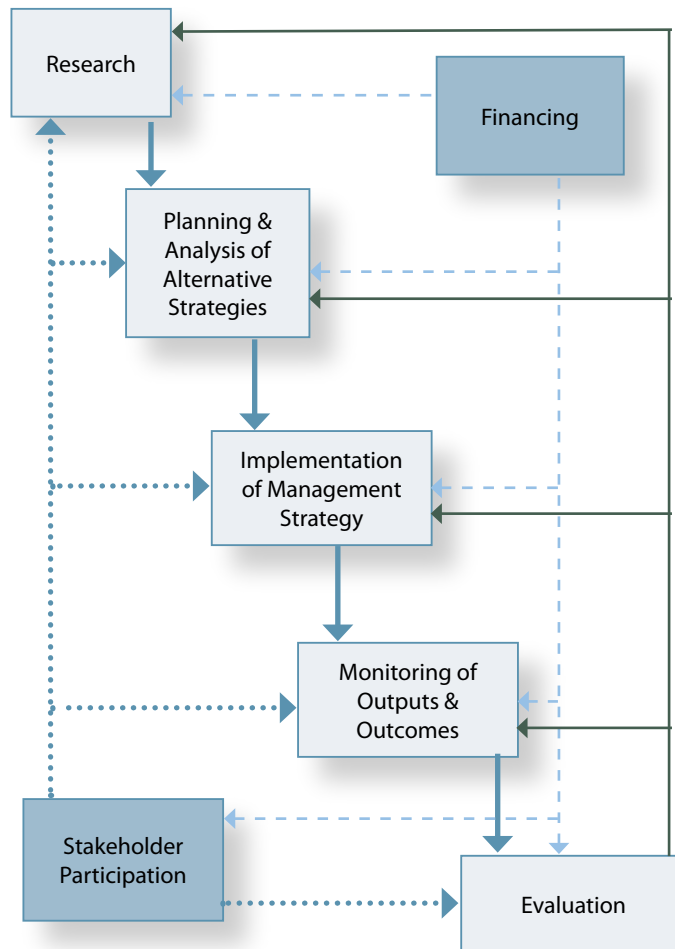
See also Gilliland workshop presentation (2006) at <http://ioc3.unesco.org/marinesp/>.

What Are the Important Processes of Marine Spatial Management?

Marine spatial management is comprised of at least three ongoing phases:

- **Planning and Analysis:** generating and adopting one or more integrated, comprehensive spatial plans for the protection, enhancement and sustainable use and development of the sea and its resources;
- **Implementation:** implementing the plan through the execution of programmed works or investments, enabling change, encouraging improvement and through regulation and incentives and enforcement of proposed changes and ongoing activities in, on, over and under the sea, in accordance with the plans; and
- **Monitoring and Evaluation**—assessing the effectiveness of the plans, their time scales and implementation mechanisms, considering ways in which they need to be improved and establishing review and adaptation procedures. Results of evaluation are fed back into the planning and analysis element of management, and the process begins again.

Fig 8.
The Elements
of Management



Is There an Appropriate Approach to Setting Management Objectives?¹⁹

Defining overall goals and objectives for marine areas has a high value compared to, as currently done, simply defining each individual sector's needs and hoping that these needs can be integrated or reconciled in the absence of some overall vision or 'top down' direction. Improved coordination of data gathering, management and greater accessibility of datasets can have obvious benefits to both government agencies and developers.

Marine spatial planning within the context of sea-use management can provide a framework within which to articulate, reconcile, and integrate relevant economic, environmental and social objectives collectively, i.e., government policy. This is not done at present in the marine environment or under the auspices of any existing authorities. Objectives, with associated targets, are defined for some individual sectors, either explicitly, e.g., a 10% by 2010 target for renewable energy, quotas for fisheries, or implicitly, e.g., to optimize exploitation of oil and gas reserves wherever they are found or to maintain or improve environmental quality.

Even then, objectives are not broken down into more operational regional targets and rarely do they have a spatial context, although again these are sometimes implicit. Therefore, a marine spatial plan provides a framework within which to identify and state the contribution that will be made by the planning area, i.e., "the region", to national objectives, such as wind and other renewable energy targets to be achieved, fish stocks in need of recovery, environmental quality, habitat protection or restoration targets.

Defining overall goals, and then more specific and measurable objectives, that ideally are spatially defined, for different human use activities, should provide the following added value compared to existing practice:

- Clear, "top-down" or strategic direction for what is to be achieved within the sea-use management area to complement "bottom-up" stakeholder involvement and interests, strengthening the vertical integration between national policy guidance and targets and their

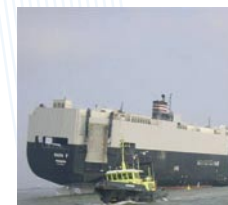
regional delivery and the horizontal integration across economic sectors or agencies of government;

- A better basis on which to consider the inter-relationship between economic, environmental and social objectives at the same time, rather than sequentially, and increase the chances of achieving sustainable development;
- To encourage synergies and reduce conflicts, i.e., to provide a more strategic basis for any one economic sector to identify the objectives of other sectors and their environmental, economic, and social impacts. This should reduce the burden on any one sector for undertaking this type of comprehensive analysis;
- An improved basis for analyzing the cumulative effects of incremental decisions;
- A better basis for identifying widely-agreed, common scenarios for the future taking account the best available forecasts such as identifying which targets are likely to change significantly beyond, for example, a 20-year planning time frame (e.g., renewable energy targets) and their projected increases. The ability to forecast will vary among sectors. These differences would need to be accommodated irrespective of the management measure under consideration;
- A proactive approach to the delivery of objectives for the safeguarding and recovery of the marine ecosystem and the services that it provides rather than through each sector of economic activity having to enter into consultation on these for every permit application; and
- Improved governance with greater confidence of government, industry, and other stakeholders of how and where their objectives can and should be translated into reality at the level of the marine ecosystem.

What Is the Process of Making a Plan?

The process of making a plan should involve:

- **Analysis:** information gathering, including surveying and mapping, better understanding the interaction of activities with each other and with the environment, identifying and filling gaps in information;



19

Adapted from: "The added value of marine spatial planning" (2005), UK Country Agencies Interagency Working Group on MSP



- **Forecasting and Developing Alternative Scenarios:** Analyzing trends and changes, identifying issues and what needs to be done, or not done, and what needs to be resolved, potential conflicts, opportunities for multiple use and development. A good example of how forecasting and developing alternative scenarios for the future use of space can be applied is provided by the Belgian research project “GAUFRE” (Maes, *et al.*, 2005) (at <http://www.belspo.be/belspo/fedra/proj.asp?l=en&COD=MA/02>);
- **Assessing Alternatives:** considering the costs and benefits of possible alternatives and options;
- **Stakeholder and Public Participation:** including the meaningful involvement of stakeholders, at a time when they can be genuinely influential on the plan, for example, in the selection of options or alternative strategies, and where necessary, possibly involving mediation to resolve any more deeply embedded conflicts of interest; and
- **Outreach:** making the draft plan available to the public, along with supporting reports such as the environmental report, issue papers, surveys, etc., and providing meaningful opportunities for interested members of the public to express their views in a reasonably informal, open and non-adversarial setting.

What Are the Steps of Analysis in Making a Plan?

The various analyses undertaken for planning can be described as a sequence of activities. Some of the activities, or portions of the activities, can be done simultaneously; and there is—or should be—continuing feedback among the activities and continuing interaction between the planners and the decision makers and other stakeholders throughout the analytic activities, i.e., during each “round” of analysis in the continuing management context. At the same time there should be a finite period of time for a given “round” of analysis. All of the segments should be completed within some specified time period.

Examples of analytical activities include:

- identifying current conditions/problems of the management area;
- specifying problems in detail;
- evaluating resources of the management area with respect to potential for producing goods and services;

- specifying alternative ecological and socio-economic models to be used in the analysis;
- specifying possible scenarios for analysis, where a scenario includes economic and demographic conditions, environmental and ecological conditions; and
- selecting scenarios for detailed analysis and evaluation.

Then for **each** “scenario” selected:

- estimating demands on the resources of the management area;
- analyzing human activities in the management area with respect to resource use, direct modifications of habitat, and discharges of pollutants;
- analyzing the responses of marine ecosystems and natural processes in relation to human activities;
- analyzing the effects (injuries) of the changes in marine ecosystems on various species, habitats, and ecosystems;
- analyzing monetary damages and benefits in relation to effects delineated in the previous step;
- formulating alternative management strategies to reduce undesired effects and damages and produce desired outputs;
- selecting management strategies for analysis;
- evaluating management strategies; and
- presenting results to the decision makers and other stakeholders.

Box 9.

The Irish Sea Pilot Project

The Irish Sea Pilot helped develop a strategy for marine nature conservation that could be applied to all UK waters and, with international collaboration, the adjacent waters of the north-east Atlantic. The work fulfils a commitment made by the UK Government in May 2002 at the launch of *Safeguarding our Seas*. The Pilot was funded primarily by Defra with contributions from other partners.

One of the aims of the Irish Sea Pilot was to test the proposed framework for marine nature conservation, developed by the Review of Marine Nature Conservation Working Group. The framework was developed to demonstrate that action needed to be taken at a range of scales. The proposed framework anticipated that a range of measures would be needed to conserve marine biodiversity, including protected areas, spatial planning and other measures.

The results of the Pilot study have been published. The report, *Marine Nature Conservation and Sustainable Development, The Irish Sea Pilot, Report to Defra* by the Joint Nature Conservation Committee is available on the JNCC website (<http://www.jncc.gov.uk>). A synopsis of the main areas investigated and conclusions drawn included:

Data and information. The Pilot collated geophysical, hydrographical, nature conservation, ecological and human use data and used GIS analysis. While intertidal and near-coast biological information was found to be satisfactory, data were sparse for most offshore localities to a degree which would constrain good decision-making. Furthermore, some survey data were not available to the Pilot, either because they were held in an inappropriate format or because the data owner was unable or unwilling to release it.

Marine landscapes. The Pilot tested the concept of 'Marine Landscapes' which is based on using geophysical and hydrographical data to identify habitat types in the absence of biological data. If reliable, such an approach would enable management measures for offshore areas to be developed with confidence in the absence of biological data, which is very expensive to obtain in offshore areas. The Pilot successfully applied this approach to the Irish Sea, identify-

ing and mapping 18 coastal and seabed marine landscape types, and 4 water column marine landscape types.

Nationally-important marine features. A draft set of criteria for the identification of nationally-important marine landscapes, habitats and species was tested. A recommendation was made that further work should be undertaken to determine which marine nationally-important features would benefit from specific Action Plans.

Nationally-important marine areas. The Pilot investigated the concept of ecologically-coherent networks of important marine areas as envisaged under the EC Habitats Directive and under OSPAR, tested draft criteria for the identification of important marine areas, and investigated a range of methods to develop a network of areas for the Irish Sea.

The Pilot also investigated means of identifying and conserving important marine geological and geomorphological areas, an aspect previously little considered in the UK or internationally.

Conservation objectives. Building on the vision and strategic goals set out in *Safeguarding our Seas* and in *Seas of Change*, a generic series of high level conservation objectives and operational conservation objectives applicable to national waters was formulated.

