

Adaptive management of natural resources

Catherine Allan

Charles Sturt University, PO Box 789, Albury, NSW, 2640. Web: <http://www.csu.edu.au/faculty/science/ses/>, Email: callan@csu.edu.au

Abstract

The concept of adaptive management has been embraced by natural resource managers worldwide, and in Australia the promise to manage adaptively underpins most government water related programs and projects. Adaptive management is learning from doing; learning comes through the implementation of policies and strategies, so adaptive management complements research-based learning. Passive adaptive management learns from the implementation of an historically informed ‘best’ practice, followed by review of that implementation. Active adaptive management involves a range of practices designed to achieve strategic goals (treatments) to test the hypothesis that ‘best’ practice is just that. Adaptive Management is *not* sycophantic flexibility, nor is it simply muddling through. In particular, adaptive management is *not* business as usual. For adaptive management to achieve its promise it must be recognised as a radical departure from established ways of managing natural resources; it requires new ways of thinking about management, new organisational structures and new implementation processes and tools. Planners and managers require educational, administrative, and political support as they seek to understand and implement adaptive management.

Keywords

Adaptive management, natural resource management, environmental management, catchment management

Introduction

Adaptive management of natural resources has been my research focus for the past six or so years, so I have been asked to provide some context for other presentations at this conference which deal with adaptive management. The following discussion is my personal reflection on adaptive management of natural resources in Australia in 2007, based on both my own research, and on extensive review of literature.

You may be asking “why bother talking about adaptive management at all?” One reason for doing so is that adaptive management has become formally embedded in catchment and water planning in Australia through the bilateral agreements that underpin the National Action Plan for Salinity and Water Quality (NAP) (Commonwealth of Australia, 2003). In fact, the management of invasive plants, pest animals, flow regimes in rivers, soil health and biodiversity maintenance are all supposedly guided by adaptive management principles. The pervasiveness of the idea of adaptive management can be gauged by a casual browser search of the World Wide Web, restricting the search to “adaptive management” and “environment” or “natural resources”. This will yield over a million results, with around 125000 of these from Australia. In short, ‘adaptive management’ is well entrenched in our current discourse on natural resource management, and the reason for **that** is because it offers an opportunity for natural resource managers to continue to manage despite these increasingly complex and uncertain times.

Adaptive management explained

Before explaining what adaptive management is it is useful to consider what it is **not**. Adaptive management not just a fancy name for muddling along, nor is it about creating institutions or organisations that respond to every social or political whim. Adaptive management involves **learning** from **implementation**. Because adaptive managers develop their understanding of how the world works from the implementation of plans and policies, adaptive management complements other forms of knowledge creation such as the reductionist investigations historically undertaken in research organisations. For visual thinkers adaptive management is a roughly circular process (see Figure 1).

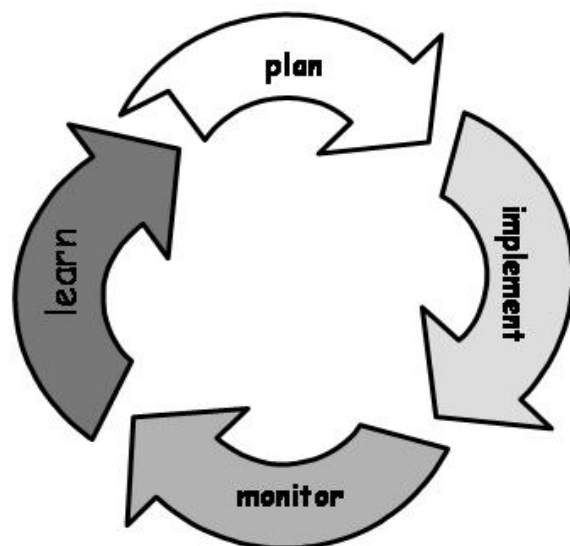


Figure 1. A simple conceptualisation of adaptive management.

Adaptive management initially was conceived as a technical-ecological model (e.g. Holling, 1978; Walters, 1986), but has increasingly become as much a social and civic undertaking as a technical one (Lee, 1993). Depending on their interests and needs different people may focus on different aspects of adaptive management, so that there is, for instance, a large body of adaptive management literature concerned with large scale field experiments (for example Walters & Holling, 1990; Walters & Green, 1997; Ladson & Argent, 2002), while another focuses on using the new knowledge in policy and planning (for example Stankey *et al.*, 2003; Gunderson & Light, 2006; Pahl-Wostl, 2007). This latter area is the emerging field of adaptive governance (Figure 2).

