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# **Marine and Coastal Ecosystem-Based Management**

An Introductory Guide to Managing Oceans and Coasts Better

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## **Foreword**

**(to be drafted by Ole)**

Addresses the questions:

- How does EBM fit into UNEP's strategies? (This is a good place to discuss UNEP's strategic approach to EBM, including its Ecosystem Management Programme)
- How does UNEP want the Regional Seas Programme to proceed on EBM?
- How can/should the Regional Seas Programme implement EBM at a variety of scales and with a diverse range of approaches?

## Introduction

Imagine this scenario.

A very productive and picturesque ocean area lies at risk. Previously the area provided people with everything they needed: food, energy, recreation, and more. But now there are problems. Runoff from farms and towns upstream has started to pollute the water. Coastal wetlands where fish produced their young are being filled to build condominiums. Offshore energy platforms for oil and wind are being built near coral reefs and in key habitats for whales, turtles, and seabirds.

The people gather to decide what to do. Farmers, builders, fishermen, conservationists, politicians, energy industry people — everyone is there. They use science to understand how the various parts of the ocean ecosystem connect to each other, as well as to people. They decide which impacts most need to be addressed by management. Together they plan how uses can be managed better and special areas can be protected.

Then they put those changes into effect. Practices at upstream farms and in towns are improved to reduce runoff. Wetlands are protected from development. And offshore energy projects are placed to have less of an impact on sensitive marine habitats.

The people enjoy the benefits of these changes, including healthier ecosystems, larger catches of fish, and fewer conflicts between groups of users. By involving all stakeholders and government agencies in the planning, the new management system is widely accepted and embraced. And many institutions continue to help with management, improving the plan as circumstances change. The future of this marine area is bright.

This scenario is ecosystem-based management.

**ILLUSTRATION:** *photos or conceptual diagram of ecosystem linkages (i.e. UMCES and MA)*

## Section I. Making the Case for Ecosystem-Based Management

### Why is change necessary?

People have been managing ocean uses for centuries, beginning with tribal authorities establishing marine tenure and taboos on resource use, and continuing to the modern era of complex governance. Yet today, the degraded condition of many seas and the overall decline in their diversity and productivity threaten our coastal communities and human well-being. The ocean's ability to maintain ecological balances — and to provide a wide array of valuable services to people — has been compromised.

Decades of overfishing, pollution and habitat destruction have left ocean ecosystems in unprecedented decline. Ecosystem health is compromised when waterways are dredged, wetlands are filled in, ports are constructed, housing and resorts are developed, and resources are over-exploited. Sediment transport and hydrology are dramatically altered by land and freshwater use in watersheds. With too many nutrients reaching our shores from agricultural run-off and sewage, coastal waters are among the most chemically altered environments in the world. Coasts are vulnerable to major impacts from sea level rise, erosion and storm events, and many marine systems are near thresholds for healthy functioning, putting coastal populations at risk.

Management of ocean uses has failed repeatedly. Despite the proliferation of coastal zone management agencies, the inability to control land-based sources of pollution has contributed to drastic declines in ecosystem health in coastal waters around the world.

Part of the decline of our oceans is due to a lack of awareness. People do not realize their actions are causing harm because many of these ecosystems are out of sight, out of mind.

Another reason is conflict: between various uses...between the cultures of different user groups...between jurisdictions charged with management. Vested interests are clashing.

And there is also fragmentation: coastal planners looking almost exclusively at the land side of the coastal zone; watershed management authorities focused on freshwater flows; fisheries managers controlling exploitation of single stocks; shipping authorities influencing ports and ship traffic; navies keenly guarding national security interests; conservationists safeguarding threatened species and bits of reef and wetland; developers and tourism ministries eagerly eyeing sites for the newest resorts; and bewildered local communities trying to interject their own visions and needs into the mix. Amid all this, marine management often targets only a single use (or set of related uses) at a time. It fails to consider the multiple and cumulative uses that can affect these ecosystems.

A new way of management is needed for our oceans and coasts.