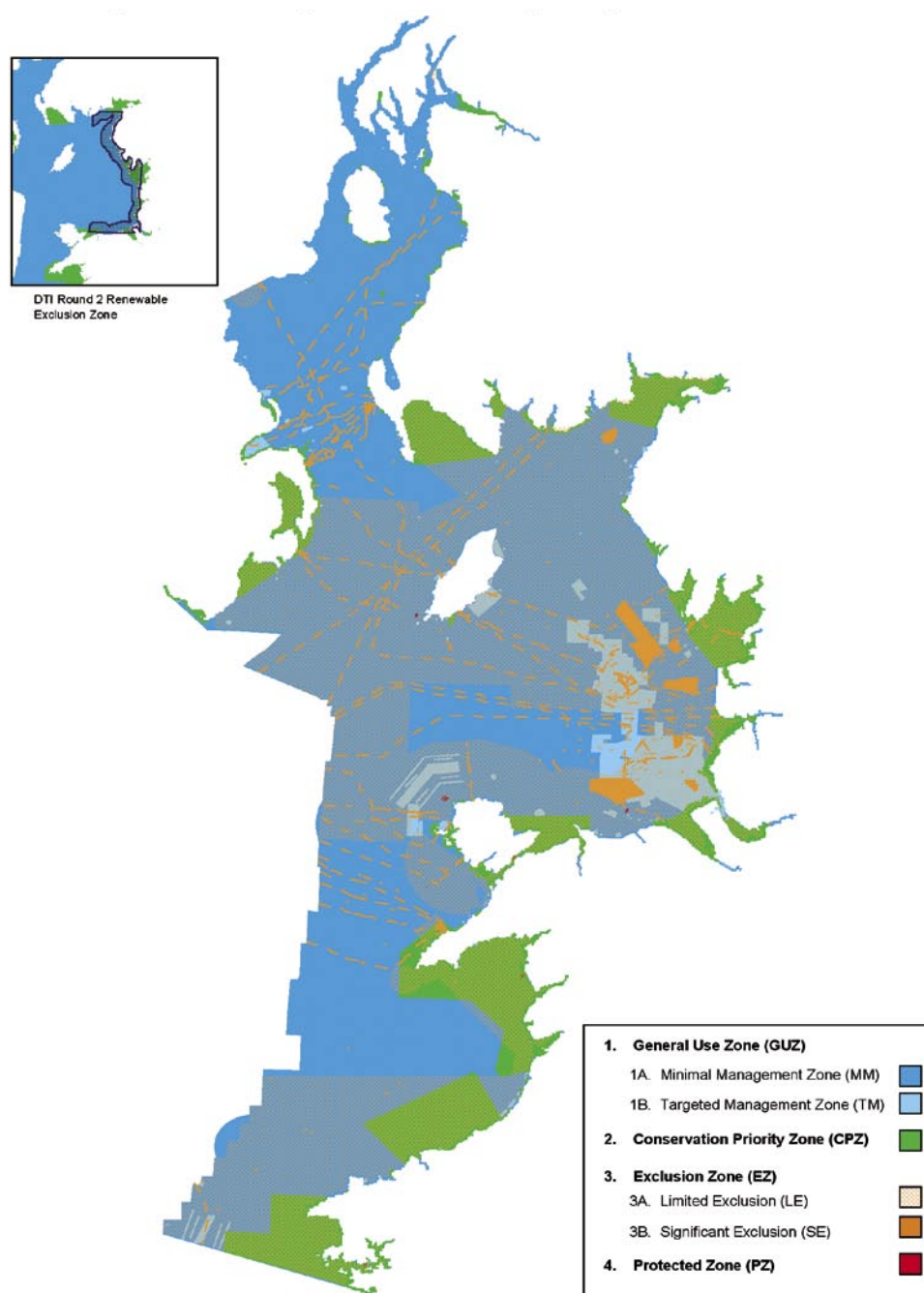
Overarching measures required. Mechanisms by which the Regional Sea could be managed to achieve the conservation objectives at the various scales of the proposed framework for marine nature conservation were considered, in relation to current measures and legislation.

International working. While the previous conclusions are intended to apply directly to the United Kingdom, one of the main conclusions of the Pilot was the importance of working closely with international Government partners and stakeholders. This will be crucial in the effective future management of the national seas and adjacent waters.

Adapted from the Defra Website at <http://www.defra.gov.uk/wildlife-countryside/re-sprog/findings/irishseapilot/index.htm>

Fig 9.
Proposed
Multiple Use
Zoning Map of
the Irish Sea

(Source: Boyes et al.,
 2005)



Why Is Public Participation So Important?

It's difficult to overstate the importance of the effective involvement of the public and stakeholders throughout the MSP process. People matter and are the agents for change – political and other. However, the process of engagement needs time and financing. The investment is worth it.

A balance is needed. Stakeholder engagement should inform and support, but not to be the sole determinant of any MSP scheme. That should be achieved through the leadership of politicians and the planning team.

The degree to which all stakeholders are involved at different points in the process will vary. Sometimes it is not helpful to involve everyone at every point. However, stakeholder engagement should occur from the outset – it should be early, often, and sustained throughout the MSP process.

Stakeholders should be properly informed to enable them to play their full roles, e.g., the pros and cons of different activities or options. It can work, even in a very “top-down” situation. It can be a lengthy and labor-intensive activity. Care is needed to keep the costs associated with it in proportion to the activities being undertaken—a balance should be struck throughout the process.

How it is done is critical, but the outcome of effective stakeholder involvement is invaluable.

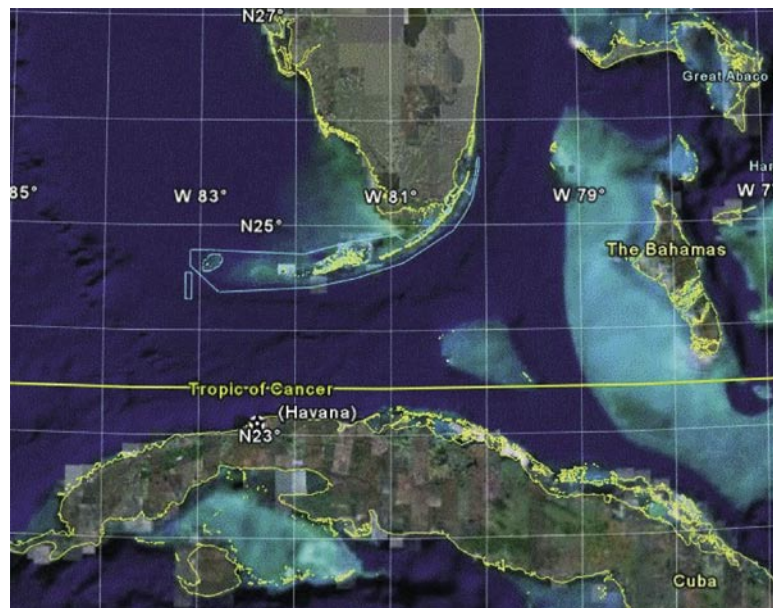


Fig 10.
Regional
Context of
Florida Keys
National
Marine
Sanctuary

(Source: NOAA)

Box 10.
Stakeholder
Involvement in
Expanding the
Florida Keys
National Marine
Sanctuary

The Tortugas Ecological Reserve, a fully protected marine reserve that is currently the largest such area in the United States, is part of the Florida Keys National Marine Sanctuary, a multiple-use MPA that uses marine zoning to protect resources while allowing compatible activities. The design and implementation of the reserve are considered to be a successful example of collaborative decision-making. The community-based planning process for the reserve acknowledged the important contributions of the area's users, and represented a significant departure from government-driven, top-down marine conservation initiatives that are often the norm in many developed countries. The inclusion of citizen representatives with an equal voice in the decision-making process was significant. In addition to unprecedented community involvement, socio-political and economic factors weighed heavily in the outcome of the reserve process. Science played a crucial role in balancing short-term economic concerns with potential long-term economic and ecological benefits.

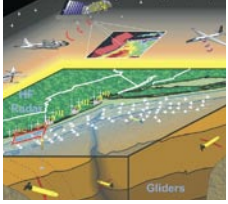
At the core of Tortugas 2000 was a 25-member working group that included Sanctuary Advisory Council members, stakeholders, and government agency representatives. The Working Group ensured that all constituents and agencies with an interest in activities in the Tortugas were present during the design phase. The Tortugas 2000 Working Group was charged with reviewing available natural science and socio-economic information and making a recommendation to NOAA on the size, shape, and placement of the Tortugas Ecological Reserve. A professional facilitator guided the Working Group, which over the course of 13 months met five times to define operating goals, agree to ground rules, develop and weight

criteria for the reserve, evaluate draft boundaries, and recommend a preferred boundary.

What were the ingredients of success? First and foremost, it was essential to begin the design process with a common foundation of knowledge among all decision-makers. Secondly, making the same knowledge available to the local community and the general public enhanced interest in and support for the eventual decisions made about the reserve. Internet posting of technical papers, maps, and other visual data was particularly useful; however, the more significant vehicle by which the Sanctuary shared scientific and traditional knowledge was through the informational forums that were held at the beginning of the design phase. Given the broad dissemination of scientific information related to reserve design it was important that the data be easily interpreted and understood by a variety of audiences. GIS maps based on familiar units and scales were extremely helpful for visualizing reserve boundaries and determining how alternatives would meet specific criteria and affect certain users. Lastly, it was important that science experts were seated at the table with other relevant stakeholders from project inception. Scientific data and research results are important to a reserve design process, but should be considered alongside traditional knowledge provided by users of the area. Also, when scientific experts participate directly in the process they are able to answer questions and advise on technical matters as needed. This direct exchange of information served to build trust and engendered a sense of accountability among the Working Group members and the public.

Adapted from Cowie-Haskell & Delany, 2004.

7 Defining the Human Dimension of **MARINE SPATIAL PLANNING**



How Is Geographic Information System (GIS) Technology Changing Marine Resource Management?

New geo-technologies are revolutionizing marine resource management. Through remote sensing and geo-positioning technologies, science is making visible what had been previously been hidden or inaccessible. Living and non-living marine resources, species ranges and their life histories, habitats, physical and chemical conditions, and sea bottom morphology are increasingly being measured, monitored, and mapped.

This information is being stored, managed, and analyzed using geographic information systems (GIS). GIS is quickly becoming the forum where marine spatial data are aggregated, planning options are visualized, impact analyses are performed, and ocean zones, e.g., marine protected areas or fishery closure areas, established and mapped.

However, GIS models the environment as layers of information to be queried, combined, and analyzed in various ways. This way of thinking structures decision making as the consideration of layers and their overlap, e.g., siting a wind farm offshore.

Most research and data collection is a documentation of the bio-physical geography of the oceans. This new geographic information makes marine resources more open to exploitation and makes necessary a detailed and permanent governance of the spaces where those resources are located.

See also St. Martin presentation (2006) available at <http://ioc3.unesco.org/marinesp/>.

How Is This Different from What Resource Managers Used in the Past?

While the full extent of an ecosystem is important to consider and define, it is the complex of processes and interactions within the system, between species and habitats, and between users and the environment, that are the focus of most ecosystem analysis and ideally the basis for policy development. These interactions are typically local events demanding local data collection and analyses that can then be integrated with analyses at other scales (St. Martin, 2004).

How Can the “Human Dimension” Be Added to MSP?

The human dimension of MSP reduces in most cases to a listing of activities (e.g., recreation, oil/gas, fisheries, shipping). These are, of course, vital to document, but they are complex processes across a variety of scales parallel to biophysical processes. Ecosystem-based approaches have transformed the way we view the latter and, eventually, manage the biophysical environment by understanding processes, connections, space, and scales (as opposed to, for example, single species fisheries management). Human dimensions need to be thought of similarly through a similar understanding of processes (e.g., community and territory), connections (e.g., within and across communities, economies), space (e.g., territories, mappings, cultural perceptions) and scales (e.g., local, regional, national scales of society).