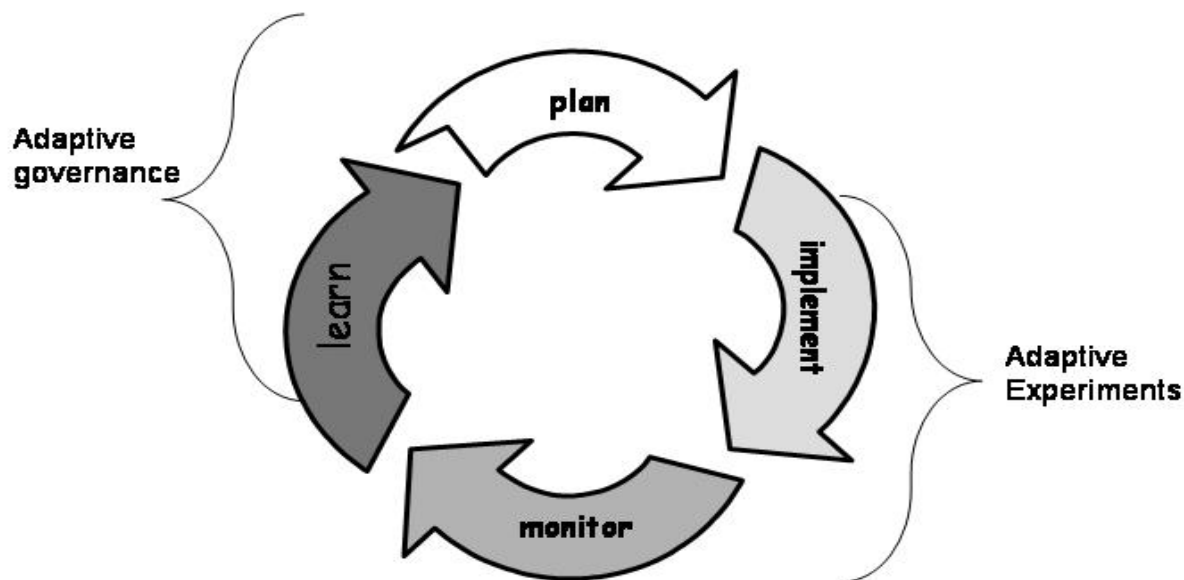


Figure 2. Two different foci for adaptive management.

Individuals can ‘do’ adaptive management relatively easily, because all of the processes- from adaptive experiments to adaptive governance- can happen within one person. Consider a farmer treating one half of a paddock with a new fertiliser; that one farmer can plan and do the activity, monitor the pasture growth on the treated and untreated areas, make judgments about the efficacy and impacts of the new fertiliser, and use that new knowledge when in the next phase of paddock planning. Small, cohesive groups of people with similar and clearly articulated goals can also use adaptive management relatively easily and unconsciously, but once management is achieved through larger groups- agencies, communities, Landcare groups, CMAs and the like- different parts of the adaptive management cycle are carried out, not only by different people, but by teams of people with separate societal roles, with a variety of goals. Thus, as the size or complexity of projects increase, adaptive management gets more difficult to do as more effort is needed for the negotiation of agreed goals, and for simply co-ordinating and sharing information.

A necessary aspect of co-ordination of social scale adaptive management is the articulation of the mechanisms of the adaptive process, and some active decision making about what form (if any) of adaptive management is appropriate. Walters and Holling (1990) distinguished three distinct forms of learning from doing; evolutionary, passive and active adaptive management:

Evolutionary adaptive management

Evolutionary adaptive management is undirected learning from random experience, or trial and error learning. I think it is a bit of a Furphy to call it adaptive management at all, and I suspect others agree, as it is a term that is rarely evoked. The terms passive and active adaptive management are however, because they draw attention to two distinct approaches to adaptive management.

Passive adaptive management

Passive adaptive management has a strong focus on implementation, in particular the implementation of an historically informed best practice or policy, followed by review of that implementation. For instance, a passive adaptive approach may involve promoting and supporting a current best practice of requiring replanted riparian vegetation to be at least 20 metres wide to enhance biodiversity outcomes. As the 20 metre

wide strips advance across the countryside their impact on biodiversity would be monitored. Perhaps in time the benefits of the 20 metre strips will be confirmed, or perhaps it will be learned that 20m is not sufficient in many situations. In the latter case the current 'best' practice recommendations would be increased.

Effective passive adaptive management involves:

- an active culture of reflection comprising effective evaluation, rewards for thinking and reflection, and appropriate communication fora for all project participants; and
- provision of mechanisms for incorporating learning into planning and management.