**VOICE IN MARGIN:** *"Unless scientists and practitioners can convince ocean users that conserving ecosystem structure and function is fundamental to obtaining the ecosystem goods and services people desire, our opportunity for progress is limited."*

- Barry Gold, Gordon and Betty Moore Foundation

**ILLUSTRATION:** Adapted from this: <http://see-the-sea.org/topics/commerce/overfishing.htm>

**BOX:** *Unsustainable fisheries, UNEP-FAO Rome meeting report*

### Defining EBM

Ecosystem-based management, or EBM, is an approach that goes beyond examining single issues, species, or ecosystem functions in isolation. Instead it recognizes our coasts and oceans for what they are: a rich mix of elements that interact with each other in important ways. A single commercially valuable fish species, for example, may depend on a range of habitats over its life, depending on if it is young or

adult, feeding or spawning. It needs access to each habitat at the right time, as well as ample food, clean water and shelter.

Because humans depend on an array of ocean functions for our well-being — including the fish for food — EBM recognizes that our welfare and the health of the environment are linked. Put another way, marine and coastal systems provide valuable natural services — or “ecosystem services” — for human communities. To ensure our own health, therefore, we need to make sure ocean functions are sustained and protected. This means managing them in a way that acknowledges the complexity of marine ecosystems, the connections among them, and their links with land and freshwater as well.

One of the most important aspects of EBM is that it is fundamentally a place-based approach. That is, it aims to restore and protect the health, function and resilience of an entire ecosystem and the benefits it provides. This means managing ocean uses on scales that encompass marine ecosystem function, rather than on scales defined by jurisdictional boundaries. Regional scale management is an important strategy being tested in a range of places, including within the framework provided by the UNEP Regional Seas Programme.

**VOICE IN MARGIN:** *EBM is aimed at conserving and sustaining ecosystem services to benefit current and future human generations.*

*- Michael Sissenwine, Chair, ICES Advisory Committee*

Ecosystem management of land-based systems began in the 1950s. But its application in the marine environment is relatively new, developed in response to the declining state of fisheries and ocean ecosystems. Although the term “ecosystem-based management” has been defined in numerous ways, key elements of it include:

- Recognizing connections between marine, coastal and terrestrial systems and between ecosystems and human societies
- Using an ecosystem services perspective, where ecosystems are valued not only for the basic goods they generate (such as food or raw materials) but also for the important services they provide (clean water, protection from extreme weather, and so on)
- Addressing the cumulative impacts of individual actions occurring within an ecosystem
- Managing for and balancing multiple objectives that are related to different benefits and ecosystem services
- Embracing change, learning and adapting throughout the management process

Each of these core elements will be examined in more detail in Section II of this primer.

It is important to recognize there is no single correct path to EBM. The approach is being put into practice in different ways in different places, and across different scales. Often it simply combines and improves management practices that are already in place. The intent of this primer is to draw on a variety of experiences of marine EBM practitioners to describe how EBM is viewed, how it is put into practice, and how its success can be measured around the world.

In addition, EBM is a process, not an end point. It does not require a single giant leap from traditional, sectoral management to fully integrated, comprehensive management. Instead, EBM can be achieved in a step-by-step, incremental process. This guide will show what such a process can look like.

Finally, EBM does not require managing all aspects of a system at once. Instead, an EBM initiative is founded on good knowledge and understanding of the system, allowing for thoughtful prioritization of the most important management actions and activities. It is better to manage the most critical elements effectively than to become paralyzed by trying to manage everything else at the same time.

**VOICE IN MARGIN:** *“It is important to realize that ecosystem-based management is an ongoing process, not an end state. It builds on existing knowledge and management structures and*

*develops these further. It is not about throwing out what we have and replacing it with something else.”*

*- Alf Håkon Hoel, editor of Best Practices in Ecosystems Based Oceans Management in the Arctic*

**BOX:** Helpful resources on EBM

UNEP definition of EBM:

*“The **ecosystem approach** is a strategy for the integrated management of land, water and living resources that provides sustainable delivery of ecosystem services in an equitable way”.*