Related to the above is the perception that the incorporation of human dimensions into MSP will be done by engaging with economists and, presumably, economists’ understandings of human behavior. While the economy is an important consideration relative to human dimensions, there are other considerations, other human motivations, other society processes, etc. to be considered. Indeed, economics (e.g., fisheries bioeconomics) reduces the “human dimension” to fishing effort as a result of utility maximization. Other social sciences (e.g., anthropology) have suggested that other processes drive human behavior, etc. Also, the economy is studied and understood not just through the discipline of economics, it is the focus of many geographers, anthropologists, and sociologists as well. Therefore, while advancing and refining MSP, it is vital that the human dimension does not reduce to economics as representing by economists alone. *Integrating the human dimension requires the same diversity of disciplines/perspectives as does the ecosystem approach relative to the biophysical environment.*

Little work is being done on the social or human geography of the oceans. The “human dimensions” of the marine environment are widely recognized as important to include and integrate into decision making, but there are few layers of socio-economic information that one might combine with the bio-physical in, for example, spatial suitability analyses for the establishment of a marine protected area.

Furthermore, to the degree that socio-economic information is available and integrated, it is expressed as the presence or absence of particular activities, e.g., fishing, mineral extraction, dredging, and shipping. Documenting these activities in space is clearly important to spatial planning and decision making, but once reduced to layers in the GIS, these activities are severed from the communities that they support and/or from which they originate. What is incorporated into the GIS is, for example, a layer representing fishing intensity rather than one representing the territories of fishing communities.

The layer that is missing then is not just the socio-economic, though that is often absent, but the relationship between offshore locations and the onshore communities and economies to which offshore locations are necessarily attached.

As a result, community-level participation in management is difficult to implement. Local knowledge is not incorporated in planning. Impact analyses miss local economic effects, and human meanings, social history, and cultural context are lost.

What Is a Good Example of This Problem?

The designation of a marine protected area (MPA) may have considered fishing intensity along with other layers of information such as biological diversity, species presence or absence, habitat vulnerability, recreational use, and so on. A suitable location for an MPA may be proposed and may appear to minimally affect commercial fishing. Perhaps it will close only 10% of regionally-important fisheries. However, the MPA may represent the entire fishing territory of a particular fishing community that might not be able to fish elsewhere due to distance, custom, safety, etc. In addition to simple dispossession, spatial planning that ignores community territoriality also produces conflict as people move to other locations already inhabited by other users, intensifies resource exploitation in remaining areas, and makes fishing more hazardous as fishers must travel further to catch fish. Neglecting the connection between locations offshore and communities onshore can result in uneven impacts and unforeseen hardships.

This problematic raises significant questions about spatial planning methodologies. In particular, it suggests that methods to better docu-

ment the connections between offshore locations and onshore communities need to be developed along with socio-economic layers generally. It also points out the need for greater community-level participation in marine spatial planning.

Is There an Alternative Approach to Adding the Human Dimension?

The “missing layer” in the GIS is “community”, i.e., the link between offshore activities and onshore economies, livelihoods, cultures, places, etc. Ignoring community produces uneven impacts and conflict, and area closures based on activity cannot account for communities.

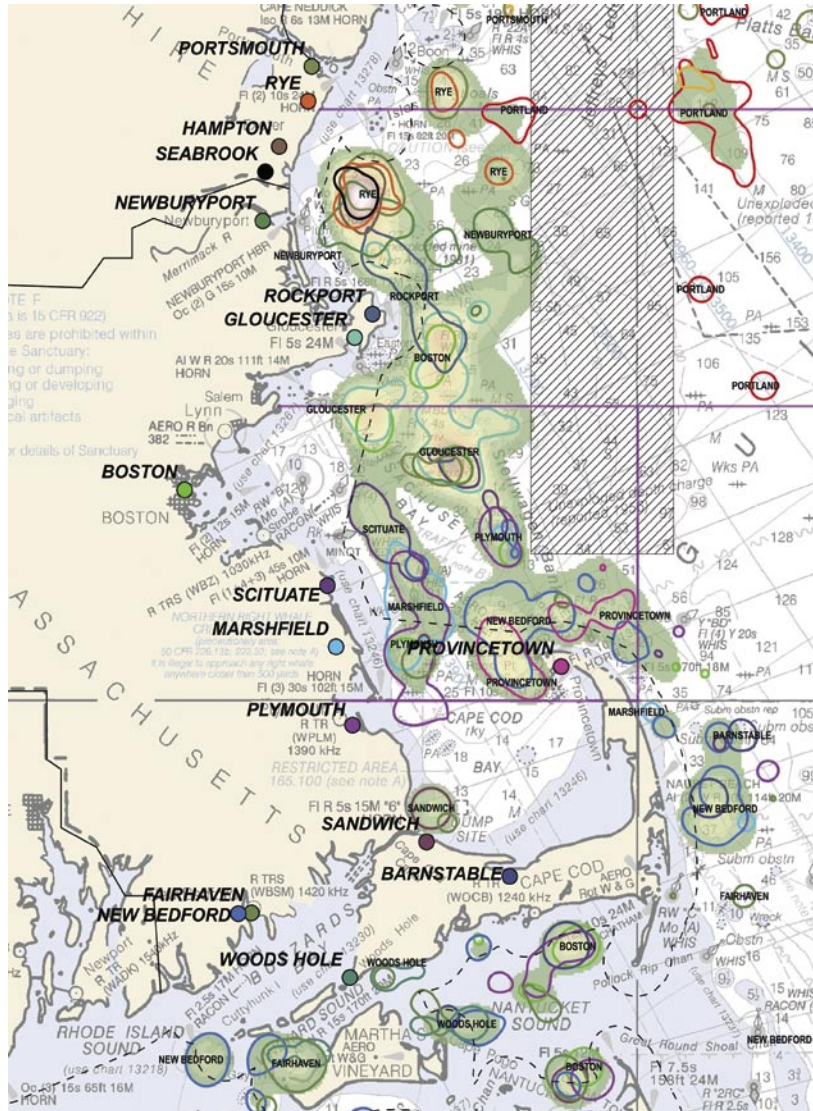
It’s a question of methodology that requires community participation and the incorporation of local knowledge, assessing local impacts of area management, incorporating qualitative methods and GIS.

The growing need for more localized data in terms of local habitat and environment, as well as local community analyses, suggests a participatory role for communities in both science and management. Fishers can act as sources of valuable localized information within a regime of trust and mutual benefit. Similarly, community members can provide information necessary for informed and reliable impact analyses at the community level, information that is simply not otherwise available within existing data bases. Importantly, GIS increasingly is associated with community participation in both science and the assessment of policy and planning impacts.

GIS is an important technology for marine spatial planning. However, the promise of GIS goes beyond supplementing current numeric methods with a new technology. It implies performing management in new ways at several institutional levels. The promise of GIS is that its incorporation into science and management might, at the same time, create new opportunities to combine social data with biological data, to enhance cooperation between user communities and marine scientists and managers, and to make management more participatory and multi-objective (St. Martin, 2004).

Fig 11.
Community-
based Fishing
Grounds in the
Gulf of Maine

(Source: Kevin St. Martin,
Rutgers University)



Box 11.
Mapping
the Social
Landscape of
Fishers in the
Gulf of Maine

The work of Kevin St. Martin of Rutgers University illustrates how the human dimension can be added to marine spatial planning. Based on the local knowledge of fishers of the Gulf of Maine, he and his colleagues have been developing maps of: (1) where fishers fish; (2) who fishes (by gear type and port) in what locations (identifying discrete areas corresponding to the “home range” of vessels from various ports; and (3) where do peer groups fish (identifying fishing locations by gear type for single ports)?

The results of this work include development of a method for producing maps of the “social landscape” of the Gulf of Maine, an improved understanding of the processes of human community and territory in this ocean space, a way of reducing uneven impacts of spatial planning decisions, and improved participation of fishers in science and management



8 Implementing **MARINE SPATIAL PLANNING**



Do Politicians Have Different Criteria than Planners for Evaluating Plan Implementation?

Absolutely. Politicians have a different time frame than scientists and planners. Their term is usually about 4-5 years of which half is typically dedicated to re-election. Consequently, results from plan implementation are expected within a short term—which is usually not possible. Often decisions to implement plans are based on the potential contribution to re-election. Scientists and planners, on the other hand, propose solutions to current and future problems or damaging trends that go far beyond the time frame of 4-5 years.

See also Plasman presentation (2006) available at <http://ioc3.unesco.org/marinesp/>.

It is also necessary to have a broad consensus by all actors and stakeholders, no risk of legal challenges, and compliance with international or regional agreements and legislation.

The time required for implementation often determines the way plans are evaluated. Politicians will often want to know if the time before results are realized can be shortened by aspects such as scientific knowledge or experience, existing legislation, or debates that have already been underway for some years.

Other questions relevant for politicians to implement marine spatial planning include:

- What are the resource requirements?
- What is the budget?
- Over what period of time?
- What human resources are required—staffing, consultancies, training?
- Are there other administrative costs?
- Is more scientific advice needed?
- Is that need immediate, based on the existing scientific programs or are there proposals for new (and potentially expensive) studies?
- Is there broad-based scientific consensus for the plan? A lack of consensus can be counter-productive.
- What is the real problem?
- Does it exist now, or is it something that will happen in the future?

- If there is no current problem, is it worth the costs of implementation today?
- Explain why zoning and other control measures are necessary if there is not existing problem.
- Who benefits as a result of plan implementation? Who pays? How much, how, and when?

Costly proposals will need fine tuning. Conflicts and solutions will have to be defined clearly and solutions, e.g., is a total prohibition of an activity really necessary or can a temporal prohibition, e.g., during winter, or during spawning season?

How Can Plans Best Be Transformed into Action?

Politicians will usually look for a consensus among the stakeholders. They do not like the lack of transparency, i.e., no black box, where a “commission will decide upon the measures to be taken”.

Set a clear line from the beginning and look for margins to discuss, for example, “historical rights”. Search for “win-win” situations, e.g., marine spatial planning can provide legal/economic stability in the longer term.

Ensure participation and access to information. User committees and voluntary agreements can be a solution when there is polarization at the extremes, which is often the case. Look for a consensus within government.

Broad acceptance makes it difficult for someone to be against the plan. However, the plan must be in line with administrative rules such as simplicity and impact on staffing/budget.

The legislative framework in Belgium has shaped marine spatial planning in a continuous process. The need for a comprehensive approach toward spatial planning became particularly urgent because of new objectives and associated targets for future ocean use and protection. The core issues of the MSP policy framework included the development of an offshore wind farm, the delimitation of marine protected areas, a policy plan for sustainable sand and gravel extraction, enhanced financial resources for the prevention of oil pollution, the mapping of marine habitats, protection of wrecks valuable for biodiversity, and the management of land-based activities affecting the marine environment. Together, these objectives provide the basis for a Master Plan that has been implemented incrementally since 2003. The first two phases of the Master Plan are now operational and focus on:

- Spatial delimitations for sand and gravel extraction and a zone for future offshore wind energy projects (**Phase 1**), followed by
- Delimitation of marine protected areas as part of the Natura 2000 Network (**Phase 2**).

The spatial plan has led to a more diverse zoning system for sand and gravel extraction that includes new control zones with sequential rotation for the most intensive exploitation areas, seasonally closed zones in which extraction is prohibited during fish spawning seasons and an exploration zone where potential future use is examined.

The zones defined for wind farms now allows companies to submit proposals without the former risks of denial of permit or compensation costs to other marine resource users (e.g., fisheries) resulting from the lack of a spatial framework for the area as a whole.

