Marine Policy 44 (2014) 366–374

Contents lists available at ScienceDirect

Marine Policy

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

An innovation and agency perspective on the emergence and spread of Marine Spatial Planning

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ARTICLE INFO

Article history:
Received 12 July 2013
Received in revised form
27 September 2013
Accepted 12 October 2013
Available online 5 November 2013

Keywords:
Large-scale marine governance
Social–ecological systems
Institutional entrepreneurship
Diffusion
Innovation
Marine Spatial Planning

ABSTRACT

The roles of governance and technological innovation have been widely recognized as important parts of sustainability transitions. However, less attention has been paid to understanding the mechanisms of the emergence and spread of innovative ideas for stewardship of social–ecological systems. This study considers how theories of innovation and agency are able to provide explanatory power regarding the spread and impact of such ideas. This includes how innovations may contribute to resolving the mismatches between the scale of ecological processes and the scale of governance of ecosystems. The emergence and spread of Marine Spatial Planning (MSP) is used as an illustrative case study. The study shows that individuals embedded in informal networks have played a key role in driving the emergence of MSP across scales and in constantly re-framing the tool in order to overcome obstacles to adoption and implementation. In a number of cases, MSP has been decoupled from the ecosystem despite being framed as a tool for ecosystem-based management. Finally, this study is important to understand the process of emergence of new integrated tools for ecosystem stewardship at the global level.

1. Introduction

Multiple and interacting anthropogenic drivers of change are influencing the structure and function of marine ecosystems [1]. At the same time, there is an increasing demand for use of marine ecosystem services [2,3] and cumulative human pressure on coastal and marine areas [1,4]. These pressures and the rapid degradation of marine ecosystems points to an urgent need for the shift to new forms of governance and management of these areas, such as ecosystem stewardship [5]. This entails transformations that can help humanity embark on more sustainable trajectories that both increase human well-being and development and increase the capacity of ecosystems to generate services. Many of the ideas and innovations for reversing current global trends of marine resource degradation already exist in various parts of the world. However, there is a need to understand how these can have an impact at scales that match the problems. More specifically, it is crucial to understand how ideas and innovations for ecosystem stewardship emerge and spread and the role of different organizations and individuals in these processes.

This article uses an innovation perspective to explore the emergence and spread of Marine Spatial Planning (MSP), a tool that could contribute to ecosystem stewardship. The focus of much of the work on innovation has been on the development of new knowledge within society which goes beyond a simplistic focus on new technologies as they enter societies [6]. However, in order for new innovations to actually contribute to sustainability and to solving the challenges facing linked social–ecological systems it is important to understand how and where ecological knowledge enters the process of emergence and how this impacts the framing and the packaging of ideas [7].

This is important because in the past many technologies that have led to disruptive and rapid changes in economies and societies have occurred at the expense of ecosystems, which have been degraded in part due to technological innovation and transformation [8]. An example here is the green revolution in agriculture which has drastically increased food production but has also been a cause of soil erosion, nutrient loading and the reduced provision of a wide range of ecosystem services within intensively farmed landscapes [9]. Innovation therefore involves trade-offs. Future 'sustainability' innovations must incorporate the ecosystem dimension if the intention is to move towards sustainable stewardship of the oceans.

1.1. Why is MSP a good case study?

Marine Spatial Planning (MSP) is regularly acknowledged to have potential as a new and integrated "solutions tool" with a capacity to balance conservation with sustainable use and economic development [10]. Furthermore, further study is merited given that MSP is being developed and implemented in many

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http://dx.doi.org/10.1016/j.marpol.2013.10.006

parts of the world and is a key component of government policy to move towards integrated management of the sea. These similar sets of policy processes have seemingly emerged both recently and relatively simultaneously [11].

As it has been defined in the literature, MSP is an attempt to couple human and environmental dynamics at the outset of a planning process [12]. It is by design, an approach that explicitly offers an integrated way of managing the ocean at relatively large spatial scales. It has the potential to meet the challenge of simultaneously increasing human wellbeing and the delivery of ecosystem services. An innovation lens that accounts for the roles of individuals and organizations as change makers (agency) [13] has been applied to look more closely at the spread of MSP as a tool for ecosystem stewardship that supports integrated governance of marine systems.

