



An approach to ecosystem-based management in maritime spatial planning process



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ARTICLE INFO

Article history:

Received 16 September 2016

Received in revised form

2 March 2017

Accepted 8 March 2017

Keywords:

Ecosystem-based management

Adaptive management

Operational framework

Monitoring

ABSTRACT

Sustainable development is the framing concept assuring that resources are exploited while maintaining the ability of these natural resources to provide for future generations. With human dependence on marine resources increasing, Ecosystem-Based Management (EBM) has been identified as a suitable approach to ensure sustainable development. In order to achieve this, the core principles and elements of EBM should be operational in the maritime/marine spatial planning (MSP) process to ensure that human activities in marine space are ordered to attain ecological, economic and social objectives. However, policies from various states and organizations sometimes do not set a clear precedence for translating principles of EBM and present different and complex approaches to an ecosystem-based marine spatial planning (EB-MSP). Again, a feasible methodology for EBM to be operational in MSP is still vague. This paper therefore presents results from a survey and review of MSP initiatives in Europe, Asia and the Americas. Results showed that essential MSP steps and elements such as adaptive management, setting of planning boundaries, understanding and analysing the ecosystem and future conditions are not fully operational. This paper focuses on a methodology for EB-MSP and gives recommendations on how to ensure that EBM is operational at each stage of an MSP process. It stresses the importance of setting planning boundaries beyond jurisdictional borders to consider bio/eco-regions and cover near-shore waters, the need to have a cross-sector integration, understanding the ecosystem through having an ecosystem service perspective and having a legal framework to ensure that results from monitoring and evaluating of plans are adapted through review and revision.

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1. Introduction

Marine resources play a vital role in social and economic development as industries such as fisheries, tourism, agriculture, pharmaceuticals, shipping and mining all benefit from the resources offered. Increase in consumer demands and improvements in technology, along with population growth rate, has increased the dependency on marine resources. There is the need to strike a balance between economic development, social needs and environmental sustainability when it comes to ocean use and management. One approach and concept that has been supported by many scientists after a merger between various disciplines is the

ecosystem-based approach to sea use management, built on the recognition that “the nature of nature itself is integrated” (Misund, 2006).

In terms of a marine environment, ecosystem-based management (EBM) is defined as an environmental management approach that recognizes the full array of interactions within a marine ecosystem, including humans, rather than considering single issues, species, or ecosystem services in isolation (Christensen et al., 1996). The goal of ecosystem-based marine management is to maintain marine ecosystems in a healthy, productive and resilient condition so that they can sustain human uses of the ocean and provide goods and services (McLeod et al., 2005; Foley et al., 2010). EBM represents a paradigm shift from other traditional management approaches which were focused on individual species, on a small spatial scale, lacked research, and were based on a short-term perspective. EBM on the other hand, focuses on the ecosystem as a

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whole with a long-term perspective, performed at multiple scales with the involvement of stakeholders by using an adaptive management approach (Sherman and Duda, 1999).

Although most nations and practitioners support EBM and this concept is found in most literature, policies and legislation about coastal and marine management and the practicality and implementation of it is yet to be fully realised as often the concept and its principles are too broad, and complex for planners and resource managers to put into practice to ensure effective implementation of EBM (Arkema et al., 2006). Even though EBM has received considerable attention over recent years and it is a popular term in the ocean management field, there are still few examples, which demonstrate its practical implementation and it still largely remains as a promise unfulfilled (Murawski, 2007).

The need for an effective marine management cannot be over-emphasized as many concepts and processes such as integrated coastal zone management and ocean zoning amongst others have been established and implemented over the past decade. However, opportunities for misunderstanding are ripe in the marine management domain, and once misunderstanding or lack of clarity about objectives of management occurs, the investment of time and energy in spatial tools and approaches may be wasted as conflicts emerge (Agardy et al., 2011).