Future initiatives concerning spatial planning in Belgium are being considered. New actions will focus on the protection of marine shipwrecks for archeological, biodiversity, and ecological interests, development of a marine component for existing terrestrial, protected areas, and the allocation of a research zone for alternative fishing methods.

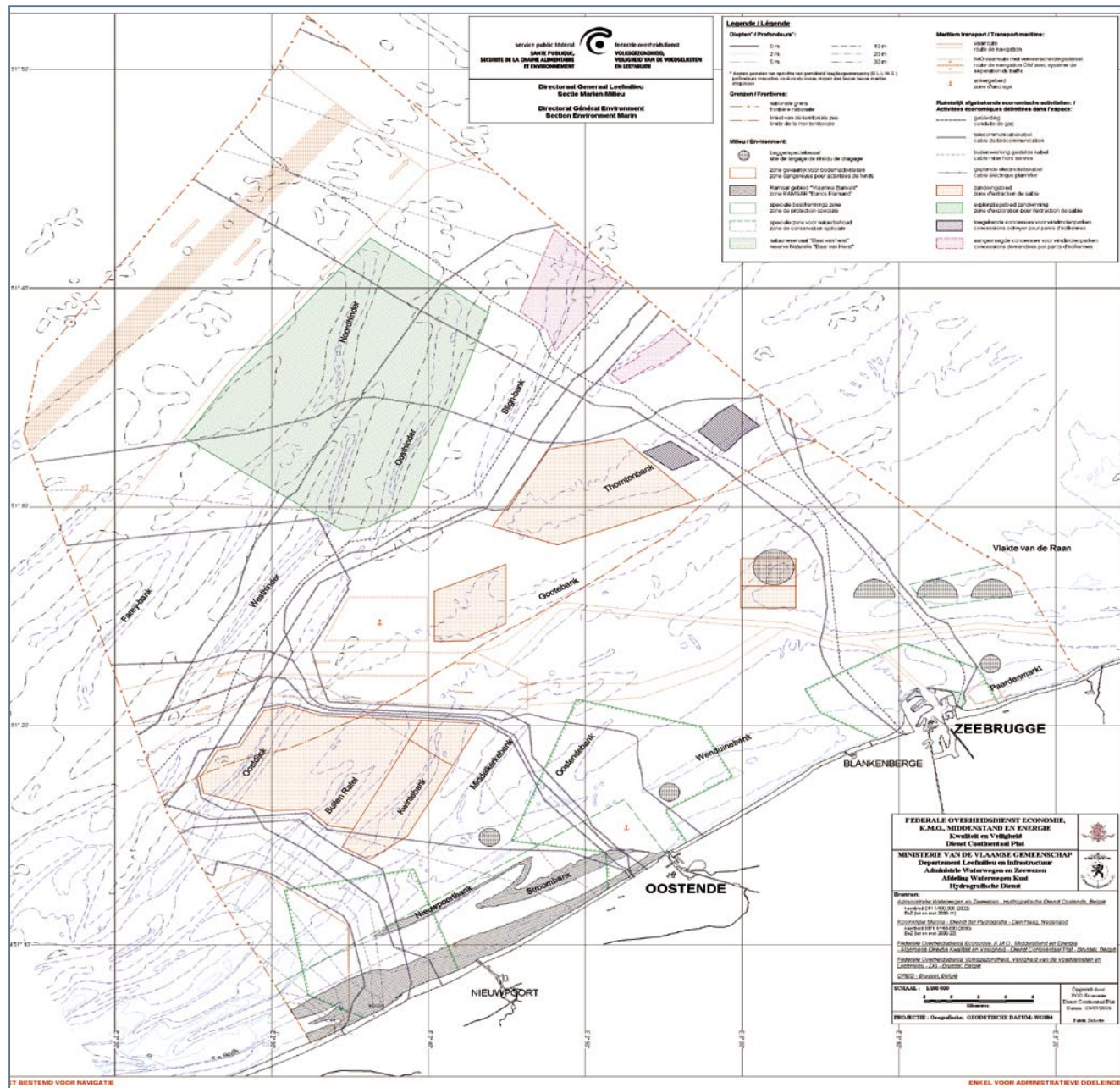
At the scientific level, a multidisciplinary two-year research project (GAUFRE) was set up to develop a visionary approach for the marine environment, applying and translating land use planning concepts and methodologies. This visionary approach – in the form of alternative scenarios for future sea use reflecting various importance of core objectives – has been developed to provide a basic tool for policy decisions because of deficiencies in existing scientific knowledge and data.

From Douvere, F., et al., 2007.

Box 12. **Implementation** **of Marine Spatial** **Planning in** **Belgium**

Fig 12.
Implementation
of Marine Spatial
Planning in Belgium

(Source: Belgian Federal Government, Directorate General for Environment)



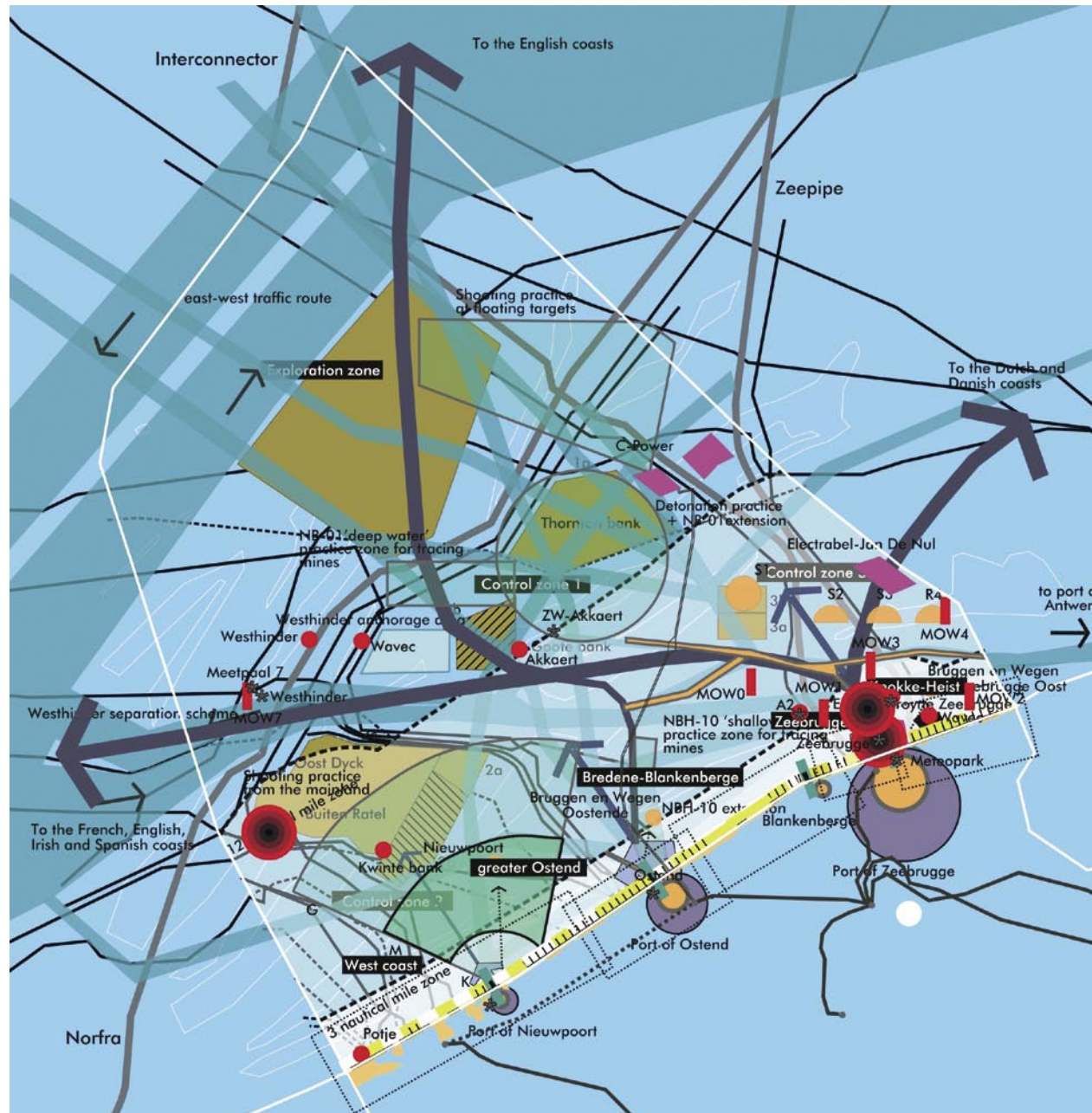


Fig 13.
Existing Ocean
Uses in the
Belgian Part of
the North Sea

(Source: Maes et al.,
2005)

Box 13. Implementing China's Sea Use Management Law

In 1997, responding to the policy of China's national government to "rigorously enforce laws governing the management and protection of land, water, forests, minerals, and seas", the State Oceanic Administration (SOA) officially proposed the formulation of a law to manage sea use. In 1999, after two years of effort, the Law on the Management of Sea Use was drafted and submitted for approval. On 27 October 2001, the 24th session of the Standing Committee of the Ninth National People's Congress adopted the Law, which entered into effect on 1 January 2002. The law has established three principles:

- (a) **The right to the sea-use authorization system.** According to the law, the seas are owned by the State. The State Council exercises the ownership of the seas on behalf of the State. Any entity or individual who intends to use the sea must apply in advance and obtain the right to use the sea; they are authorized only after the approval of the national government;
- (b) **A marine functional zoning system.** The law stipulates that any use of the sea areas must comply with the marine functional zoning scheme established by the State. The scheme is the foundation for marine management, under which the sea is divided into different types of functional zones (according to the criteria related to ecological functions and priority use), to regulate and guide rational use of the sea area; and
- (c) **A user-fee system.** The right to sea use is protected under the State's legal system. The State imposes a user-fee system, which requires that any entity or individual who uses the sea must pay a fee in accordance with the regulations of the State Council. This system stipulates that the sea is a State-owned asset, and all entities and individuals who intend to use the sea to carry out production and other economic activities, must pay for its use.

The law has also established a "two-level management system", i.e., all sea-use applications will be assessed and approved by the provincial, as well as the national government. Governments at city and county levels do not have the authority to approve sea-use applications. This is to ensure that sea-use activities are placed un-

der stricter control of the provincial level and national government and that the long-term benefits of the State is guaranteed in a sustainable manner. According to the Law, 70% of the fees collected from sea use will rest with the local government, and 30% will go directly to the State revenue, for marine development, protection and management.

Starting in 2000, under the overall supervision of the State Council, SOA, along with other relevant ministries and coastal provinces, autonomous regions and municipalities formulated a nation-wide marine functional zoning scheme. After extensive data collection, intensive studies and several consultations, the National Marine Functional Zoning Scheme was submitted to the State Council and approved on 22 August 2002. The scheme was widely publicized and implemented by SOA starting in September 2002.

The State Council provided comprehensive guidelines on the national implementation of the zoning scheme and its management, and further defined the responsibilities and mandates of the various competent governmental organizations in ocean management. It emphasized that marine functional zoning scheme is the legal basis of the management of sea use and marine protection and should therefore be strictly implemented. The Council also pointed out that relevant laws and regulations on ocean management should be firmly implemented based on the principle of "development in protection and protection in development", with the ultimate goal of the rational development and sustainable use of the sea.

The implementation of the National Marine Functional Zoning Scheme marks the initial establishment of a regional planning system and an integrated management framework for marine development and conservation in China. Over two-thirds the zoning schemes of the 11 coastal provinces, autonomous regions, and municipalities have been completed, and most of the schemes had been approved by their respective local governments for implementation.

