



A comparative analysis of holistic marine management regimes and ecosystem approach in marine spatial planning in developed countries



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ABSTRACT

Internationally marine ecosystem-based management has been embraced as an approach to design holistic marine management regimes. In this article a comparative research strategy is applied in the analysis of the holistic marine management regimes in Norway, Australia, US, Canada and the European Union. How can holistic marine management regimes based on an ecosystem approach contribute to sustainable ocean development? Important in this context is how the origin and theory of an ecosystem-based management is implemented and interpreted, and to what extent this is manifested through policies, strategies and legal frameworks. The results of this research indicate that the implementation of marine-ecosystem based management is heterogeneous. This article discusses the concrete mechanisms that are used to reach the aim of sustainable ocean management. Implementation challenges are related to lack of functional metrics, weak spatial measures, weak integration and lack of adaptive management. Still marine ecosystem-based management is an important step forward for sustainable ocean governance.

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1. Introduction

Interconnections between human society and the marine environment are complex. Understanding these interconnections, and being able to identify important drivers and pressures are at the forefront of the scientific enterprise (Fath, 2015; Jonge et al., 2012). Several challenges exist due to human induced impacts on the marine environment (Barange et al., 2014; Setälä et al., 2014; Teh and Sumaila, 2014). Marine research and management systems have a central role addressing these challenges. Marine ecosystem-based management (MEBM) is suggested as a solution to improve decision making and marine management (Ehler and Douvère, 2009). MEBM can be defined as: “A 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 the marine ecosystems” (Rice et al., 2005: p. 4). The approach researched here is holistic marine management regime (HMR) and ecosystem approach in marine spatial planning. The concept of

regime is here used to describe national and regional ocean governance initiatives, e.g. the set of laws, policies, strategies, institutional arrangements to implement MEBM. These regimes aim at creating a sustainable system for the management of ocean resources, coexistence, integration, cooperation and involvement of stakeholders and institutions. Ideally a HMR based on MEBM should be able to balance between the protection of the environment and multiple human use.

It is estimated that at least 23 countries and four major regions are making efforts in MEBM worldwide (Balgos et al., 2015). HMR addresses human activity and the marine environment applying an ecosystem approach. Issues that are covered range from coordinating and integrating the management of marine habitats and species, fisheries, shipping, offshore petroleum and gas production, marine pollution, renewable offshore energy production, sea bed mining and climate change adaptation.

Ecosystem approach developed within ecology as a discipline, but it is also increasingly – since the 1980s – being used as a management principle in treaties and declarations (CBD, 1993; CCAMLR, 1980; RD, 2001). Within terrestrial systems the principle of ecosystem-based management can be traced back to the 1950s,

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Abbreviations

HMR	Holistic marine management regimes
MEBM	marine ecosystem-based management
MPA	marine protected area
MSP	marine spatial planning
UNCLOS	United Nations Convention on the Law of the Sea
CCAMLR	Convention on the Conservation of Antarctic Marine Living Resources
CBD	Convention on Biological Diversity
RD	Reykjavik Declaration

but only recently it has been applied to the marine environment (Agardy et al., 2011).

The central question is: How can holistic marine management regimes based on an ecosystem approach contribute to sustainable ocean development?

A comparative method is used to research the development and characteristics of MEBM in developed countries. The cases compared here are the HMRS of Australia, Canada, Norway, the European Union, and the United States of America. The selection of cases is based on some of the first attempts to establish HMR and some of the most recent cases. Australia was one of the first countries to release a policy for MEBM in 1998 (Anonymous, 1998). Canada followed shortly after together with Norway, and both countries published a policy for MEBM in 2002 (Anonymous, 2002a, 2002b). The European Union and the United States of America represent some of the more recent cases to establish MEBM in 2007 and 2010 (Anonymous, 2007b, 2010a, 2010d). The selection of cases consists of completed regimes and plans under development, but ought to be sufficient to answer the question raised here, and being able to characterize the link between theory and practice.

MEBM represents a new turn in management of ocean space (Kidd et al., 2011). Previously marine management has been highly sectoral (Balgos et al., 2015). An extensive theoretical literature has developed addressing characteristics of MEBM, and how such management regimes can be constructed and developed (Jonge et al., 2012). Jones et al. (2016) calls for a more critical and empirical approach to MSP research. The dialogue between theory and practice is important for the scientific development of management systems. Practice is a way of testing theory, and can also be an indicator for the need to develop more robust systems, verifying theoretical insights or handling the implementation differently.

