



Stakeholder perspectives for coastal ecosystem services and influences on value integration in policy



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ABSTRACT

Environmental and natural resource management in Australia occurs at a regional scale with many initiatives underpinned by an ecosystem services framework that aims to integrate economic, social and ecological values in decision-making. This research examines potential influences on value integration by identifying stakeholder perspectives for coastal ecosystem services using mangroves in south-east Queensland as a case study. The study site is one of Australia's fastest growing regions and exhibits a "hotbed of issues" with institutional complexity in coastal areas where urban development is concentrated. Q-methodology was used to systematically study stakeholder perspectives on coastal ecosystem services and identify natural groupings between stakeholders with shared values. A total of 43 respondents representing nine stakeholder categories were interviewed. Factor analysis identified four perspectives that were labelled: (1) *Green Infrastructure*; (2) *Recreational Opportunity and Well-being*; (3) *Sustaining Regional Industries and Communities*; and (4) *Coastal Living*. The concept of ecosystem 'bundles' was conducive to analysing the range of services valued by different perspectives and highlighted stakeholder priorities that underpin demand for coastal ecosystem services. Stakeholder perspectives show potential to influence coastal policy according to the ecosystem service categories that are prioritised in decision-making and the saliency of the services to the stakeholder group. This research contributes to the field of coastal management where a lack of progress on "well-documented problems" partly stems from governance failure to capture and consider pluralistic values in decision-making and exacerbates conflict between contested views.

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1. Introduction

The concept of ecosystem services emerged from an increasing awareness that benefits provided by natural systems were often overlooked or underestimated in policy decisions (Costanza et al., 1997; Hein et al., 2006). As a framework for decision-making, an ecosystem services approach seeks a more integrated process by enabling inclusion of intangible aspects of ecosystems together with more physical costs and benefits (Pittock et al., 2012). Recognition and formalisation of the concept in the policy arena occurred through release of the United Nations Millennium Ecosystem Assessment (MEA, 2005) and underpins current environmental policy in Australia (Pittock et al., 2012).

The challenge of integrating the pluralistic values of natural resources in decision-making is not new and forms part of a broader multi-dimensional issue of integration for effective coastal governance. In Australia, the coastal zone contains more than 85 percent of the population (DCCEE, 2010) and is subject to impacts from increasing human dependence on coastal resources and pressure from development-related activities. Sustainable management of coastal areas is challenged because of complex administrative processes, characterised by decision-making that is "layered" (Clarke and Harvey, 2013) and "fragmented" (Dale et al., 2010), and involves a diversity of people and perspectives (Coffey and O'Toole, 2012). The lack of progress toward a more integrated approach partly stems from failure to capture and consider the plurality of interests and values present on the coast (Clarke et al., 2013; Stocker et al., 2012), which is compounded by institutional arrangements that constrain the issues and values that can be considered by regional governance units (Alexandra, 2012).

Coastal areas are valued in a multitude of ways (Stocker and

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Kennedy, 2009), many of which are unable to be articulated and included in decision-making processes. The term 'value' in this context refers to a relative importance conferred or assigned, which is influenced by a person's held values (i.e., ideals) and their perception of that (i.e., an object) which is important or of worth (Brown, 1984). Accordingly, 'what is valued' about the coast represents different worldviews, constructs or 'truths', supported by different forms of knowledge and different ways of knowing (Stocker and Kennedy, 2009). Ecosystem services are defined where this value is conferred to specific benefits from ecosystems (MEA, 2005), with a central tenet of the concept that benefits become 'services' when they are valued by humans (Fagerholm et al., 2012). Although an ecosystem services approach fundamentally aims to integrate value domains in decision-making, values have predominantly been ascribed in economic or biophysical formats (Plant and Ryan, 2013). As the basis for decision-making, this information can neglect social values and those that provide intrinsic, non-use or indirect benefits that are often unable to be captured or obscured by methods that frame such values. Short-term needs of humans are often favoured in decision-making regarding ecosystem services, partly as a consequence of preferential selection for provisioning services that are tangible, more readily identified and therefore able to be valued (Rodríguez et al., 2006). In the sphere of coastal management, such decision-making has limited the spectrum of issues being considered and has resulted in narrow policy settings that privilege protection of built infrastructure and terrestrial resource management (Clarke and Harvey, 2013).