Adapted from Li, 2006

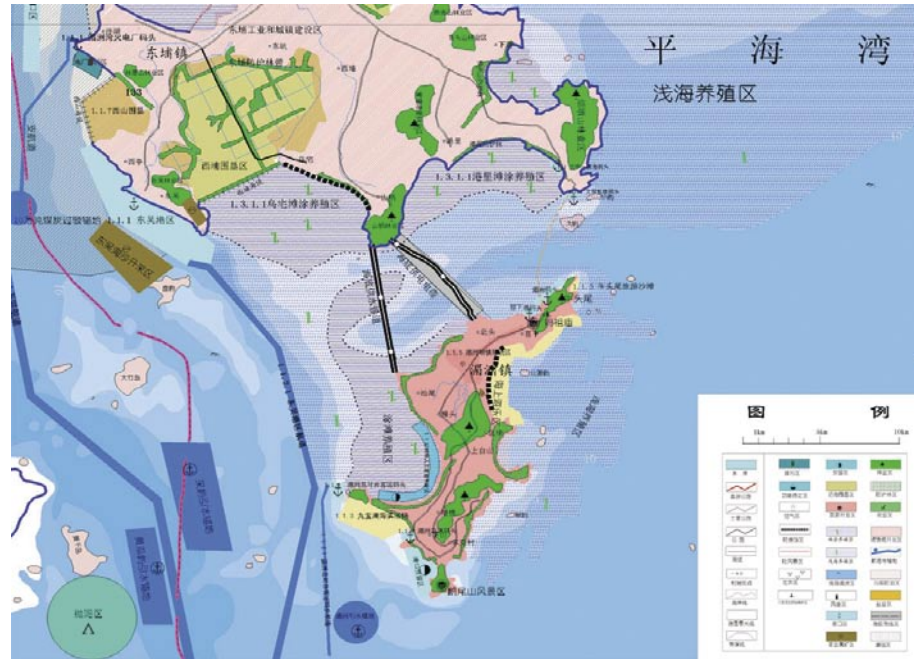


Fig 14.
Xiamen Zoning Scheme

(Source: State Oceanic Administration)

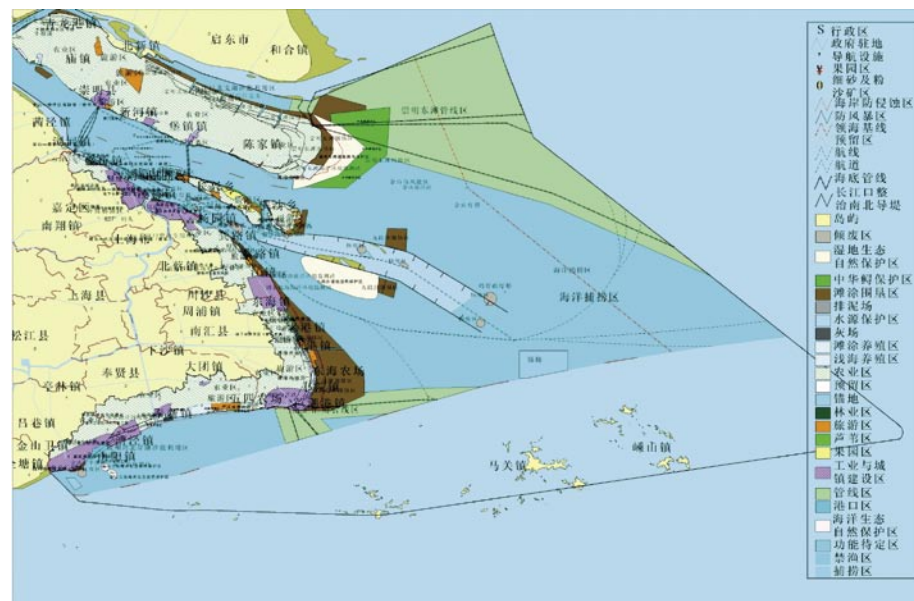


Fig 15.
Shanghai Zoning Scheme

(Source: State Oceanic Administration)

9 Monitoring, Evaluating, and Adapting **MARINE SPATIAL PLANNING**



Why are Monitoring, Evaluation, Reporting and Adaptive Management Important?

Monitoring, evaluation, effective reporting and adaptive management are widely recognized as fundamental components for effective marine management. MSP is a continuous process involving all the above elements (and more—see previous sections). Monitoring and evaluation needs to concentrate on the most important issues affecting or potentially affecting a marine area. Adaptive, ecosystem-based, sea use management can ensure healthy, productive and resilient marine areas that provide the goods and services that people want and need.

See Day presentation available at <http://ioc3.unesco.org/marinesp/>.

Adaptive management can:

- demonstrate the extent to which objectives have been achieved;
- identify gaps that can be rectified;
- provide feedback as to what's working and what's not, enabling more informed decision-making;
- promote accountability and demonstrate resources have effectively used; and
- enable effective review of management direction, priorities, resource requirements, etc.

Use an adaptive planning approach—don't wait for perfect information. Always be prepared to learn new information—and use that information to adapt management plans and decisions.

What Are the Main Steps in Evaluating Management Effectiveness?

- Identify management objectives/desired outcomes;
- Choose indicators;
- Undertake monitoring;
- Periodically assess results;
- Report findings & recommendations; and
- Adjust management as necessary (= *adaptive management*).

Why Are Clear, Measurable Management Objectives Important?

Clear, measurable objectives are fundamental for assessing effectiveness. Articulating the desired outcome for each objective helps define a practical interpretation of that objective. Objectives should be developed for different management levels (e.g., broad goals, regional areas, specific tasks/projects). Objectives should be established early in any planning/management process.

What Do We Mean by “Indicators”?

An indicator is a measure (quantitative or qualitative) of how close we are to achieving what we set out to achieve (i.e., our objective).

Indicators are quantitative/qualitative statements or measured/observed parameters that can be used to describe existing situations and measure changes or trends over time. Their three main functions are simplification, quantification and communication (Belfiore *et al.*, 2006).

What Is the Problem of “Shifting Baselines”?

“Each generation accepts the species composition and stock sizes that they first observe as a natural baseline from which to evaluate changes. This ignores the fact that this baseline may already represent a disturbed state. The resource then continues to decline, but the next generation resets their baseline to this newly depressed state. The result is a gradual accommodation of the creeping disappearance of resource species, and inappropriate reference points... for identifying targets” (Pauley, 1998)

What Lessons Have We Learned from Applying Indicators?

Some of the lessons learned from applying indicators in a management context include:

- Indicators must reflect changes at spatial and temporal scales of relevance to management and what needs to be measured;
- Differing indicators should be used for site level and system level;

- As well as more obvious environmental indicators, need also to develop social and governance indicators;
- Ecological goals and socio-economic goals are not mutually exclusive. However, they do need different evaluation criteria/indicators; and
- Problems of “dangerous targets” (Agardy *et al.*, 2003).

What Is “Monitoring”?

Monitoring is the process of repeated observation for specified purposes, according to prearranged schedules in space and time and using comparable data collection methods (after Meijers, 1986).

How Can Monitoring Meet Management Needs?

Monitoring can be used to:

- Assess the ecological state of ecosystems;
- Assess whether regulated performance criteria have been exceeded;
- Detect and assess impacts of human-generated disturbance(s); and
- Assess responses to restoration efforts.

What Lessons Have We Learned from Monitoring?

Monitor wisely—at ecologically- and socially-relevant temporal and spatial scales. Many monitoring programs ‘do the thing right’ (i.e., precise local measurements) rather than ‘doing the right thing’! If possible, get managers and users who are on the water daily to assist with monitoring. Know the value of quick, easily accessible results. Development of affordable/acceptable monitoring programs for some areas may typically involve innovation in scientific methods and approaches. Finally, you may need to monitor outside your particular area or jurisdiction to ascertain the context upon which your results may be assessed.

Why Is Reporting Important?

Reporting is a key part of communicating monitoring or evaluation results to a wide range of interested parties including:

- Managers, especially those in the field;
- Other managers/other agencies;
- Decision makers/governments; and
- Interest groups (funding bodies, NGOs, international community/programs).

Reporting may take many different forms, including written (reports, papers), mass media, internet/web, and oral presentations.

What Lessons Have We Learned about Reporting and Adaptive Management?

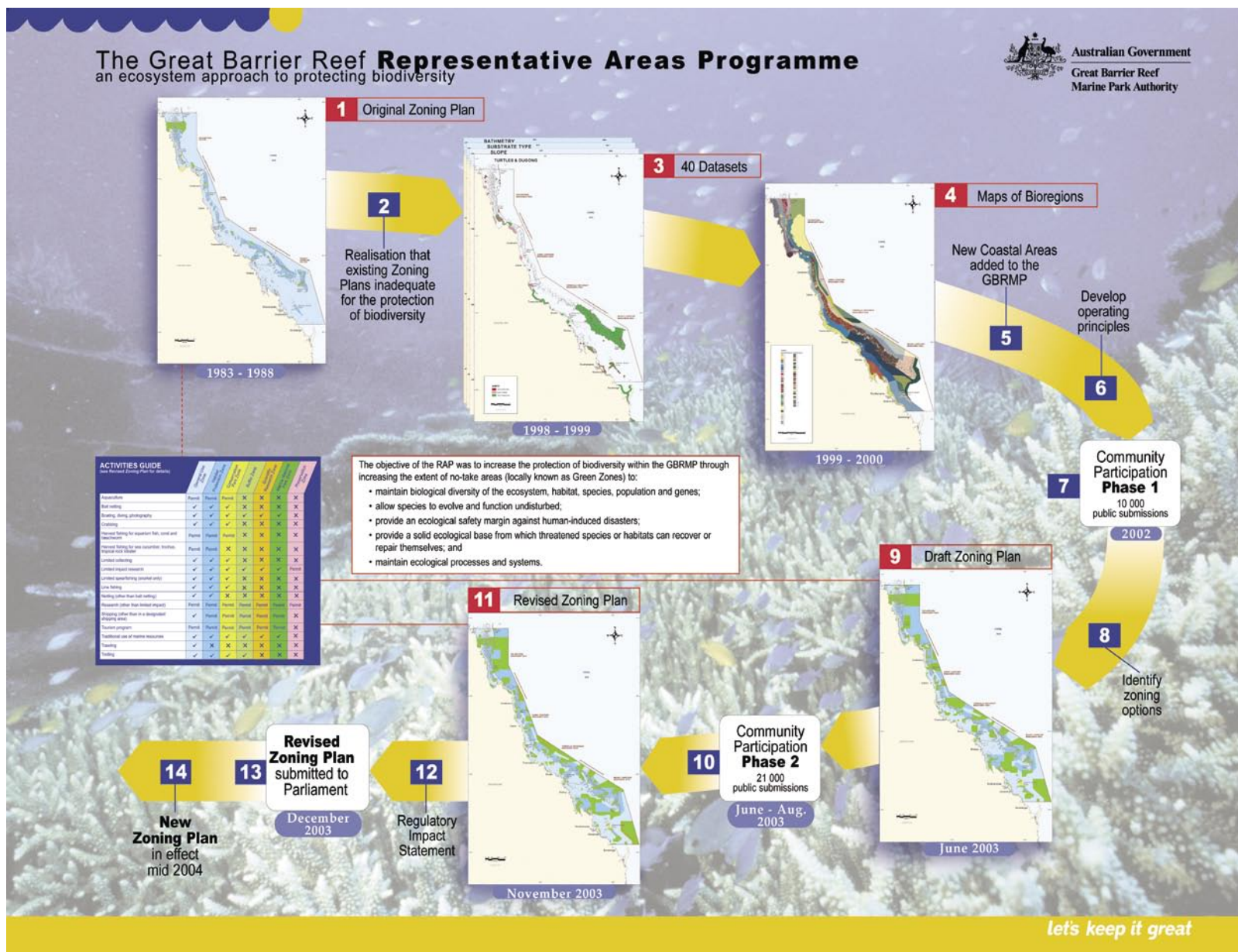
Assessments should be open, transparent and accessible to community. *“A picture paints a thousand words”* (importance of visuals, graphs to show trends, etc.). It’s important to think about reporting means at the outset of the project, and to tailor the report style and level of detail to the target audience. Timing/release of a report can be critical, especially if using media. Reporting research results can sometimes take years/decades—far outside management, and especially political, timeframes.

