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Australian protected areas and adaptive management: contributions by visitor planning frameworks and management effectiveness assessments

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Protected areas are recognised as crucial for conserving biodiversity and supporting the ecological processes that benefit humans, as well as providing recreational and wellbeing benefits. The complexities and uncertainties associated with their management make adaptive management an appealing ideal. This paper examines how two well-developed management methodologies – visitor planning frameworks (e.g. limits of acceptable change) and management effectiveness assessments – contribute to the adaptive management of visitor use of protected areas. A set of principles was developed from the literature by the authors and used to analyse the performance of these methodologies in facilitating adaptive management of visitor use in such areas in Australia. The analysis revealed both methodologies as contributing to institutionalising monitoring and the development of shared understandings. Effectiveness assessments are facilitating adaptation, with systematic evaluation and feedback of results into management evident. Performance of the visitor frameworks was impeded by a lack of commitment to implementation. Identifying and evaluating future options was a weakness of both frameworks. In sum, however, both provide practical, much-needed means for progressing the institutionalisation of adaptive management and hence contributing to innovative solutions to the complex problems facing protected areas.

Keywords: adaptive management; limits of acceptable change; management effectiveness assessment; monitoring; protected areas; uncertainty; visitor planning framework

Introduction

Protected areas are crucial for conserving biodiversity and supporting the ecological processes that benefit humans. They also provide a suite of recreational and wellbeing benefits. About 13% of the Earth's land area is in formally designated protected areas (UNEP WCMC 2012). Designation is, however, insufficient for their protection, with management being an essential accompanying activity. Such management must be cognizant of uncertainties associated with a changing climate, changing political circumstances, and the vagaries of public funding. Complexity stems from the same sources, as well as dealing with complicated ecosystems and imperfect knowledge, again overlaid by great uncertainties regarding the effects of a changing climate. Social complexity is also the norm for protected areas, with visitors with multiple and

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sometimes competing interests, and increasing numbers of stakeholders with an interest and right to be involved in protected area governance and management (Phillips 2003). For these reasons, the need for an adaptive approach to managing protected areas has been widely recognised (Roman et al. 2007).

In Australia, 11% of the country's land mass is in protected areas, including Indigenous protected areas, nature reserves, wilderness and state recreation areas as well as national parks (UNEP WCMC 2012). As such, their successful management is important not only for the future of the nation's protected areas, but also in contributing to the sustainable management of the broader Australian landscape. Visitor planning frameworks, developed in the 1980s in North America (Cole & Stankey 1997; McCool et al. 2007), and management effectiveness assessments, developed over the last decade (Hockings et al. 2004, 2006), have been applied in Australia. Both methodologies have been influenced by adaptive management principles (Hockings et al. 2006; McCool et al. 2007; Newsome et al. 2013) and have the potential to contribute to successful management. The implicit corollary here is that adaptability is a feature of successful management. The contribution of these methodologies in facilitating adaptive management of protected areas in Australia and elsewhere is poorly known.

This paper examines how these two management methodologies – visitor planning frameworks (e.g. limits of acceptable change) and management effectiveness assessments – perform in facilitating adaptive management of visitor use in Australian protected areas. A set of adaptive management principles was developed from the literature by the authors. Australia was chosen as the study focus, given both methodologies have been developed and applied in this country, and the significant contribution protected areas make to its natural and cultural landscape. These principles were then used to analyse both the design of the methodologies and their implementation, with sources of evidence including journal articles, reports, books, theses and websites. The interpretation was guided by the authors' extensive experience both as protected area managers and active members of the International Union for Conservation of Nature World Commission on Protected Areas (IUCN-WCPA). Based on the analysis, the implications for achieving adaptive management of visitor use in protected areas conclude the paper.

Adaptive management

Adaptive management is management through experimentation (Holling 1978). It differs from other forms of 'trial and error' management because it has explicit, formalised learning processes (Jacobson et al. 2009). Central to these learning processes are experiments relying on hypotheses and then feedback, either from modelling or implementation in the real world, which are then used to modify management. This kind of flexible, experimental approach has been widely advocated in natural resource management, given the associated uncertainties and complexity (McLain & Lee 1996; Stankey et al. 2005).

Because adaptive management requires flexibility in management and policy making it has associated institutional requirements for acquisition and rapid incorporation of new information into decision making (McLain & Lee 1996). It also requires monitoring and the means for including the associated feedback in management (Jacobson et al. 2009). Adaptive management has been a response to

uncertainty and complexity (Swanson et al. 2010), a feature widely acknowledged as being associated with the management of protected areas (McCool et al. 2007).