Comparative approaches have been applied in the research on MEBM (Arkema et al., 2006; Balgos et al., 2015; Collie et al., 2012; Jones et al., 2016; Leslie et al., 2015; Olsen et al., 2014; Rosenberg et al., 2009; SAB, 2011), and have given important insight on the design and function of holistic marine management regimes. Arkema et al. (2006) researched US and Australian plans, and discovered a need for better incorporation of ecological principles, explicit management approaches and stakeholder participation. Collie et al. (2012) researched 16 marine spatial plans worldwide. They found that marine spatial planning (MSP) is heterogeneous, but they identified five key characteristics: “1) *legal mandate and political capabilities to implement the plan*, 2) *the need for operational objectives defined early in the process*, 3) *inclusiveness, plans should be worked out in accordance with financial and human resources*, and 4) *the need for feedback and adaptive management*”. Olsen et al. (2014) points to “*political will and leadership, process transparency and stakeholder participation*” as critical success factors.

2. Material and methods

This article applies a comparative research strategy and the use of multiple case studies (Blatter and Haverland, 2012; Ragin, 1989, 1992; Sartori, 1991; Stake, 2006; Yin, 1994).

Relevant to the discussion of cases is the theoretical literature developed in the field of MEBM (Arkema et al., 2006; Foley et al., 2013; Grumbine, 1994; Long et al., 2015). A set of elements that underpins MEBM has been identified in the theoretical literature (Grumbine, 1994; Long et al., 2015). These elements can be described as a conceptual model for MEBM, also referred to as the “architecture” of MEBM (Fogarty and McCarthy, 2014: p. 7). These can be viewed as essential components of such a system. A conceptual model of MEBM was constructed based on international manuals for conducting MEBM and MSP, and review of literature in the field (Agardy et al., 2011; Ehler, 2014; Ehler and Douvère, 2009).

1. Holistic marine management regime (HMR): This type of regimes is established through either national, bilateral or greater regional initiatives. The aim is integration, bringing together institutions in marine management and create a common framework for understanding of management challenges. Policies, legislation, and strategies are important for establishing these measures. A HMR is not created to replace sector management, but aims to integrate sectors and enhance cooperation between sector authorities, e.g. cooperation between fishery management authorities and petroleum licensing authorities (Misund and Olsen, 2013).
2. Delineation of management area: In the theoretical literature it is assumed that the management area should be moved towards coinciding with the ecosystem as an entity (Bailey, 2014; Crowder and Norse, 2008; Spalding et al., 2007).
3. Knowledge acquisition: To prioritize, set goals and strategies to reach them, the plan must be updated with available knowledge. Integration such as cross-sectoral cooperation, international cooperation and stakeholder involvement also contributes to the knowledge pool. Empirical data on the state of the ecosystem must be collected, and human interactions with the ecosystem must be mapped (Crowder and Norse, 2008). Important here is the assessment of cumulative effects (Foley et al., 2013; Levin et al., 2009).
4. Procedures: Planning and enacting a system involves integrating stakeholders. Procedures are needed to seek integration across sectors. This can be solved either by creating new institutions that have the responsibility to coordinate actions. A more common model is to create a common arena for integration between sector authorities and stakeholders. The role of stakeholders can also be used constructively to ask and propose management questions (Fowler, 2009).
5. Evaluation criteria: Evaluation criteria are important to correct the management system, but also to evaluate if the goals set by the plan is reached, or if other procedures are better shaped to solve a certain problem (Carneiro, 2013; Ehler, 2014). Environmental principles have an important function to set norm and guidelines to evaluate function of the plan. In this connection metrics are important, i.e. indicators or other measures for assessing the state of the ecosystem and the impacts of human activity.
6. Management plan: This is the implementation of policies, legislation and strategies. They include mechanisms to address challenges, set objectives for the state of the environment, create the basis for coexistence, introduces spatial measures, applying monitoring of environmental indicators to inform and evaluating if goals have been reached and the need for actions (Agardy et al., 2011; Ehler and Douvère, 2009).

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