Have We Learned any General Principles about Adaptive Management?

- There are many theoretical calls for comprehensive evaluation of management effectiveness of marine areas. Reality is few resource management agencies have implemented such systems or procedures.
- Most evaluation efforts to date have concentrated on the biophysical aspects/condition in a few selected areas. Very few are comprehensive assessments of management effectiveness, or include social or economic aspects.
- Many evaluations have relied upon staff from academic or research institutions to do the work. Very few have been conducted by, or effectively involved, management staff.
- Most management plans today refer to adaptive management and the need to monitor performance. Few really have, with the main excuses seeming to be high costs, institutional barriers, and lack of political support.

Fig 16.
The Great Barrier Reef Representative Areas Programme

(source: Great Barrier Reef Marine Park Authority)



Can We Draw Any Conclusions about the Need for Marine Spatial Planning To Be Adaptive?

- Monitoring, evaluation, effective reporting and adaptive management are all fundamental components of effective sea use management. Marine spatial planning should be a continuous process that involves all these elements.
- Adaptive, ecosystem-based sea use management can ensure healthy, productive and resilient marine areas that provide the goods and services that people want and need.
- Monitoring and evaluation need to concentrate on the most important issues affecting or potentially affecting a marine managed area. Managers should develop a comprehensive list of research and monitoring priorities required to address key management needs.
- Apply the precautionary principle – *don't wait for "perfect" science before taking management action.*

- Zoning is only one of a wide range of management tools that can be used for marine management.
- A complementary approach is needed across appropriate jurisdictional boundaries, i.e., local, state, federal, regional, international.
- Adaptive management can: (1) demonstrate the extent to which objectives have been achieved; (2) identify gaps that may be rectified; (3) provide feedback as to what's working and what's not, enabling more informed decision-making; (4) promote accountability and demonstrate resources have effectively used; and (5) enable effective review of management direction, priorities, resource requirements, etc

Finally, use an adaptive planning approach. Don't wait for perfect information that will never come. Be prepared to take on new information and use it to inform the next round of management decisions.

10 Conclusions and **NEXT STEPS**



What Are Possible Next Steps After the Workshop?

Workshop participants developed the following list of potential follow-up activities both during and after the workshop:

- Continue to develop an international community of MSP researchers and practitioners through the Internet and other communications and build on the work of the “pioneers” in practice;
- Maintain the UNESCO MSP website (<http://ioc3.unesco.org/marine-sp>) to continue to follow developments in different countries and regions;
- Identify how MSP is reflected in regional and sectoral legislation, management systems, and regulations as well as what kind of “political opportunities” exist for moving MSP forward;
- Develop information for the general public, resource managers, and the politicians, especially about the nature of the problem and how MSP can help, i.e., the benefits of MSP;
- Communicate with and learn from terrestrial and coastal zone management examples and planning processes for ecosystem-based spatial planning;
- Work to integrate the human dimensions into MSP in more complex and complete ways. Given the scarcity of social science data gathering, etc., learn from and adapt terrestrial models and methodologies.
- Develop case studies in developing countries that have pioneered and advanced the integration of community-level participation, local knowledge, and conflict resolution, in MSP (e.g., The Philippines and Mexico);
- Acknowledge and address the first world bias of MSP, i.e., MSP appears to be emerging from the growing need to reserve space for semi-permanent structures such as wind farms, aquaculture, oil/gas platforms, etc. and other competing activities (e.g., industrial fishing, recreation). MSP, so far, addresses these competing activities as activities and interests of equal “actors.” In developing countries, many of these activities (e.g., industrial fishing, oil/gas, recreation) are not the activities of local actors. Insofar as MSP is about dividing and allocating common property, just whose commons is being divided and allocated to whom is vital to consider as we develop universal models, typologies, techniques, etc., for MSP?

What Meetings/Workshops Could Be Organized?

- Convene workshops dedicated to the implementation process of ecosystem-based, marine spatial planning that include political, legal, and economic/financial aspects of MSP; develop improved benefit measures of MSP; identify legal constraints to achieving ecosystem-based MSP; and
- Organize meetings with sectoral representatives (i.e., users) to get a reality check on their ideas about MSP.

What Documents Could Be Prepared?

- Develop a common vocabulary of MSP terminology; the use of existing groups such as OSPAR Working Groups and EU working groups may be helpful in this endeavor. (note, for example, that the Polish language does not have a word for “zoning” and Chinese does not have a word for “governance”);
- Develop “how to” guidelines or a list of best practices to assist practitioners in the implementations of MSP. Use lessons learned from as many case studies as possible, emphasizing what works and what doesn’t in each MSP experiment. The guidelines could also define a set of marine problems and define how MSP can be used to help solve them as well as provide instructions for identifying and selecting indicators or “measures of success” for MSP efforts;
- Develop an annual report of international achievements and challenges of MSP practice;
- Over next two years, conduct a critical international review of practical MSP experiences;
- Use results of workshop to prepare comments on draft EU “Green Paper on Maritime Policy” before 30 June 2007—the earlier the better — *timing is everything*.

References

- Agardy, T., et al., 2003. Dangerous targets? Unresolved issues and ideological clashes around marine protected areas. *Journal of Aquatic Conservation: Marine and Freshwater Ecosystems*. 13. pp. 353-367.
- Agardy, T., 2007. Ocean zoning is coming. Ocean zoning is coming! Music to some ears, a fearsome sound to others. *The Ocean Observer*. Available at: <http://thew2o.net/newsletter.html>
- Arkema, K.K., et al. 2006. Marine ecosystem-based management: from characterization to implementation. *Frontiers in Ecology and Environment* 4(10): 525-532.
- Avasthi, A., 2005. California tries to connect its scattered marine reserves. *Science*. 308 (5721): 487-488.
- Belfiore, S., et al., 2006. *A Handbook for Measuring the Progress and Outcomes of Integrated Coastal and Ocean Management*. IOC Manuals and Guides, 46. ICAM Dossier Series 2. Paris: UNESCO. 217 p.
- Beck, M. The around us—planning in marine regions. In: Groves, C.R., ed. *Drafting a Conservation Blueprint*. The Nature Conservancy.
- Beck, M., and M. Adaya, 2001. Ecoregional planning in marine environments: identifying priority sites for conservation in the Northern Gulf of Mexico. *Aquatic Conservation*. 11: 235-242.
- Beck, M., Z. Ferdana, D. Dorfman & J. Deblieu, 2006. Using marine assessments with multiple objectives to advance ecosystem-based management. The Nature Conservancy. Presentation available at: <http://ioc3.unesco.org/marinesp>
- Birdlife International, 2003. *Developing a Framework for Marine Spatial Planning in the North Sea: Principles*. Paper presented to the OSPAR Convention for the Protection of the Marine Environment of the North East Atlantic, Meeting of the Commission, 23-27 June. Ref. OSPAR 03/4/12-E.
- Boersma, D., J. Ogden, et al. 2004. Lines on the water: ocean-use planning in large marine ecosystems. Chap. 6 in *Defying Ocean's End: An Agenda for Action* (L. Glover and S. Earle, eds.). Washington: Island Press. pp. 125-138.
- Bower, B.T., Ehler, C.N., & Basta, D.J., 1994. *A Framework for Planning for Integrated Coastal Zone Management*. Silver Spring, MD: National Oceanic & Atmospheric Administration. 65 p.
- Boyes, S., M. Elliott, S. Thomson, S. Atkins, P. Gilliland, J. Hamer, & A. Hill, 2005. *Multiple-use zoning in UK and Manx Waters of the Irish Sea: an interpretation of current legislation through the use of GIS-based zoning approaches*. Perth, UK: Scottish Natural Heritage. 69 pp.
- Boyes, S., M. Elliott, S. Thomson, S. Atkins, & P. Gilliland, 2007. A proposed multiple-use zoning scheme for the Irish Sea: an interpretation of current legislation through the use of GIS-based zoning approaches and effectiveness for the protection of nature conservation interests. *Marine Policy*. 31: 287-298.
- Brown, J., 2003. The case for marine spatial planning – the WWF view. In Earll, R. (ed.) *Spatial planning in the coastal and marine environment: next steps to action*. CoastNet Conference, 1 October 2003, SOAS, University of London, p.48.
- Canning, R., 2003. The elements of marine spatial planning. In *CoastNet Conference: Spatial Planning in the Coastal and Marine Environment: Next Steps to Action*.
- Cicin-Sain, B., and Knecht, R.W., 1998. *Integrated Coastal and Ocean Management: concepts and practices*. Washington: Island Press.
- Cicin-Sain, B., and Knecht, R.W., 2000. *The Future of US Ocean Policy: Choices for the New Century*. Washington: Island Press.
- CoastNet, 2003. *Spatial Planning in the Coastal and Marine Environment: Next Steps to Action, Briefing papers for delegates to the CoastNet Conference*.
- Connor, D.W., et al., 2004. *The Marine Habitat Classification for Britain and Ireland*. Version 04.05. Peterborough, UK: Joint Nature Conservation Committee. 49 p.
- Connor, D.W., P.M. Gilliland, N. Golding, P. Robinson, D. Todd, & E. Verling, 2006. *UKSeaMap: the mapping of seabed and water column features of UK seas*. Joint Nature Conservation Committee: Peterborough, UK. 103 p.
- Conservation International, no date. *Seascapes: globally important marine ecosystems* [brochure]. Washington: CI. Available at: <http://portals.conservation.org/marine>
- Country Agencies Interagency Marine Spatial Planning Working Group. *The added value of marine spatial planning*. UK. 16 pp. Unpublished.
- Country Agencies Interagency Marine Spatial Planning Working Group. 2005. *Natural Heritage/Nature Conservation objectives for a Marine Spatial Planning (MSP) system*.
- Courtney, Fara, and Jack Wiggin. 2003. *Ocean Zoning for the Gulf of Maine: A Background Paper*. Gulf of Maine Council for the Marine Environment. 33 p.
- Cowie-Haskell, B., and J.M. Delaney, 2004. Integrating science into the design of the Tortugas Ecological Reserve. *MTS Journal*. Vol. 37, no.1. pp. 68-79.
- Christensen, N.L., et al. The report of the Ecological Society of America committee on the scientific basis for ecosystem management. *Ecological Applications*. 6: 665-691.