Decision-making processes need to account for multiple values for management to be responsive to a changing climate and for the ensuing policy to gain public acceptance. To foster long-term sustainability, decision processes must be capable of capturing and emphasizing multiple values of ecosystem services, as decisions that maximise diversity offer more options for the future (Raudsepp-Hearne et al., 2010; Rodríguez et al., 2006) and act as a vital mechanism in an adaptive policy framework that allows decisions to be adjusted (Gorddard et al., 2012). Decision-making processes also need to consider multiple values to account for differences in viewpoints and enable negotiation. Where values are overlooked, marginalised or perceived as under threat, their importance and worth can be exaggerated where processes of deliberation occur (McDonough et al., 2014). This can polarise debate, prevent rationale dialogue, and make negotiation even more difficult (Pittock et al., 2012). Processes that exclude certain values, ultimately exclude certain stakeholders, thereby creating potential for conflict and reducing opportunity for policy acceptance, stability and efficacy (Lawton and Rudd, 2013).

This study aims to investigate how different perspectives of 'what is valued' about the coast can affect the integration of economic, social, and ecological domains in decision-making. It uses mangroves in south-east Queensland, Australia as a case study to examine varying viewpoints in coastal management. The primary research question is, 'How can stakeholder perspectives for coastal ecosystem services influence the integration of values in coastal management policy?'. This inquiry is addressed by: (1) identifying distinct stakeholder perspectives for coastal ecosystem services; and (2) determining associated elements that can influence integration of values in policy. The study uses Q-methodology, a technique that facilitates systematic study of people's viewpoints and identifies natural groupings through detection of latent patterns between stakeholders who have shared values (Gruber, 2011). The ecosystem services and categories emphasized in each perspective provide a basis to examine their influence in decision-making. A regional focus has been adopted in this research because policies related to natural resource management (NRM) and environmental

regulation are developed and delivered at this scale (Alexandra, 2012; Head, 2005) with considerable variability in ecosystem services and threats among regions (Bryan et al., 2010; Raymond et al., 2009).

We begin by synthesizing research from a range of disciplines to establish how different approaches to valuation have captured mangrove ecosystem services. The paper proceeds to provide details of the regional context of the south-east Queensland and mangrove ecosystem study area. Subsequent sections describe the Q-methodology technique and present results that interpret four factors revealed in the analysis. These perspectives are analysed in relation to ecosystem service categories and stakeholder saliency to identify elements that can influence value integration in decision-making. We close with a discussion of the implications of research findings and concluding remarks that relate these findings to management and policy.

1.1. Mangrove ecosystem service valuation and decision-making

Valuation of mangrove ecosystem services has favoured economic and ecological over social approaches (James et al., 2013), and has focused on a limited number of specific ecosystem services (Barbier, 2012b). These trends are reflected in the study of ecosystem services in general with social valuation under-utilised because of unclear frameworks (Felipe-Lucia, 2015). When social valuation is included, its use is often confined to assessment of cultural services rather than all category types, or malapplied using econometric methods based on social preferences (Felipe-Lucia, 2015). Moreover, valuations have concentrated on individual key services but not multiple or bundled services, with targeted services regarded as being the most critical (e.g. biodiversity habitat) or amenable to intervention such as through environmental markets (Pittock et al., 2012).

Economic valuations of mangroves have been directed at three key ecosystem services to inform environmental policy and management, in particular, options for land use (Barbier, 2012a, 2012b). These valuations have focused on: (1) nursery-breeding habitats for marine fisheries; (2) barrier functions protecting coastal communities and infrastructure from the impacts of storm events; and (3) raw materials and products fundamental to livelihoods (Barbier et al., 2011). These studies have helped redress decision-making that preferences short-term economic gains from conversion of mangrove ecosystems to pond aquaculture, principally in Asian and Latin American countries. Mangrove conversion has been the leading cause of mangrove loss worldwide (Primavera, 2006). More recently, the focus and motivation for economic studies of mangrove ecosystem services has expanded to include carbon sequestration (i.e., 'blue carbon') to inform financial incentive measures aimed at maintaining carbon stores for climate change mitigation (e.g. Alongi, 2011).

Ecological valuations have focused on the same subset of ecosystem services including carbon sequestration (e.g. Hutchison et al., 2014). Recent research has progressed from biophysical assessments of the capacity of the ecosystem to deliver services, toward quantifying spatial and temporal variability in delivery of these services (Barbier, 2012b; Lee et al., 2014). Whereas earlier studies evidenced habitat-fishery linkages or storm protection benefits, later studies quantified where and when these services vary according to non-linear spatial properties such as distance to the seaward edge (Manson et al., 2005), habitat configuration or connectivity (Lee et al., 2014), and temporal influences including seasonal biomass and tidal level (Koch et al., 2009). This research has been intended to identify thresholds for service provision or ecological collapse to prioritise conservation efforts (Barbier, 2012b).

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