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Review

A systematic review of socio-economic assessments in support of coastal zone management (1992–2011)

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ABSTRACT

Cooperation between the social and natural sciences has become essential in order to encompass all the dimensions of coastal zone management. Socio-economic approaches are increasingly recommended to complement integrated assessment in support of these initiatives. A systematic review of the academic literature was carried out in order to analyze the main types of socio-economic assessments used to inform the coastal zone management process as well as their effectiveness. A corpus of 1682 articles published between 1992 and 2011 was identified by means of the representative coverage approach, from which 170 were selected by applying inclusion/exclusion criteria and then classified using a content analysis methodology. The percentage of articles that mention the use of socio-economic assessment in support of coastal zone management initiatives is increasing but remains relatively low. The review examines the links between the issues addressed by integrated assessments and the chosen analytical frameworks as well as the various economic assessment methods which are used in the successive steps of the coastal zone management process. The results show that *i)* analytical frameworks such as 'risk and vulnerability', 'DPSIR', 'valuation', 'ecosystem services' and 'preferences' are likely to lead to effective integration of social sciences in coastal zone management research while 'integration', 'sustainability' and 'participation' remain difficult to operationalize, *ii)* risk assessments are insufficiently implemented in developing countries, and *iii)* indicator systems in support of multi-criteria analyses could be used during more stages of the coastal zone management process. Finally, it is suggested that improved collaboration between science and management would require that scientists currently involved in coastal zone management processes further educate themselves in integrated assessment approaches and participatory methodologies.

1. Introduction

Managing sustainability in coastal zones is usually referred to as Integrated Coastal Zone Management (ICZM). Although the exact meaning of ICZM may be debated, in broad terms it is intended to deal with conflicts between economic demands and protection of the environment in a given coastal area (Portman et al., 2011). One of the most popular definitions of ICZM is given by Cicin-Sain and Knecht (1998), who refer to it as "a continuous and dynamic process by which decisions are made for the sustainable use, development, and protection of coastal marine areas and resources" (p. 279). According to these authors, ICZM is "multipurpose oriented: it analyzes implications of development, conflicting uses, and interrelationships among physical processes and human activities, and it promotes linkages and harmonization between sectoral coastal and ocean activities" (Cicin-Sain and Knecht, 1998, p. 41).

The ICZM process thus differs significantly from the "coastal area management" practiced in the late 1960s, which was a set of sectoral policies concerning one or a few uses and carried out only onshore (Vallega, 1999). The geographic scale on which ICZM is applied is essentially set by the extent of the issues it is being used to address (Clark, 1997); since the mid-1990s, this process has promoted the management of conflicting uses and ecosystems on a holistic level, converging with an ecosystems approach (Forst, 2009). Viewed today as the key paradigm for sustainable development of coastal areas (Billé, 2008), ICZM is becoming an

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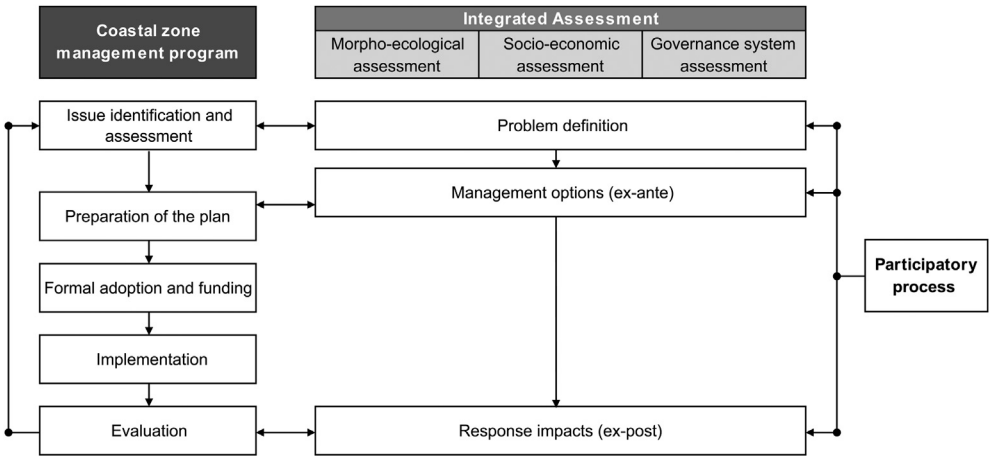

Fig. 1. Main objectives of the integrated assessment used to inform the different steps of a coastal zone management program (our own figure, developed from Olsen, 2002; van der Sluijs, 2002; Roca et al., 2008).

operational model of environmental governance in which stakeholders and public participation are key components of successful implementation (Fletcher, 2003).