- Crowder, L.B., G. Osherenko, O.R. Young, S. Aïramé, E.A. Norse, N. Baron, J.C. Day, F. Douvère, C.N. Ehler, B.S. Halpern, S.J. Langdon, K.L. McLeod, J.C. Ogden, R.E. Peach, A.A. Rosenberg, and J.A. Wilson, 2006. Resolving mismatches in U.S. ocean governance. *Science*. 313: 617-618 (4 August 2006).
- Day, J.C., 2002. Zoning—lessons from the Great Barrier Reef Marine Park. *Ocean & Coastal Management*, 45, 139-156.
- Day, J.C., 2002. Marine park management and monitoring: lessons for adaptive management from the Great Barrier Reef. In: S. Bondrup-Nielsen, et al., eds. *Managing Protected Areas in a Changing World: Proceedings of the Fourth International Conference on Science and Management of Protected Areas*, 14-19 May 2000. pp. 1258-1282.
- Day, J., M. Hockings & G. Jones, 2003. Measuring effectiveness in marine protected areas—principles and practice. Presented at *World Congress on Aquatic Protected Areas*, Cairns, August 2002.
- Department for Environment, Food, and Rural Affairs (Defra), 2002. *Safeguarding Our Seas: a strategy for the conservation and sustainable development of our marine environment*. Defra: London, UK. 80 p.
- Department for Environment, Food, and Rural Affairs (Defra), 2007. *A Sea Change: A Marine Bill White Paper*. March. Marine Legislation Division. Defra: London. 176 p.
- Department of the Environment and Heritage, 2005. *National Marine Bioregionalization of Australia*. National Oceans Office: Hobart, Australia. 145 p.
- Department of Fisheries and Oceans (DFO), 2002. *Canada's Oceans Strategy: Our Oceans, Our Future*. Oceans Directorate: Ottawa, Canada. 30 p.
- Douvère, F., and C. Ehler, 2007. New perspectives on ecosystem-based management: lessons from recent European experiences with marine spatial planning (submitted for publication).
- Douvère, F., et al., 2007. The role of marine spatial planning in sea use management: the Belgian case. *Marine Policy*, Vol. 31, March. pp. 182-191.
- Dutch Fish Product Board, 2004. *Fishing on a square inch*. Rijswijk: Productschap Vis. 12 pp.
- Ehler, C., et al., 1986. New oceanic and coastal atlases focus on potential EEZ conflicts. *Oceanus*. Vol. 29, no. 3. pp. 42-51.
- Ehler, C., and D.J. Basta, 1982. Information for assessing the future use of ocean resources. *Marine Pollution Bulletin*. Vol. 13, no. 6. pp. 186-191.
- Ehler, C., and T.-E. Chua, 2006. The ecosystem approach to integrated ocean and coastal management. In: B. Cicin-Sain, ed., *Reports from the Third Global Conference on Oceans, Coasts and Islands: Moving the Global Agenda Forward*. University of Delaware.
- Ehler, C., B. Cicin-Sain, and S. Belfiore (eds.), 2004. *Incorporating Marine Protected Areas into Integrated Coastal and Ocean Management: Principles and Guidelines*. IUCN/World Commission on Protected Areas: Gland, Switzerland. 38 p.
- English Nature. 2005. *Our coasts and seas - making space for people, industry and wildlife*. Peterborough, UK: English Nature.
- European Commission, 2006. *EU Marine Strategy. The story behind the strategy*. Luxembourg: Office for Official Publications of the EC. 32 p.
- European Commission Maritime Policy Task Force, 2006. Towards a future maritime policy for the Union: A European vision for the oceans and seas. Maritime Policy Green Paper. J-99 7/12. EC: Brussels. At: <http://ec.europa.eu/maritimeaffairs>.
- Fisheries and Oceans Canada, 2005. *Eastern Scotian Shelf Integrated Ocean Management Plan (2006-2011)*. Draft for discussion. ESSIM Project Office. Dartmouth, NS: Fisheries and Oceans Canada. 73 pp.
- Fisheries and Oceans Canada, 2005. *The Scotian Shelf: An Atlas of Human Activities*. DFO Maritime Region: Dartmouth, NS. 120 p.
- Food and Agriculture Organization of the United Nations (FAO), 2003. *The Ecosystem Approach to Fisheries*. FAO Technical Guidelines for Responsible Fisheries. Rome: FAO. 112 p.
- Food and Agriculture Organization of the United Nations (FAO), 2005. *Putting into Practice the Ecosystem Approach to Fisheries*. Rome: FAO. 76 p.
- von Gadow, Inken, 2006. Report on marine spatial planning. Prepared for the Maritime Policy Task Force of the European Commission. 36 p. Available at: <http://ioc3.unesco.org/marinesp>
- Gee, Kira, et al. 2004. National ICZM strategies in Germany: a spatial planning approach. In *Managing the Baltic Sea* (Schernewski, G., and N. Loser, eds.). *Coastline Reports 2*. pp. 23-33.
- Gilliland, P.M., S. Rogers, J.P. Hamer & Z. Crutchfield, 2004. The practical implementation of marine spatial planning—understanding and addressing cumulative effects. Report of a workshop held 4 December 2003, Stansted. *English Nature Research Reports*. No. 599. Peterborough: English Nature.
- GHK Consulting & S. Wilson, 2004. *Potential Benefits of Marine Spatial Planning to Economic Activity in the UK*. Sandy, UK: Royal Society for the Protection of Birds. 100 pp.
- Great Barrier Reef Marine Park Authority, 2003. *Zoning Plan*. GBRMPA: Townsville, Australia. 211 p.
- Grumbine, R.E. 1994. What is ecosystem management? *Conservation Biology*. Vol. 8, no.1. March. Pp. 27-38.
- Gubbay, S., 2004. *Marine Protected Areas in the context of Marine Spatial Planning – discussing the Links*. A report prepared for WWF-UK. 22 pp.
- Hall, P., 2002. *Urban and Regional Planning* (4th edition). London: Routledge. 237 p.
- International Council for the Exploration of the Seas (ICES), 2005. Guidance on the Application of the Ecosystem Approach to Management of Human Activities in the European Marine Environment. *ICES Cooperative Research Report, Rapport des Recherches Collectives 273*, 1-28.

- Intergovernmental Panel on Climate Change (IPCC) Working Group II, 2007. *Climate Change 2007: Climate Change Impacts, Adaptation, and Vulnerability. Summary for Policy Makers*. Fourth Assessment Report. Available at <http://www.ipcc.ch/SPM6avr07.pdf>.
- Joint Nature Conservation Committee, 2004. *The Irish Sea Pilot*. Report to Defra. JNCC: Peterborough, UK. 171 p.
- Kaiser, Edward J., David R. Godschalk, and F. Stuart Chapin, Jr. 1995. *Urban Land Use Planning*. Urbana and Chicago: University of Illinois Press. 493 p.
- Kenchington, R.A., 1990. *Managing Marine Environments*. New York: Taylor & Francis. 247 p.
- Kenchington, R.A. and M.T. Agardy. 1990. Achieving marine conservation through biosphere reserve planning and management. *Environmental Conservation* 17(1):39-44.
- Laffoley, D., et al. 2004. *The Ecosystem Approach: coherent actions for marine and coastal environments*. A report to the UK Government. Peterborough: English Nature. 65 pp.
- Lee, A., and J. Ramster. 1981. *Atlas of the Seas Around the British Isles*. London: HMSO.
- Li, H., 2006. The impacts and implications of the legal framework for sea use planning and management in China. *Ocean & Coastal Management*. 49: 717-726.
- Lindeboom, H., et al. 2005. *Areas with Special Ecological Values on the Dutch Continental Shelf*. The Hague: Rijkswaerstaat. November. 105 p.
- McLeod, K., J. Lubchenco, S.R. Palumbi, and A.A. Rosenberg, 2005. *Scientific Consensus Statement on Marine Ecosystem-Based Management*. COMPASS (Communication Partnership for Science and the Sea) at <http://compassonline.org/?q=EBME>.
- Maes, F., et al., 2005. *A Flood of Space: toward a spatial structure plan for sustainable management of the North Sea*. Brussels: Belgian Science Policy. 204 p.
- Marine Spatial Planning Pilot Consortium, 2006. *Marine Spatial Planning Pilot: toward marine spatial planning and management (Final Report)*. Prepared for the UK Department of Environment, Food, and Rural Affairs (Defra). 105 p.
- Marine Spatial Planning Pilot Consortium, 2005. *Marine spatial planning project: literature review*. 121 pp.
- Meijers, E.M.J., 1986. Defining confusions—confusing definitions. *Journal of Environmental Monitoring and Assessment*. Vol. 7, no. 2. pp. 157-159.
- Millennium Ecosystem Assessment, 2005. Washington: Island Press. At <http://www.MAweb.org>
- Myers, R.A., and B. Worm, 2003. Rapid worldwide depletion of predatory fish communities. *Nature* 423: 280-283.
- National Research Council, 1995. *Understanding Marine Biodiversity: a research agenda for the nation*. Washington: National Academy Press. 114 p.
- Netherlands North Sea Department, 2005. *Integrated Management Plan for the North Sea, 2015*. Rijswijk, The Netherlands: Rijkswaterstaat Noordsee. 166 p.
- Netherlands 2000. *Summary: Making Space, Sharing Space. Fifth National Policy Document on Spatial Planning 2000/2020*. The Netherlands: Ministry of Housing, Spatial Planning and the Environment, Communication Directorate.
- Nolte, N., 2006. Marine spatial planning in the German Exclusive Economic Zone. Presentation available at: <http://ioc3.unesco.org/marinesp>
- Norse, E.A. (ed.), 1993. *Global Marine Biological Diversity: a strategy for building conservation into decision making*. Washington: Island Press. 383 p.
- Norse, E.A., 2002. A zoning approach to managing marine ecosystems. In *Improving Regional Ocean Governance in the US* (B. Cicin-Sain and C.N. Ehler, eds.). Newark: University of Delaware. pp. 53-57.
- Norse, E.A., and Crowder, L.B. (eds.), 2005. *Marine Conservation Biology*. Washington: Island Press. 470 p.
- North Sea Conference, 2002. *Ministerial Declaration of the Fifth International Conference on the Protection of the North Sea*, Bergen, Norway, 20-21 March 2002.
- North Sea Secretariat. 1999. *The North Sea: An Integrated Ecosystem Approach for Sustainable Development*. International Conferences on the Protection of the North Sea. Helsinki: Department of the Environment.
- Olsen, O.T., 1883. *The Piscatorial Atlas of the North Sea, English and St. Georges Channels, illustrating the fishing ports, boats, gear and species, and other information concerning fish and fisheries*. Taylor and Francis: London, UK. 50 maps.
- Orth, R.J., et al. 2006. A global crisis for seagrass ecosystems. *BioScience* 56(12): 987-996.
- Osherenko, G., 2007. New discourses on ocean rights: understanding property right, the public trust, and ocean governance. *Journal of Environmental Law & Litigation* (forthcoming).
- OSPAR Convention for the Protection of the Marine Environment of the Northeast Atlantic, 2003. Planning the North Sea—a first attempt to describe the existing spatial control mechanisms. Annex to London meeting, 8-9 January 2004. 57 p.
- OSPAR Convention for the Protection of the Marine Environment of the Northeast Atlantic, 2004. *Workshop on spatial planning in the North Sea (SPINS)*. London, 8-9 January 2004.
- OSPAR Convention for the Protection of the Marine Environment of the Northeast Atlantic, 2005. *Workshop on spatial planning in the North Sea (SPINS)*. The Hague, 2-3 February 2005. 5 p.
- OSPAR Convention for the Protection of the Marine Environment of the Northeast Atlantic, 2003. *Legal regulations and legal instruments to achieve the management objectives in OSPAR marine protected areas*. At: <http://ioc3.unesco.org/marinesp>
- Peel, D., and Lloyd, M.G., 2004. The social re-construction of the marine environment: toward marine spatial planning. *Town Planning Review* 75(3). pp 359-378