The paper is outlined as follows. Section 2 focuses on relevant literature on different conceptualisations of innovation, the connection between social innovation, ecosystem stewardship and agency using the concept of institutional entrepreneurship. Section 3 outlines the methodological framework. This is followed by a presentation of the results. The paper concludes with a discussion on some key features of the emergence and spread of MSP in the context of the roles of individuals and organizations interacting in networks and the degree to which MSP is coupled to ecosystem-based management and stewardship.

2. Analytical approach

The innovation perspective allows the empirical analysis of the emergence and spread of new ideas in society [14]. The term innovation can be traced back to Joseph Schumpeter who identified innovation as being at the heart of economic change [15]. His original conception of innovation and that of many studies that followed is of a technological innovation [6]. However other studies have focused on innovations that are not defined as technologies but ideas. Examples of these types of innovations include; models of democracy [16]. Wejnert identifies these types of innovations as having 'public consequences' and being primarily focused on 'issues of societal well-being [16].' Another example of these 'social innovations' that Wejnert [16] puts forward draws on the work of Soule [17] that studied the involvement of students in anti-apartheid protests around the world.

However, much of innovation theory using linear models of change does not explain very well how ideas move and develop that are focused on solving complex problems. This point is articulated by Moore and Westley [18] who state: *"Complex problems demand that knowledge and ideas will need to cross scales, whether the scales are spatial, temporal, hierarchical, or even cognitive."* Scale here is defined as *"The spatial, temporal, quantitative, or analytical dimensions used to measure and study any phenomenon, and 'levels' as the unit of analysis that are located at different positions on a scale* [19]." In the context of this study, it is important to consider how MSP might move across scales over time. The levels of analysis in this case are geographic.

The work of Olsson and Galaz [7] draws attention to the fact that when dealing with complex social–ecological systems; 'Innovation is crucial to steer away from potential critical thresholds in the earth system and open up new trajectories of sustainability.' However, the theoretical perspectives available for understanding the spread of ideas and tools for addressing challenges facing interlinked social–ecological systems are limited. In summary, there is an emerging field that uses a complexity perspective on innovation which is good at tracking the emergence and spread of new ideas in society but does not help us understand how they can fundamentally change human–environmental interactions [7]. Resilience scholars have for a long time been interested in shifts in social–ecological systems', including the novelty, renewal, and transformations that are part of such systems' dynamics. However, they have rarely used an innovation perspective to understand these dynamics (one exception is the work of Westley [20] and onwards). This study aims to bridge this gap and improve our understanding by using MSP as an empirical case study.

The case study provides an opportunity for considering innovation as part of transitions towards sustainability and looking at innovations that do not only consider social dynamics [21] or socio-technical change [22,23] but address linked social and ecological systems and the implications for the ongoing delivery of ecosystem services [5,7,24]. In order to clarify the distinction between these different approaches to innovation, the following table has been constructed. This shows that a classic theory of innovation would address a certain component of MSP (i.e. the geospatial technical component that enables the planning) but social and ecological components need to be considered to fully understand why MSP can be seen as being innovative in the context of transitions towards sustainability. Table 1

In understanding the emergence and spread of innovation understanding the role of agency is crucial. This includes the role of individuals and organizations and the strategies they use to achieve change. It is appropriate to turn to the work of Moore and Westley [18] and Westley et al [13] who explore the role of institutional entrepreneurs [13,18]. In this work, institutional

Table 1
A comparison table that shows three different conceptualisations of innovation.

Distinguishing variable	Classical theory of innovation [6]	Social innovation [25]	Social–ecological innovation [7]
Core definition	An innovation is an idea, practice or object that is perceived as new by an individual or other unit of adoption. It matters little, as far as human behavior is concerned, whether an idea is objectively new as measured by the lapse of time since its first use or discovery	Social innovation is an initiative, product or process or program that profoundly changes the basic routines, resource and authority flows or beliefs of any social system	Social innovation that is ecologically literate and embedded in being able to deliver ongoing provision of a bundle of desirable ecosystem services while maintaining ecosystem structure and function
Consequences of innovation	Deliberate private consequences, unintentional or unknown social consequences	Focus is on hoped for social consequences with less of a focus on private consequences	Focus is on public consequences connected directly to sustainability and the ongoing functioning of ecosystems as important for human wellbeing.
Connection to MSP	Marxan and related Geospatial tools for spatial planning	Geospatial tools combined with an application of adaptive cross, sectoral planning process with a high degree of stakeholder engagement	Geospatial tools, a cross-sectoral, adaptive planning process with stakeholder engagement explicitly focused on maintaining ecosystem structure and function.