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Monitoring and evaluation for adaptive coastal management

C. Jacobson*, R.W. Carter, D.C. Thomsen, T.F. Smith

Sustainability Research Centre, University of the Sunshine Coast, Locked Bag 4, Maroochydore DC, Queensland, Australia

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ABSTRACT

Monitoring and evaluation is a critical component of adaptive management, enabling adjustment of management actions and the assumptions upon which they are based. Despite the recognised need for adaptive management of the coastal zone, the way in which monitoring and evaluation can support practice is not often considered. Monitoring involves activities that measure the effectiveness of actions, whereas evaluation involves the interpretation of that information. In the first national study of its type, we analysed the extent that monitoring and evaluation was used to support adaptive management in the coastal zone in Australia. An on-line survey of 70 practitioners found 54 (77%) conducted monitoring and evaluation, and of these, only 25 (46%) used it for adapting management, and 17 (32%) for evaluating management effectiveness and assumptions. Use of monitoring and evaluation for adapting management was significantly correlated with organisation type, but not with perceived sufficiency of monitoring and evaluation, or the extent it informed decision-making. Assessment breadth was highly variable. Organisations who used monitoring and evaluation to adapt management and test assumptions were significantly more likely to conduct broad assessment, although assessment of socio-economic condition, resources and activities were least likely to be assessed. This has implications for the types of management decisions monitoring and evaluation can inform. For example, to determine which actions are most cost effective in preventing coastal erosion, both resources and outcomes need to be assessed. Overall, our results indicate a propensity for organisations to claim adaptive behaviour, but evaluation design does not facilitate it. Inappropriate design, insufficient resources (financial, technical skills), and concern for assessment scale (including the need to share information across organisations to inform regionally meaningful assessments) impede more adaptive behaviour. Capacity building in the use of evaluation frameworks designed to specifically support learning would enhance adaptive coastal management in Australia.

1. Introduction

Adaptive management has become a normative approach to environmental management since its initial development as an experimental approach to address uncertainty (Holling, 1978; Walters and Hilborn, 1978). The approach is now widely used in all environmental sectors, including forestry, fisheries, conservation and coastal management (McFadden et al., 2011). Debates about the nature of adaptive management and tendencies to either an experimental or collaborative approach have been prevalent in the literature since the 1990s (Allen et al., 2011; Jacobson et al., 2009). Common to all descriptions is a structured process of learning from management in the face of uncertainty, which can occur from policy to project scales (Allan and Stankey, 2009). Structured learning involves monitoring and evaluation of the management process and using that information to inform management decision-making, by reflecting on and adapting actions, or by reflecting on and adapting both actions and assumptions about the most appropriate actions (Jacobson et al., 2009). The integration of monitoring and assessment information is a core component of a structured learning process (Jacobson et al., 2011, 2009; Smith et al., 2009). However, it is often this component that challenges managers (Douvere and Ehler, 2011; Jacobson et al., 2011; Smith et al., 2009).

Uncertainty in the coastal zone is exacerbated by complex environmental and socio-economic processes (Smith et al., 2013, 2009). Discussion on monitoring and evaluation and the way it can support adaptive management of the coastal zone is rare. Some monitoring and evaluation frameworks, such as the pressure-state-response framework, can provide a benchmark of management performance (see Allen et al., 2012; von Koningsveld et al., 2005; Doody, 2003), while alternative frameworks such as orders of outcomes (Olsen, 2003) and management effectiveness evaluation (Hockings et al., 2006; Ehler, 2003) offer a more structured

* Corresponding author. Tel.: +61 7 5456 5053.
E-mail address: cjacobso@usc.edu.au (C. Jacobson).

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approach to learning that enables reflection on both actions and assumptions. The later involves assessment of each element of the management cycle (objectives, plans, inputs, management processes, outputs and outcomes) for any given management objective, to enable adaptation of appropriate elements if desired outcomes are not achieved (Hocking et al., 2006).

In a review of integrated coastal management in Europe, Pickaver et al. (2004) identified that while monitoring was conducted routinely, this did not correlate with assessment of progress towards sustainability, nor improvements in the sustainability of coastal resources. As noted by McDonald-Madden et al. (2010), the benefits of monitoring are not often assessed. Smith et al. (2009) argue that the capacity of managers to integrate information is a critical impediment to realizing the potential benefits of adaptive management. In other fields, for example conservation management, the monitoring and assessment of all stages of the management cycle (including context, planning, inputs, processes, outputs and outcomes) has been proposed as a way to support managers in identifying how to adapt management (Hockings et al., 2006). Without coverage across different components of the management cycle, identifying which elements of management to adapt is problematic (Jacobson et al., 2008).

