Ocean and Coastal Management 160 (2018) 158–166

Contents lists available at ScienceDirect

Ocean and Coastal Management

journal homepage: www.elsevier.com/locate/ocecoaman

Promoting enriched coastal zone management: The role of boundary objects

Wynanda I. van Enst Dr.[a,*], Peter P.J. Driessen Prof. Dr.[a], Hens A.C. Runhaar Prof. Dr.[a,b]

[a] Copernicus Institute of Sustainable Development, Utrecht University, The Netherlands
[b] Forest and Nature Conservation Policy Group, Wageningen University and Research, The Netherlands

ABSTRACT

In coastal zone management (CZM), scientific knowledge can help enrich and underpin the development of policy options by providing insight into ecosystems and their management, the use of ecosystem goods and services, and ecological limits to the exploitation of natural resources. Due to the large array of interests and stakeholders involved in CZM, however, it is often complicated to produce and use knowledge which is perceived to be credible, legitimate and salient. The scholarly literature advocates employing collaborative and participatory approaches, such as the development and use of boundary objects, to enhance the production and use of knowledge in CZM with the aim of enriching decision-making processes. This paper empirically explores two assessment systems as boundary objects in order to address the question 'To what extent and in what way do boundary objects contribute to enriched coastal zone management?'. Our analysis suggests that for a boundary object to contribute to enriched CZM, the need for it to be credible is less important than the need for all stakeholders involved to perceive it and its development process as being legitimate to their interests. Secondly, without a direct 'policy window', the boundary object has little chance of directly enhancing decision-makers' knowledge.

1. Introduction

Coastal zone management (CZM) faces a number of challenges, among them sea level rise, acidification and overfishing (e.g. Cazenave and Cozannet, 2014; Gattuso et al., 2015). Interactions among ecological and economic interests are complex, not least because the different objectives of the broad array of stakeholders ranging from policy-makers, coastal managers and industry to researchers and civil society organisations, etc. can give rise to tension (e.g. Puente-Rodríguez et al., 2015). This presents challenges for the management of the physical coastal zone as well as the management of knowledge in this process (Giebels et al., 2013). Scientific knowledge can help enrich and underpin CZM by providing insights into and policy options for the management of ecosystems, the use of ecosystem goods and services, and the ecological limits to the exploitation of natural resources (Van Tatenhove et al., 2016: 377). However, the large array of interests and stakeholders involved in CZM often complicates the production and use of knowledge. In particular, tension may occur between science and policy: *'the former seeks unbiased, objective descriptions or reality, while the latter must incorporate various factors in its development, including values, ideologies, economics, biases, and emotions'* (Rose and Parsons, 2015: 71). It is also argued that often, *'the supply of scientific knowledge does not meet the requirements of users of knowledge in terms of the speed in which knowledge is delivered, its level of detail, its scale, its relevance or the extent to which uncertainties have been reduced'* (Van Tatenhove et al., 2016: 377).

In order to optimise the role of science in enriching and underpinning CZM, various authors have proposed employing collaborative and participatory approaches (e.g. Döring and Ratter, 2015; Runhaar et al., 2016; Seijger, 2014; Tompkins et al., 2008; Van Tatenhove et al., 2016; Vugteveen et al., 2015). Enriched decision-making can be understood to be the behaviour of decision-makers when influenced by their enhanced knowledge of the consequences of their decisions (Heink et al., 2015). To make this more tangible, in enriched decision-making, knowledge is used to arrive at a clearer picture of the problem setting, to underpin and implement policy and management measures, to explore policy options; it is also used in learning processes among policy-makers, scientists and stakeholders (e.g. Van de Riet, 2003; Van Tatenhove et al., 2016).

Our research focuses on a specific science–policy interface, or approach, for organising participatory knowledge development processes: the employment of boundary objects. Boundary objects are *'hybrid constructs that integrate elements from scientific and political worlds to facilitate the negotiation and exchange of multiple types of knowledge and action'* (White et al., 2010: 221), and *'can be used to transfer or communicate complex scientific information into understandable and tailored*

* Corresponding author.
E-mail addresses: vanenst@squarewise.com (W.I. van Enst), p.driessen@uu.nl (P.P.J. Driessen), h.a.c.runhaar@uu.nl (H.A.C. Runhaar).

https://doi.org/10.1016/j.ocecoaman.2018.04.001
Received 30 August 2017; Received in revised form 25 March 2018; Accepted 8 April 2018
Available online 05 May 2018
0964-5691/

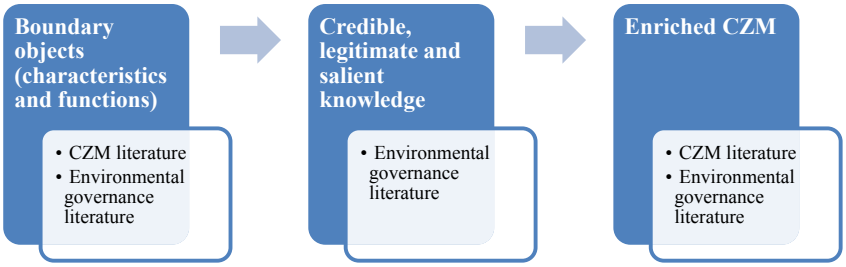

Fig. 1. Structure of the literature review on boundary objects in CZM.