Visitor planning frameworks and management effectiveness assessments

Visitor planning frameworks were developed in the 1980s and 1990s in the United States and Canada to address concerns about dramatically increasing visitor use of wilderness and national parks, and associated concerns regarding impacts on natural resources and visitors' experiences (McCool et al. 2007). The most widely known are the recreation opportunity spectrum (ROS), limits of acceptable change (LAC) and visitor impact management (VIM). Less well known and applied are visitor experience and resource protection (VERP), visitor activity management process (VAMP) and the tourism optimisation management model (TOMM) (McCool et al. 2007; Newsome et al. 2013). They have been most widely applied in the United States and, to a lesser extent, in countries such as Australia where tourism and recreation are major uses of protected areas.

These visitor frameworks aim to help in planning and managing for diverse visitor experiences and monitoring conditions to contribute to adaptive management (McCool et al. 2007). Table 1 gives the generic features of these frameworks and, in the last row, lists the frameworks that have been applied in Australia, and which are the focus of this analysis. Additionally, all include the steps of rational planning starting with the identification of issues and concluding with recommendations for management and monitoring (Figure 1). Most (with ROS being the exception) develop indicators and standards. VERP and VAMP share the greatest similarities, such as their emphasis on a broad range of factors at the strategic level of planning and management (McCool et al. 2007). Once these strategic decisions are made, these two frameworks then move onto developing indicators and standards. LAC and VIM, on the other hand, begin with a narrower focus, identifying issues and using these to guide the identification of indicators and standards.

Protected area management effectiveness (PAME) assessments are a more recent management methodology, and are a response to growing interest in knowing if management of such areas has been effective (Hockings et al. 2004; Leverington et al. 2010). Thousands of assessments of the effectiveness of protected area management have been conducted since the 1990s (Leverington et al. 2010). The methodologies used relate to the framework for evaluating management effectiveness developed by the IUCN-WCPA (Hockings et al. 2000, 2006). The framework has its origins in the quality assurance activities of the preceding two decades, where a central interest is the management cycle (Moore et al. 2003; Hockings et al. 2004). Indicators are grouped according to six elements in this cycle: context; planning; inputs; processes; outputs; and outcomes (Figure 2). Fundamental to its design is an interest in monitoring performance to contribute to adaptive management (Hockings et al. 2004, 2006; Table 1).

Methods

Developing the adaptive management principles

To determine how these two management methodologies performed in facilitating adaptive management of Australian protected areas, the authors developed a set of

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Table 1. Generic features of visitor planning frameworks and management effectiveness assessments.

Feature	Protected area visitor planning and management frameworks	Protected area management effectiveness (PAME) assessments
Purposes of framework	Planning and managing for diverse visitor experiences Monitoring conditions to contribute to adaptive management and continued provision of desired visitor experiences	Monitoring performance to contribute to adaptive management and improve management, and assist in resource allocation Improving accountability Communicating with public
Scale of application Breadth of focus	Usually park (site) based Visitor focus only	Usually system (to park) based Whole system focus (e.g. natural environment, visitor management, local communities, legal and governance settings)
Types of indicators	Site-based within a protected area; can be aggregated for park or group of parks Monitor resource (e.g. soil erosion) and social conditions (e.g. crowding). Monitor context, less so outputs, outcomes	Park or system based (e.g. adequacy of infrastructure, threat monitoring, effect of park on local community) Monitor whole system including context, planning, inputs, processes, outputs, outcomes
Judgements about indicators	Measure and assess indicators against standards	Variable from quantitative assessment against site-specific standards to qualitative assessment against generic standards
Frameworks applied in Australia; focus of this paper	ROS, LAC, VIM, TOMM	IUCN-WCPA

Sources: Clark & Stankey (1979), Hockings et al. (2004), McCool et al. (2007), Leverington et al. (2010), Newsome et al. (2013).

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adaptive management principles from the literature. The principles were derived from early work on adaptive management (e.g. Holling 1978; Stankey et al. 2005), widely cited reviews (e.g. McLain & Lee 1996), and more recent research recommending how adaptive management can be operationalised (e.g. Jacobson et al. 2009; Swanson et al. 2010). Collectively, these principles encapsulate what is needed for adaptive management of visitor use in protected areas to become a reality. They cover issues of: knowledge acquisition and management; monitoring, learning and adaptation; and evaluation and feedback (Table 2).