Again, a feasible agreed method for translating this attractive concept into operational management practice has been largely discussed but EBM has been implemented in different forms based on different principles (Young et al., 2007; Long et al., 2015.). However, comprehensive, effective and balanced EBM requires a detailed understanding of environmental processes, and also ethical, social and economic processes (Christie, 2011). To address failures in ocean governance, new perspectives have emerged that explore a more holistic approach to manage complex seascapes. These include spatial management approaches such as marine spatial planning, which seek to implement ecosystem-based management (Koehn et al., 2013).

MSP has been identified as one of the processes for effective implementation of an EBM of maritime use. MSP is defined as “a public process of analysing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that usually have been specified through a political process” (Ehler and Douvère, 2009). MSP is supposed to ensure that maritime uses are planned to be compatible, considering ecosystem services by harmonizing ecological, economic and social objectives. MSP considers all the interactions, connections and structures that make up the marine ecosystem to ensure that ecosystem values are enhanced. MSP is an essential tool for delivering an ecosystem approach and should add value to existing management measures for the marine environment. It should be based on a clear set of principles with a sustainable development purpose (Gilliland and Laffoley, 2008).

Ecosystem-based MSP (EB-MSP) aims to the maintenance of marine ecosystems in a healthy condition, the sustainable exploitation of ecosystem goods and services, the reduction of conflicts among competing uses of the maritime territory, and the provision of multiple benefits to an as wide as possible array of involved sectors (Katsanevakis et al., 2011).

This paper therefore presents best approaches and recommendations that were used from different contexts to serve as a learning point for other MSP initiatives. The questions still remaining are “how effective is EBM considering the MSP process”? What is needed to make EBM operational in MSP process? What are the recommendations to ensure that EBM is operational in MSP? The main objective of this paper is to examine the effectiveness of EBM in existing MSP initiatives and to explore, through an

empirical methodological approach, how the MSP process can operationally implement EBM. The analysis of MSP case studies and the results of a survey with MSP practitioners is used to support recommendations for an EB-MSP process.

1.1. Ecosystem-based management and marine spatial planning

EBM is an approach to natural resources management that considers human society as an integral part of ecosystems (Koehn et al., 2013). The core elements of EBM (Agardy et al., 2011), which were developed based on various case studies include the following:

- ✓ Element 1: Recognizing connections within and across ecosystems
- ✓ Element 2: Understanding and addressing cumulative impacts
- ✓ Element 3: Managing for multiple objectives
- ✓ Element 4: Embracing change, learning, and adapting

Recently, MSP has been envisaged as a tool to overcome the main challenge in operationalizing EBM, consisting in integrating the human components in ecological and environmental considerations (Domínguez-Tejo et al., 2016). The coupling of MSP and EBM was argued by (Domínguez-Tejo et al., 2016) to represent a new emerging paradigm in sustainable ocean management (Katsanevakis et al., 2011; Crowder and Norse, 2008; Douvère, 2008).

MSP is an explicit planning approach within an integrated, policy-based approach to the regulation, management and protection of the ecosystem, including the allocation of space that addresses the multiple, cumulative and potentially conflicting uses of the sea and land and thereby facilitates sustainable development (MSSP, 2006). The overall aim of spatial planning is to create and establish a more rational organization of the use of 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 (DEFRA, 2006).

It is important, however, to recognize that marine spatial management can only influence the spatial and temporal distribution of human activities (Douvère, 2010). MSP is an essential tool for delivering an ecosystem approach (Gilliland and Laffoley, 2008) and a focus on the spatial and temporal aspects of EBM is one way to make an ecosystem based approach more tangible in MSP and as suggested by Douvère (2010) it can be accomplished by defining:

- The boundaries of the ecosystem to be managed;
- Ocean spaces with special ecological or biological value within the ecosystem;
- Ocean spaces with special economic value and potential;
- Ocean spaces where the effects of human activities interact positively or negatively with ecological functions and processes; and
- Where conflicts are occurring or might occur (uses vs. uses and uses vs. environment).

In order for MSP to serve as a tool to ensure that the objectives of marine EBM are achieved, the components, principles and tools of EBM as highlighted above have to be incorporated into the planning process and institutionalized through its implementation.

2. Methodology

This research used two key data bases from secondary and primary sources. The output therefore is a combination of a

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