ICZM became popular in the decision-making sphere following the publication of Agenda 21, adopted during the 1992 United Nations Conference on Environment and Development held in Rio de Janeiro, whose chapter 17 was entirely dedicated to the oceans and coastal areas. Under the title "Integrated management and sustainable development of coastal and marine areas, including exclusive economic zones," the first section of that chapter provides a program for achieving sustainable development in the coastal zones, stressing the need to improve the knowledge used for management purposes and emphasizing the necessity of developing socio-economic and environmental indicators.[2] This recommendation highlights the need to improve our knowledge of coastal physical systems and uses by drawing on information from both the natural and social sciences (Cicin-Sain, 1993).

Olsen (1993, 2002) has described the coastal zone management program (CZM program or ICZM policy cycle) as a process made up of five steps: issue identification and assessment (step 1); program preparation (step 2); formal adoption and funding (step 3); implementation (step 4); and evaluation (step 5). Scientific knowledge is mainly brought in during steps 1 and 5. Integrated Assessment (IA), being an approach that seeks to involve all disciplines in policy-relevant assessment (Harremoës and Turner, 2001), provides a useful framework for informing CZM initiatives, whatever their degree of implementation (Fig. 1). IA consists in combining, interpreting, and communicating knowledge from diverse scientific disciplines in such a way that the whole set of cause–effect interactions of a problem can be evaluated from a synoptic perspective (Rotmans and Dowlatabadi, 1997). In its fully developed form, IA is "an iterative participatory process that links knowledge (science) and action (policy) regarding complex … issues …" (van der Sluijs, 2002, p. 250).

The first advantage of IA is that it defines a problem by drawing on current, policy-relevant knowledge. Secondly, IA can help to identify and evaluate specific management options. Thirdly, it may be used for assessing response impacts on coastal problems once management initiatives have been implemented. In this context, cooperation between the social and natural sciences has proved to be helpful for analyzing all the dimensions of improved CZM; socio-economic approaches in particular are increasingly needed to better understand the linkages and interdependencies between natural and anthropogenic systems in coastal areas (Cooper and McLaughlin, 1998; Bowen and Riley, 2003; Ban et al., 2009; Nobre, 2011).

Examples of research studies that have used or produced socio-economic assessments in support of CZM are abundant. These socio-economic assessments address a variety of goals, issues, and interactions and may use a wide range of tools, methodologies, information, and analytical frameworks. It thus seems worthwhile to carry out an analysis of socio-economic assessments in support of CZM through a systematic literature review. However, to our knowledge, only three literature reviews have attempted to explore this research field. Cooper and McLaughlin (1998) analyze the "contemporary multidisciplinary approaches to coastal classification and environmental risk analysis" (p. 512) in terms of scale of application, variables included, mode of analysis, mode of presentation, and the nature of the risks being assessed. Carneiro (2011) explores "the evidence of the impacts of marine management interventions on human development and well-being reported in marine management literature in the past two decades" (p. 351). His study addresses peer-reviewed literature dealing with fisheries, aquaculture, marine conservation, and CZM in terms of methodologies used, human development dimensions considered, and results reported. Nobre (2011) reviews management instruments to address coastal zone problems and of some research areas to support management. Although very interesting, these reviews consider only some specific uses of socio-economic information, such as the problem definition step of CZM (Cooper and McLaughlin, 1998) and the impact assessments of management initiatives (Carneiro, 2011; Nobre, 2011). All these studies take the form of a narrative literature review.

This paper presents a systematic review of the extensive body of academic writing from the period 1992–2011 concerning the socio-economic assessments used in support of CZM. The aim of our study is to further analyze the issues addressed by socio-economic assessments as well as the kind of assessment methods and tools used in the successive steps of the CZM process. The paper is structured as follows: Section 2 defines the data sources and explains the systematic review methodology. Section 3 highlights the main findings obtained from the content analysis approach. Finally, Section 4 discusses the influence of the political context on socio-economic assessments and the contribution of the social sciences to improved science-management integration.

[2] See in particular paragraph 17.8 of Agenda 21.