*“In ecosystem-based management, the associated human population and economic/social systems are seen as integral parts of the ecosystem. Most importantly, ecosystem-based management is concerned with the processes of change within living systems and sustaining the goods and services that healthy ecosystems produce. Ecosystem-based management is therefore designed and executed as an adaptive, learning-based process that applies the principles of the scientific method to the processes of management.” (For more information on the UNEP Ecosystem Management Programme: [www.unep.org/pdf/brochures/EcosystemManagement.pdf](http://www.unep.org/pdf/brochures/EcosystemManagement.pdf))*

COMPASS Consensus Statement:

[http://www.compassonline.org/pdf\\_files/EBM\\_Consensus\\_Statement\\_v12.pdf](http://www.compassonline.org/pdf_files/EBM_Consensus_Statement_v12.pdf)

ELI report: [http://www.elistore.org/reports\\_detail.asp?ID=11350](http://www.elistore.org/reports_detail.asp?ID=11350)

CBD principles: <http://www.cbd.int/ecosystem/principles.shtml> [separate box]

Packard EBM Report:

[end of box]

## How is EBM different from current management?

The problems facing oceans and coasts are not new to marine managers and planning agencies – most managers address these challenges in their daily work. Successful steps within an EBM process include things that coastal and marine managers are already doing: resource or stock assessment, environmental assessment, pollution monitoring, fisheries management, marine protected area designation and management, and integrated coastal zone management (ICZM).

What sets EBM apart is its holistic, integrated approach. It seeks to link previously sector-based management, like forestry and fisheries, and to consider the full range of uses that affect a system. This requires deliberate work to build collaboration and coordination across diverse sectors that may be isolated from, or even in conflict with, one another.

EBM also considers impacts that need to be managed or mitigated over wide areas. Just as ICZM has worked to increase integration of management, including consideration of cumulative impacts, EBM looks at ecosystems as units with ecological and social links, rather than as purely political units. It looks both out to sea and inland, connecting terrestrial, coastal and marine systems.

Thus, EBM builds on other important and long-practiced management approaches; it does not try to reinvent them. If ICZM is already practiced in a region, for example, adopting an EBM approach would start with an examination of the broader area — considering boundaries relevant to the ecosystem, not just political boundaries — and assess both ecological and social connections at play. If a region has a well-

established network of MPAs, adopting an EBM perspective might begin by adding management practices that link land and sea conservation.

Another defining element of EBM is its core intent of securing the long-term delivery of a variety of benefits that support human well-being by sustaining critical ecosystem structures, functions, and processes. Humans derive these ecosystem services from healthy ecological systems, such as clean beaches, stable fisheries, timber and recreational opportunities. In EBM, goals and successes are defined in terms of sustaining ecosystem services.

**VOICE IN MARGIN:** *"In my experience in the Philippines, because communities and the government have endorsed an ICZM approach to their coastal areas through legislation and action, they tend to see EBM as a refinement but not a replacement for their ICZM framework. In contrast, other areas where there is no particular coastal and marine resource management framework in place may adopt a so-called EBM system for their needs without pause."*  
- Alan White, The Nature Conservancy

**ILLUSTRATION:** *Ole's diagram: a horizontal rectangle ("EBM") that cuts across vertical rectangles that say "ecosystem approach to fisheries", "ecosystem approach to marine transport", etc.*

**ILLUSTRATION:** *Map showing a region, with zoomed-in sections showing national and state-scale ICM, then within that a zoom-in showing MPAs or community-based fisheries management*

### Science plays a key role in EBM

Science provides critical guidance in ecosystem-based management. In fact, EBM is often described as a science-based process. By building management from a foundation of the best available science, we presume that ecosystems and the services they provide can be protected or restored in relatively predictable ways — or at least in ways that adapt to evolving scientific understanding.

Both natural and social science capacity is needed to develop robust management regimes. Natural science is needed to limit or bound the ecosystem to be managed, to understand basic facts about its functioning, and to articulate linkages between and within ecosystems. Basic ecological understanding is necessary to assess the state of ecosystems, and to look at trends in condition to determine whether thresholds are being approached, and to predict future conditions. Natural science can also help identify limits to use that allow for staying within sustainable bounds.

Social science allows us to place a value on ecosystems and their services, and understand patterns of human use. It is needed to develop scenarios for management: story lines that describe what changes in ecosystems will mean for human communities. Such science is also needed to evaluate trade-offs, assess

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