information which is tacitly connected to the target group' (Van Pelt et al., 2015: 42). In the field of CZM, various boundary objects have been used to enrich decisions (e.g. Floor et al., 2016). For example, ecological indicators (e.g. Turnhout et al., 2007; Turnhout, 2009; Uehara and Mineo, 2017) can be used as boundary objects to measure the ecological quality of ecosystems. Another boundary object is the concept of 'significant effect' as a threshold when permitting human activities in protected marine areas (Floor et al., 2016). Döring and Ratter (2015) discuss the concept of 'Heimat' as a boundary object. This German word or concept encompasses a range of place-based meanings reflecting a spatially and socially experienced construct; it is used as a boundary object in science–policy interactions to create self and external perceptions of why and how people relate to a certain natural area, what is their mutual understanding and how and why they develop common goals (Döring and Ratter, 2015). Becker (2017) refers to climate scenarios as boundary objects: these are visualisations of scenarios based on scientific data, which should help communicate complex and nuanced information in a mode which people understand (Becker, 2017). The foregoing examples give some idea of the variety of boundary objects. More specifically, boundary objects are not so much physical objects per se as the end products or outputs of participatory processes. As can be seen from the examples, they can be presented in different ways. Irrespective of their forms, boundary objects have the common aim of bringing together stakeholders (scientists, policy-makers and others) within the coastal management arena who then collectively develop a knowledge-based boundary object, for example to assess the ecological state of a coastal zone area. Notwithstanding all of this, even though the literature presents us with examples of boundary objects, the questions of how they facilitate enriched decision-making in CZM, and to what extent, remain underexplored.

This paper aims to address the 'black box' in the literature on boundary objects in CZM. Our main research question is therefore: 'To what extent and in what way do boundary objects contribute to enriched coastal zone management?'. To address this question, we formulated three sub-questions: i) How does the scholarly literature characterise boundary objects in terms of their features and their functions? ii) How can the potential influence of boundary objects on enriched decision-making processes be determined? and iii) How, and to what extent do boundary objects contribute in practice to enriched coastal zone management?

To address the questions, we first analysed the scholarly literature on boundary objects to establish their features and functions. Next, we empirically explored two boundary objects intended to assess the current ecological state of the Dutch Wadden Sea area. The latter is a coastal zone of great ecological value due to its unique ecosystem (it was awarded UNESCO Heritage status in 2010), but it is also of great economic value due to its natural resources (e.g. gas and salt) and its harbours and tourism industry. Because of these contrasting interests, the management of the Wadden Sea area is beset by continuous sparring between ecological and economic interests that involves a large array of stakeholders ranging from industries to government (national, provincial and local), environmental agencies and research institutes (e.g. Floor et al., 2013; Heslinga et al., 2018; Runhaar and van Nieuwaal, 2010; Van Nieuwaal, 2011). The exploration of boundary objects by means of a case study enables analysis of how these objects function in practice and their contribution to enriched CZM (Yin, 2003). Analysing two cases will allow us to attempt to draw conclusions that can be generalised and to formulate hypotheses, thereby contributing to the scholarly literature on boundary objects in CZM. The two boundary objects we will analyse are assessments of the impact of human interference on the ecological state of the Dutch Wadden Sea: the Wadden Sea Barometer (hereafter WSB) and the Waddenhouse Deliberation ranking (hereafter WHD). We consider these assessments to be boundary objects since they have been developed in a participatory process with the aim of developing and communicating knowledge across boundaries among science, policy and practice, in order to support CZM in the Wadden Sea. Besides their similarities, there are notable differences between these two assessments: whereas the WSB had a descriptive approach, the WHD not only assessed but also ranked the ecological and economic impact of human activities on the Wadden Sea. Ranking activities in this way immediately impacts on the interests of involved stakeholders and can potentially give rise to the boundary object itself being contested.

2. Boundary objects and their contribution to enriched decision-making: a literature review

This section will address the first two sub-questions by providing a brief literature review on boundary objects (Fig. 1 shows the review's structure), addressing their characteristics and functions, and developing a framework that could be used to empirically analyse how and to what extent boundary objects can contribute to enriched decision-making processes. CZM literature provides few examples (empirical or otherwise) of boundary objects. To provide a more thorough and in-depth theoretical analysis of the functions of boundary objects and how they contribute to decision-making processes, we begin (section 2.1) by addressing how the scholarly literature characterises boundary objects in terms of the characteristics and functions presented in section 1 above. To do so, we not only use CZM literature but also broaden our perspective by including scholarly literature which discusses boundary objects within the field of environmental governance in general. This literature discusses issues closely related to CZM, such as water management (e.g. Lejano and Ingram, 2009; Van Pelt et al., 2015; White et al., 2010), and ecosystem management (e.g. Abson et al., 2014; Cortner, 2000; Uehara and Mineo, 2017). In section 2.2 we will look more closely at the contribution of boundary objects to enriched decision-making. As we will show, the literature on boundary objects provides us with limited guidance to analyse these contributions. We will therefore use the framework developed by Cash et al. (2003), who argue that if scientific knowledge is to enrich sustainable decision-making processes, it needs to be perceived by all stakeholders involved as credible, legitimate and salient. Briefly, these three criteria can be understood as follows: for knowledge to be perceived as scientifically credible, it needs to be scientifically adequate, accurate, trustworthy and of high quality (e.g. Buizer et al., 2005; Hegger et al., 2012; Van Enst et al., 2014; but see Dunn and Laing, 2017). Legitimacy is achieved