The first three principles were strongly influenced by McLain and Lee's (1996) review of adaptive management. These authors consider increasing knowledge acquisition rates, enhancing information flow, and processes for creating shared understandings, as central to adaptive management. According to social learning theory, knowledge acquisition and management are fundamental to adaptive learning in human management systems (McLain & Lee 1996). The rate of knowledge acquisition can be increased through surprise, with surprises generated by hypothesis

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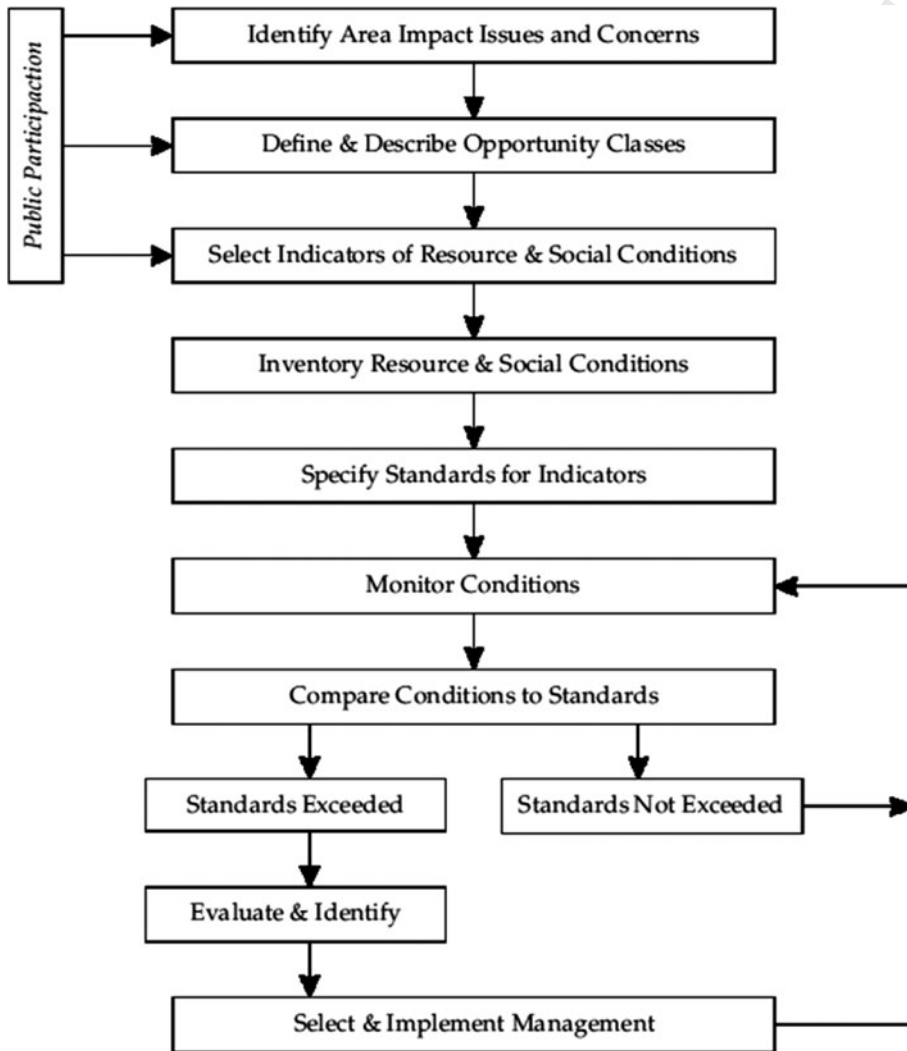


Figure 1. Generalised description of visitor planning (and management) frameworks (Moore et al. 2003).

testing. Having access to new information, and the ability to respond to it, are also fundamental for organisations dealing with uncertainty and complexity. The other important process is creating opportunities for shared understandings through strengthening social interactions (Moore & Lee 1998).

Monitoring, learning and adaptation are principles evident from recent research focused on the feedback components of adaptive management. Swanson et al. (2010) combines an interest in feedback with the necessity of institutionalising monitoring (Table 2, Principles 4–5). These authors derived their principles from reviewing fields as diverse as business management, health care and sustainable development. Their aim was designing policies that are effective in highly complex and uncertain settings. Monitoring and feedback as part of routine management are the focus of the last two

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Figure 2. The IUCN-WCPA management effectiveness assessment framework (Hockings et al. 2006).

broad principles in Table 2. They come from ‘questions’ asked by Jacobson et al. (2009) in their review of contemporary practice reported in peer-reviewed and project reports.