- Pauly, D., et al., 1998. Fishing down marine food webs. *Science* 279: 860-863.
- Pauly, D., et al., 2005. Chapter 18: marine fisheries systems. In: *Conditions and Trends Assessment Volume of the Millennium Ecosystem Assessment*. Island Press: Washington, D.C.
- PEMSEA (Global Environment Facility/United Nations Development Programme/ International Maritime Organization Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas (MPP-EAS)/ Partnership in Environmental Management for the Seas of East Asia), 1999. *Water use zoning for the sustainable development of Batangas Bay, Philippines*. MPP-EAS Technical Report No. 25/PEMSEA Technical Report No. 3, 50 p. Quezon City, Philippines.
- People's Republic of China, 2001. *Law on the Management of Sea Area Use*. Adopted at the 24th Session of the Standing Committee of the 9th National People's Congress on 27 October 2001.
- Pew Oceans Commission, 2003. *America's Living Oceans: Charting a Course for Sea Change*. Pew Oceans Commission: Arlington, VA.
- Randolf, J., 2004. *Environmental Land Use Planning and Management*. Washington, DC: Island Press. 664 p.
- Richardson, E.A., et al., 2006. *Developing Scenarios for a Network of Marine Protected Areas: building the evidence base for the Marine Bill*. Department for Environment, Food, and Rural Affairs (Defra): London, UK. June. 69 p.
- Roff, J.C., and Taylor, M.E., 2000. National frameworks for marine conservation—a hierarchical geophysical approach. *Aquatic Conservation: Marine and Freshwater Ecosystems*. 10: 209-223.
- Ruan, W. and Yu, H., 1999. *Design and implementation of marine functional zoning scheme in Xiamen, China*. In Proceedings of the International Conference on Challenges and Opportunities in Managing Pollution in the East Asian Seas, published by PEMSEA: Quezon City, Philippines, pp. 341-354.
- St. Martin, K., 2001. *Making space for community resource management in fisheries*. The Annuals of the American Association of Geographers. 91: 122-142.
- St. Martin, K., 2004. GIS in marine fisheries science and decision-making. In: W.L. Fisher and F.J. Rahel, eds. *Geographic Information Systems in Fisheries*. American Fisheries Society: Bethesda, MD. pp. 237-258.
- St. Martin, K., 2005. Mapping economic diversity in the First World: the case of fisheries. *Environment and Planning*. 37: 959-79.
- St. Martin, K., 2006. The impact of 'community' on fisheries management in the U.S. Northeast. *GeoForum* 37(2): 169-184.
- St. Martin, K., 2007. Charting fishing communities at sea: revealing new potentials for participation in fisheries science and management. Submitted to *ICES Journal*.
- St. Martin, K., B.J. McCay, G. Murray, T. Johnson & B. Oles, 2007. Communities, knowledge, and fisheries of the future. *International Journal of Global Environmental Issues* (forthcoming).
- Sanchirico, J.N., and J.E. Wilen, 2006. Optimal spatial management of renewable resources: matching policy scope to ecosystem scale. *Journal of Environmental Economics and Management* (in press).
- Scottish Environment LINK, 2006. *Marine Spatial Planning*. Marine Bulletin 3, September.
- Secretariat of the Convention on Biological Diversity, 2004. *The Ecosystem Approach (CBD Guidelines)*. Montreal: Secretariat of the Convention on Biological Diversity. 50 pp.
- Shepherd, G., 2004. *The Ecosystem Approach: Five Steps to Implementation*. IUCN, Gland, Switzerland, and Cambridge, UK. vi + 30 pp.
- Sherman, K., L.M. Alexander, and B.D. Gold (eds.), 1990. *Large Marine Ecosystems: Patterns, Processes, and Yields*. American Association for the Advancement of Science: Washington, DC.
- Sherman, K., 1991. The large marine ecosystem concept: research and management strategy for living marine resources. *Ecological Applications*. 1:349-360.
- Shepherd, G., 2004. *The Ecosystem Approach: Five Steps to Implementation*. IUCN: Gland, Switzerland and Cambridge, UK. 30 p.
- Slocumbe, D.S., 1993. Implementing ecosystem-based management. *Bioscience*. 43(9): 612-622.
- Smith, H., and A. Vallega (eds.), *The Development of Integrated Sea Use Management*. Routledge: London. 1991.
- Southgate, M. (2003) The plan-led approach. In Earll, R. (ed.) *Spatial planning in the coastal and marine environment: next steps to action*. CoastNET conference 1 October 2003, SOAS, University of London, pp.19-21.
- State Oceanic Administration, 1996. *China Ocean Agenda 21*. China Ocean Press: Beijing. 193 p.
- Sun, S., 2004, Director-General, Sea Area Use Division, State Oceanic Administration, *Briefing on the Sea Use Management System in China* (unpublished).
- Symes, D., 2005. *Marine Spatial Planning: a fisheries perspective*. Report to English Nature. 35 pp.
- TFG International, 2002. *Review of the Implementation of [Australian] Ocean Policy*. 32 pp + appendices
- Tyldesley, D. 2005. *Integrated Coastal Zone Management and the Planning System in England*. English Nature Research Report 643, Peterborough: English Nature.
- Tyldesley, D., and B. Hunt, 2004. *Review of how the Land Use Planning System could influence the development of a Marine Spatial Planning System for England*. English Nature Research Report No. 566. Peterborough: English Nature.
- David Tyldesley & Associates, 2004. *Irish Sea Pilot Project: Coastal and Marine Spatial Planning Framework*. Report to the Joint Nature Conservation Committee. London: Defra.

- David Tyldesley & Associates, 2004. *Making the Case for Marine Spatial Planning in Scotland*. Royal Society for the Protection of Birds Scotland and the Royal Town Planning Institute Scotland. 35 pp.
- Underhahl, A., 1980. Integrated marine policy—What? Why? How? *Marine Policy*. July. Pp. 159-169.
- U.S. Commission on Ocean Policy, 2004. *An Ocean Blueprint for the 21st Century*. Final Report of the U.S. Commission on Ocean Policy to the President and Congress. Washington, DC.
- U.S. National Oceanic & Atmospheric Administration (NOAA), 1980. *The Gulf of Mexico Coastal and Ocean Zone Data Atlas*. USGPO: Washington, DC. 163 maps + text.
- U.S. National Oceanic & Atmospheric Administration (NOAA), 1986. *Eastern United States Coastal and Ocean Zone Data Atlas*. NOAA: Rockville, MD. 127 maps + text.
- U.S. National Oceanic & Atmospheric Administration (NOAA). 2006. *Marine zoning and coastal zone management*. Ecosystem White Paper 4. Silver Spring, MD: NOAA. 13 p.
- U.S. National Oceanic & Atmospheric Administration (NOAA), 2005. *Mapping Human Activity in the Marine Environment: GIS Tools and Participatory Methods: Workshop Summary*. National MPA Center. December 2005. 26 p.
- U.S. National Oceanic & Atmospheric Administration (NOAA), WWF-International, and IUCN, 2005. *How Is Your MPA Doing? A Guidebook of Natural and Social Indicators for Evaluating Marine Protected Area Management Effectiveness*. IUCN: Gland, Switzerland.
- Vincent, M.A., Atkins, S.M., Lumb, C.M., Golding, N., Lieberknecht, L.M., and Webster, M., 2004. *Marine Nature Conservation and Sustainable Development—the Irish Sea Pilot*. Report to Defra by the Joint Nature Conservation Committee, Peterborough: UK. Available at www.incc.gov.uk
- de Vrees, L., 2006. Spatial management on the (Netherlands part of the) North Sea. Available at: <http://ioc3.unesco.org/marinesp>
- Walmsley, J., 2005. Developing objectives and indicators for marine ecosystem-based management: international review of marine ecosystem-based management initiatives throughout the world. Oceans and Coastal Management Report 2005-09. Eastern Scotian Shelf Integrated Management (ESSIM) Initiative. Fisheries and Oceans Canada: Dartmouth, Nova Scotia. 54 p.
- Wildlife and Countryside LINK, 2006. Spatial Planning Guidance. London, UK. 19 p.
- Wilkinson, C. (ed.), 2004. *Status of Coral Reefs of the World*. 2 Vols. Australian Institute of Marine Science: Townsville, Australia. 301 p.
- Worm, B., 2006. Impacts of biodiversity loss on ocean ecosystem services. *Science*. 3 November. 314: 787-790.
- WWF, 2004. *Marine spatial planning: a down to earth view of managing activities in the marine environment for the benefit of humans and wildlife*. Marine Update, No. 55. Godalming: WWF and Wildlife Trusts.

Workshop **AGENDA**

Tuesday, 7 November

1800-2000	Welcome Reception (UNESCO Annex—Millios Bar)
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Wednesday, 8 November

0845-0915	Coffee & Croissants
0900-0930	Registration (UNESCO Annex, Bonvin, Conference Room 13)
0930-1000	Welcome (Patricio Bernal & Natjaran Ishwaran, UNESCO) and Introductions

OVERVIEW OF THE WORKSHOP

1000-1030	Session 1: Introduction to the Practice of Marine Spatial Planning and Sea Use Management (Fanny Douvere & Charles Ehler, Co-Chairs, UNESCO)
1030-1100	Discussion
1100-1130	Coffee

LEGAL ISSUES

1130-1200	Session 2: International Examples of Authorization for Marine Spatial Planning (Frank Maes, Ghent University, Belgium)
1200-1300	Discussion
1300-1315	Summary of Discussion
1315-1500	Lunch

TECHNICAL ISSUES

1500-1530	Session 3: The Process of Ecosystem-based, Sea Use Management and Marine Spatial Planning (Paul Gilliland, Natural England, and Dan Lafolley, IUCN/WCPA)
1530-1630	Discussion
1630-1700	Coffee
1700-1730	Summary of Discussion
1730-1800	Summary of the Day's Discussions

Thursday, 9 November

TECHNICAL ISSUES, cont.

0845-0915	Coffee & Croissants
0930-1030	Session 4: Examples of Good Practice in the Application of Science for Marine Spatial Planning (Elliott Norse, Marine Conservation Biology Institute, and Larry Crowder, Duke University)
1030-1100	Discussion
1100-1130	Coffee
1130-1200	Session 5: Examples of Good Practice in the Application of New Tools for Marine Spatial Planning (Kevin St. Martin, Rutgers University)
1200-1300	Discussion
1300-1430	Lunch (on your own)
1430-1500	Summary of Morning Discussions
1500-1530	Session 6: Examples of Good Practice in Implementation of Marine Spatial Planning (Cathy Plasman, Belgian Ministry of Mobility and North Sea Affairs)
1530-1630	Discussion
1630-1700	Coffee
1700-1730	Summary of Afternoon Discussion
1730-1800	Summary of the Day's Discussions
2000-2200	Group Dinner (Le Petit Zinc, 11 rue St-Benoit, 6e)

Friday, 10 November

GOVERNANCE ISSUES

0845-0915	Coffee & Croissants
0930-1030	Session 7: Institutional Arrangements for Marine Spatial Planning (Yves Auffret, European Commission)
1030-1100	Discussion
1100-1130	Coffee
1130-1200	Session 8: Monitoring, Evaluation, and Adaptation (John Day, Great Barrier Reef Marine Park Authority, Australia)
1200-1300	Discussion
1300-1430	Lunch
1430-1500	Summary of Morning Discussions
1500-1520	Session 9: Capacity Building for Marine Spatial Planning (Antonio Diaz De Leon, Ministry of Environment and Natural Resources, Mexico)
1520-1600	Discussion
1600-1615	Summary of Afternoon Discussion
1615-1630	Coffee

SUMMARY

1630-1645	Summary and Actions from the Day's Discussions
1645-1730	Summary of Workshop and Next Steps (Ehler & Douvère, Co-Chairs, UNESCO)

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