Coastal challenges exist in many parts of the world, particularly where cumulative environmental and socio-economic issues intersect. Australia is one such area, where about 85% of the population reside within 50 km of the coast (Australian Bureau of Statistics, 2004a). Demographic trends indicate that concentration of population in Australia's coastal zone will continue (Australian Bureau of Statistics, 2004b). The population growth extends beyond the capital cities and has been described as a sea change phenomena caused by various push and pull factors (Smith and Doherty, 2006; Australian Bureau of Statistics, 2001). Although attention to coastal management followed the lead of the USA in the early 1970s, and despite various reviews (such as the 1993 Resource Assessment Commission Coastal Inquiry), there has been little agreement on a national approach to coastal management or a comprehensive and integrated coastal management policy. In addition, while notions of adaptive management pervade many natural resource management policies and strategies, there is little analysis of monitoring and evaluation approaches in the coastal zone to support it. In this article, we explore the extent that monitoring and evaluation might be useful in supporting an adaptive approach to both socio-economic and ecological aspects of coastal zone management. This is the first such national study of its type of which we are aware.

2. Methods

This study was part of a broader research program on adaptive learning in the coastal zone (see Smith et al., 2013), and part of a purposely-built online survey benchmarking monitoring and evaluation in the coastal zone (www.coastaleval.com.au). For this article, we were particularly interested in analyses of the survey data that build understanding about the adaptive behaviour of coastal organisations and the influence of monitoring and evaluation programs.

Relevant survey questions included:

1. the scale of the organisation (state government, regional organisation, local government, community group, other)
2. the sufficiency of monitoring and evaluation (4-point ordinal scale – insufficient, a bit light, about right and too much)
3. the extent that monitoring and evaluation information informs decision-making (4-point ordinal scale – never, occasionally, usually and always)
4. the purposes of monitoring and evaluation (nominal scale, including assumption testing, adapting management and other purposes)
5. the purposes and breadth of the most important monitoring and evaluation activity (both nominal and numeric scale)
6. overall perspectives on monitoring and evaluation (two-word and open-ended qualitative responses).

A full copy of the survey is included in Appendix 1.

In combination, responses to these questions enabled us to explore the inter-relationships between adaptive management focus, use of monitoring and evaluation information to inform decision-making, breadth of monitoring and evaluation focus, sufficiency of monitoring and evaluation information, and organisational scale. In addition, we were interested in understanding which institutional factors might be driving the use of monitoring and evaluation to support adaptive management.

An invitation to conduct the survey (with two follow up prompts, two weeks apart) was circulated to the following organisation types, with 288 invitations in total:

- government (including federal, state and local government levels);
- coastal-based natural resource management regional management bodies and catchment management authorities (quasi-autonomous governmental organisations operating at a scale broader than local government but narrower than state government);
- Industry groups (e.g. Australian Coastal Society);
- Community groups (e.g. Ocean Watch Australia, Coastcare groups); and
- Research and consulting groups.

Data were analysed using mixed methods including the use of SPSS for nominal, ordinal and numeric data, and the open coding analysis to identify core themes (Babbie, 1998) from text-based responses.

3. Results

Overall, the survey had a response rate of 24%, typical of many surveys (see Jacobson et al., 2013). A response bias was evident, with proportionately higher community group, state group and university group participation than expected (10%, 6% and 17% respectively compared to 3%, 1% and 4% expected participation), and lower than expected regional group and local government group participation (53% and 12% respectively compared to 65% and 27% expected participation). Further, respondents from the states of New South Wales and Tasmania were over-represented (33% and 17%, compared to 24% and 7% respectively), whilst Queensland, South Australia and Western Australia were under-represented (23%, 6%, and 7% respectively compared to 27%, 24% and 9% expected participation). These figures are approximate only; we know from university response rates that the survey was circulated more broadly through participants forwarding the survey to colleagues.

3.1. Are coastal organisations really adaptive?

Of 70 survey respondents, 77% reported conducting some form of monitoring and evaluation. Of these, 46% identified its purpose was for adapting management, and 31% for both adapting management and testing assumptions. The over-represented State (9%) and University groups (21%) reported using monitoring and evaluation for adapting management, compared with the expected 6% and 18%, whilst 49% of the under-represented local government