Undertaking the analysis

The seven principles (Table 2) were used to analyse both the design of the methodologies and their implementation, with sources of evidence including journal articles, reports, books, theses and websites. Our methodology is based on the approach taken by Moore et al. (2003), who similarly analysed documents to provide a qualitative rating of the contributions by various visitor planning frameworks and associated indicators to environmental reporting for natural area tourism. In this study, we undertook content analysis of the following: original frameworks (e.g. Clark & Stankey 1979; Hockings et al. 2000); more recent international reviews (e.g. McCool

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Table 2. Evaluation of the contribution of visitor planning and PAME frameworks to the adaptive management of visitor use in protected areas using principles derived from the literature (★★★ largely meets principle; ★★ partially meets principle; ★ hardly meets principle).

Principle	Visitor planning	PAME	Information sources and location
Principle 1. Iterative hypothesis testing [1] [2]	★	★★	[a] [b] [c] [d] [e]
Principle 2. Information flow and access [1]	★	★★★	[b] [c] [f] [g]
Principle 3. Shared understandings [1]	★★	★★	[b] [h] [i]
Principle 4. Options and solutions [2]	★★	★	[c] [j] [k]
Principle 5. Monitoring, learning and adaptation [2]	★	★★★	[b] [c] [j] [k] [l]
Principle 6. Systematic monitoring [3]	★★	★★	[l]
Principle 7. Systematic evaluation and feedback [3]	★	★★★	[b] [l] [m]

Note: Aust = Australia wide; NSW = NSW protected area system; GBR = Great Barrier Reef; Fitz. R. NP, WA = Fitzgerald River National Park, WA.

[1] McLain & Lee (1996). [2] Swanson et al. (2010). [3] Jacobson et al. (2008).

[a] McArthur & Sebastian (1998) – Aust. [b] Growcock et al. (2009) – NSW. [c] Hockings et al. (2009a) – NSW. [d] GSA (2012) – Kangaroo Is., SA. [e] Kelman (2011) – NSW. [f] Buckley et al. (2008) – Aust. [g] Griffin et al. (2010) – Aust. [h] Moore & Lee (1998) – Fitz. R. NP, WA. [i] Hockings & Gilligan (2009) – GBR, Qld. [j] McArthur (2000) – Aust. [k] Jacobson et al. (2008) – Aust. [l] Brown et al. (2006) – Aust. [m] T. Varcoe (pers. comm. 2011) – Parks Victoria.

et al. 2007; Leverington et al. 2010); international critiques (e.g. McLain & Lee 1996; Stankey et al. 2005); Australian reports and theses (e.g. McArthur 2000; Brown et al. 2006); and recent journal articles analysing practice in Australia (e.g. Jacobson et al. 2008; Growcock et al. 2009). The literature and analyses for the planning frameworks were generally older, given their earlier introduction in the 1980s and 1990s.

We used a qualitative rating system to describe the extent to which each principle was met, with three stars if a principle was ‘largely met’, through to one star if the principle was ‘hardly met’ (Table 2). Whether a principle was met depended on two aspects. First, if the methodology met the principle, which most generally did given that adaptive management underpins both. Second, if the principle was met through application of the framework. The visitor planning frameworks were analysed as a single set, given the commonalities among them (Table 1). The IUCN-WCPA framework provided the focus for the following analysis of PAME assessments, given its pre-eminence as the underlying basis for assessments in Australia.

Results and discussion

Overview of application of frameworks in Australia

Visitor planning frameworks have had a patchy history of application in Australia. Only 20 examples of implemented frameworks were identified by McArthur in his doctoral research (McArthur & Sebastian 1998; McArthur 2000). The focus in most was developing indicators with less attention to assessing and reporting on the

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resultant data (McArthur & Sebastian 1998). ROS, LAC and VIM have been the most widely applied, with agencies blending frameworks for their own customised purposes. The principles from these frameworks have also been adopted to inform planning systems and processes. For example, the Levels of Service system applied by Parks Victoria borrows heavily from ROS to identify and provide a spectrum of services. Agency managers are most familiar with ROS and LAC, with ROS the only framework used in more than two locations (Brown et al. 2006).