Active adaptive management

Active adaptive management, like passive adaptive management, is about implementation, but there is a stronger emphasis on learning. Within an active adaptive management paradigm implementation of policy and strategy is **designed to test hypotheses** (Lee, 1993; Walters & Green, 1997; Dovers & Mobbs, 1997). Active adaptive management may mimic reductionist science by using a range of "treatments" - practices designed to achieve strategic goals- to test the hypothesis that 'best' practice is just that. Viewed from within the active adaptive management paradigm, policy becomes 'questions masquerading as answers' (Gunderson, 1999 p.1). In the riparian vegetation example introduced above a range of replanted vegetation widths may be promoted, with some more narrow and some wider than the current best practice recommendation of 20 metres. Actively designing and applying 'treatments' in this way allows more information to be gained in the same time frame. In this case you may learn that not only is 20 metres too narrow, but that there is no impact until, say, 40m is planted. Or maybe 10m will be found to be sufficient. The current best practice can be changed more precisely because of the active approach taken.

Active adaptive management incorporates all of the features of passive adaptive management listed above, plus:

- management activities are specifically designed to test hypotheses through ecosystem scale holistic experiments;
- complexity is embraced;
- provision of mechanisms for multi-disciplinary and multi-stakeholder involvement; and
- there is strong emphasis on social learning.

So, while there are many different ways of interpreting and understanding social scale adaptive management at some level it always involve:

- management activities specifically designed to test hypotheses through ecosystem- scale, holistic experiments;
- reflection on the outcomes of those management activities;
- provision of mechanisms for multi-disciplinary and multi-stakeholder involvement;
- an emphasis on collaborative or participatory social learning;
- provision of mechanisms for incorporating learning into planning and management;
- development and maintenance of appropriate communication fora for all project participants; and
- a change of focus from mechanistic/reductionist thinking to holism.

What is needed to support adaptive management?

Now I can hear another question rumbling in the background- "OK, so you've convinced me that adaptive management is important, but don't we already do this? Aren't we always learning from what we do?" I suggest that the answer is no, and that actually we spend a lot of resources ensuring that, at the societal scale, we don't learn from our natural resource management actions. Passive adaptive management is sometimes considered to be equivalent to the current conventional approach to managing natural resources (Parma *et al.*, 1998), but think back to my simple passive example of the riparian buffer strips. Such plantings have occurred all over Eastern Australia over the past decade or so, but how many have been systematically monitored and evaluated? And how much of the learning from any evaluation that did happen has been used to change policy direction? The evidence for active adaptive management occurring is even less apparent, and it appears that a number of social and cultural issues constrain our ability to learn from our actions (Allan & Curtis, 2003; Allan & Curtis, 2005; Allan, 2004). These constraints include short planning cycles, inflexible and inappropriate institutional structures and some cultural preferences for action and competition

over reflection and collaboration. Rather than dwelling on constraints here I think it is more constructive to flag some issues that should be considered when attempting to embed adaptive management in our current water projects and programs.

Evaluation

Evaluation is central to the adaptive management cycle. Evaluation moves beyond summative assessment (i.e. determining if project goals and milestones have been achieved, if the money was spent on time and so on) to formative assessment (i.e. understanding such things as client needs, the implications and side effects of implementation and program logic) (Cook & Shadish, 1986). Effective project/program evaluation needs to be included as an integral part of implementation, and requires adequate planning and resources (Allan, Curtis, Howard, & Robertson, 2007). Caution is needed with the targets and milestones in all natural resource management projects; adaptive management is only possible if targets are conceived of as approximations, otherwise there is no capacity to learn and modify practice.

Multi disciplinary and collaborative approaches

Adaptive management embraces the 'messiness' of social activities by including people from a variety of backgrounds and discipline groups, and with different ways of approaching and understanding the world, in the learning cycle. This approach encourages collective responsibility for understanding and managing natural resources (Roling & Jiggins, 2001). There are, of course, increased 'transaction' costs with multi-disciplinary and collaborative approaches, and again this needs to be recognised when planning adaptive management projects by allowing sufficient time, funds and other resources.

Sound leadership

I hope that it is clear by now that adaptive management, especially in its active form, is a radical departure from the way we currently manage our natural resources in Australia. Sound leadership is required to support this radical departure in thinking and practice (Shindler *et al.*, 2002). This new and unsettling approach to management needs committed people who have (or who have been given) the time, resources, capacities and power to influence the ways in which policy is devised and its tools are implemented.

Conclusion

Although adaptive management has been discussed for many years it has yet to become more than rhetorically embedded in our natural resource management culture. I believe that this is partly because neither the approach, nor its potential benefits, are well understood. There has been, to date, little support for managers to explore and test the various manifestations of adaptive management- short project time frames, multiple demands on manager's time, and an over-emphasis on meeting targets and milestones are active disincentives for learning about and trying to use adaptive management. I hope that this brief paper goes a little way towards demystifying adaptive management so that it may become a genuine component of the new and exciting era of water management that is ahead of us.

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