PAME assessments have been undertaken for the protected area system in two states and subsets of it in another two (Leverington et al. 2008). Their application is much more widespread than visitor planning frameworks. In all four states measures for individual protected areas were aggregated to report on the performance of the system or system subset. The most widely applied evaluation elements of the IUCN-WCPA framework (Figure 2), with the highest quality of evaluation, were context, planning and outcomes (Jacobson et al. 2008). Outcomes are clearly of interest, with an international review of 27 management effectiveness systems for protected areas identifying outcomes as the most widely assessed element (Hockings 2003).

Analysis using the principles

Principle 1. Knowledge acquisition through iterative hypothesis testing

Neither visitor frameworks nor PAME assessments provide explicit hypotheses. They do, however, implicitly include objectives. A central objective of the NSW National Parks and Wildlife Service (NSW NPWS) in using PAME was determining the effectiveness of on-ground management against the Department's plans and legislative objectives (Growcock et al. 2009). Testing against these system-level objectives is possible because PAME provides for assessment of the park system. Analysis of management effectiveness data can be used to test hypotheses about aspects of management that drive performance (e.g. Kelman 2011).

In implementing PAME, repeat monitoring and evaluation have been undertaken by NSW NPWS (three iterations of state of the parks reporting) and Parks Victoria (also three iterations) (Hockings et al. 2009a). Two stars were allocated to PAME assessments for this principle because, although they do not use hypotheses, there is evidence of testing achievements against objectives and repeat measures being made. To obtain three stars these assessments would need to be explicitly hypothesis driven.

For visitor frameworks, obtaining first and repeat measures have both proved problematic. McArthur and Sebastian (1998) noted that such frameworks had been proposed for use at a number of sites but never implemented. Brown et al. (2006) suggest that even if protected area managers are familiar with these frameworks it does not translate into similar levels of use. The exception here is TOMM implemented on Kangaroo Island where repeat measures have been made (GSA 2012). Based on their use of objectives, but an absence of commitment to repeat measures and hypotheses, visitor frameworks received one star for this principle.

Principle 2. Enhanced information flow and ready access to new information

Two elements of visitor frameworks are potentially useful in providing new information: the concepts embedded in the frameworks – such as the ROS – and the

information that becomes available through monitoring. The former has been influential in providing access to new information in agencies. For example, for the WA Department of Environment and Conservation, ROS has given managers a framework for using visitor and park infrastructure information to identify a spectrum of opportunities across their park system.

The lack of broadscale implementation of visitor monitoring frameworks in Australia has impeded associated information flow. Frameworks have been applied to one or a group of parks, but not statewide, resulting in piecemeal, uncoordinated datasets (Griffin et al. 2010). Data have been collected for management plans, but monitoring has not continued beyond this single point in time. These spatially uncoordinated and narrow temporal approaches reflect a lack of institutional commitment to monitoring by Australian protected area agencies (Buckley et al. 2008). Visitor monitoring by Parks Victoria is a notable exception (Newsome et al. 2013). Use of planning concepts, but limited implementation impeding the ongoing collection of management data, gave visitor planning frameworks one star for this principle.

For PAME assessments, the situation in Australia is different. State of the parks reporting, where PAME has provided the methodology, has ensured the collection and use of both qualitative and quantitative information, both of which can contribute to adaptive decision making (Hockings et al. 2009b). The state of the parks process in NSW was managed to ensure access to, and use of, assessment results across the park agency, with a centralised database with online reporting accessible by all managers. Senior managers are provided with snapshots of spatial and thematic areas for which they are responsible. Maps are an important part of the communication process (Growcock et al. 2009).

These authors emphasise the importance of taking an intelligent approach to information flow. They note that, if results from PAME assessments mean changes are required in an agency, they must be managed in a consistent way, sponsored by the executive level. The commitment by agencies such as NSW NPWS and Parks Victoria to collecting, using and communicating new information from PAME assessments warranted three stars for this principle (Table 2).

Principle 3. Processes exist for creating shared understandings

The development of shared understandings has made a fundamental contribution to successful management planning processes. Moore and Lee (1998) report on how the development of such understandings in planning for Fitzgerald River National Park in Western Australia, where LAC was part of the planning process, resulted in stakeholders with very different views being able to work together. Elements identified as contributing to the process of creating shared understandings related to the institutional setting: creating an environment where people could talk to and listen to each other and including stakeholders (from inside and outside the protected area agency) with a wide diversity of interests in decision making. Visitor frameworks received two stars because of their commitment (especially when LAC is used) to stakeholder engagement in planning, with lack of implementation precluding allocation of three stars.

For PAME assessments in NSW, a shared understanding about why the evaluations are being done and how to do them has been pursued through training.

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Senior staff had compulsory and then follow-up training, with a written support document, online help and a telephone help-desk. Ongoing leadership and support by senior agency staff has been an important part of building ownership (Growcock et al. 2009). Shared understanding has also been facilitated by evaluations being undertaken in peer groups of managers. Leverington et al. (2008) include the broad participation of protected area managers in their checklist for good evaluation methodologies.

The two rather than three stars allocated to this methodology for this principle reflects strong attention to developing shared understandings within the assessing agencies, and less attention to such understandings with external stakeholders. Lu et al. (2012), in their PAME assessment research with Taiwan protected areas, emphasise engagement of non-government and community organisation members. Engaging with visitors is also critical. In Australia, most focus has been on reporting, although public consultation has been a component of several exercises: through interviews with stakeholders for the Great Barrier Reef Marine Park Outlook Report (Hockings & Gilligan 2009) and via a statutory consultative body for the NSW State of the Parks Report.

Principle 4. Framework allows for evaluation of potential solutions and selection of best option(s) for future management

This principle relates to learning and adaptation (Principle 5) through evaluating potential solutions. Selecting the best options (and then further monitoring and evaluation) is also part of adaptation. Most of the visitor frameworks evaluate potential management solutions, and then select and implement the ‘best’ based on the objectives they seek to achieve. Achievement of this principle in Australia is again impeded by lack of implementation (McArthur 2000), hence the allocation of two rather than three stars.

The link between monitoring, evaluation and potential solutions is less evident for PAME assessments. This methodology was not designed to evaluate management solutions; however, it can provide new understandings about the relationships between planning, inputs, processes, outputs and outcomes. For example, the NSW State of the Park data from 2004 shows that having a plan of management was significantly associated with better performance in outcomes such as information availability, community consultation, monitoring and the management of issues such as fire and visitor impacts (Hockings et al. 2009a). Generally, however, the limited attention given in evaluations to ‘inputs’ means that the influences on outputs and outcomes remains relatively unknown, making adapting and improving management difficult (Jacobson et al. 2008). PAME assessments have the potential to evaluate solutions but have not explicitly been used to do so, hence a one star rating.

Principle 5. Monitoring, learning and adaptation are integral to management and are part of a larger, recognised process, not ad hoc additions

The one-off application of visitor planning frameworks by Australian protected area agencies makes learning and adaptation over time enormously difficult. Various commentators (e.g. Brown et al. 2006) have lamented the lack of institutionalisation of such frameworks. McArthur (2000) attributes such piecemeal approaches to an

organisational culture that does not favour adaptive management. A one star rating for this principle is the outcome.

In contrast, ongoing efforts are being made to institutionalise PAME assessments by agencies such as NSW NPWS, resulting in a three star rating. Peer groups undertake evaluation of results and ‘change management’ supported by the agency’s executive is undertaken where the results suggest significant adjustments are required. Agency commitment, especially support and leadership by senior managers in the NSW agency (Growcock et al. 2009; Hockings et al. 2009a), is an effort to ensure the integration of monitoring and remedial mechanisms into agency policy.

Principle 6. Monitoring is conducted systematically using hypotheses, data are collected for management purposes, criteria are used for indicator selection, short- and long-term responses are monitored, and stakeholders are involved

This principle includes elements of several previous ones; however, importantly, it collectively encapsulates the essential features of monitoring as part of adaptive management. Monitoring to test hypotheses and stakeholder involvement has already been discussed. In terms of data collection to evaluate management processes, PAME assessments have more of a focus on this than the visitor frameworks, given that the former reports on the whole management cycle (Hockings et al. 2004) (Table 1, Types of Indicators). Clearly identifying and using criteria for indicator selection is a feature of both methodologies. Visitor planning frameworks and PAME assessments both received two stars for this principle, as they meet some but not all of its features.

Using criteria to select indicators has long been part of visitor frameworks, with those put forward by Stankey et al. (1985), as part of the limits of acceptable change approach, widely adopted. Indicators capable of being measured in cost-effective ways at acceptable levels of accuracy, and which are responsive to management control, are recommended (McCool et al. 2007; Newsome et al. 2013). For PAME assessments, indicators are selected that have a clear relationship with the attribute being assessed, are sensitive to change in the attribute, and reflect changes in space and time of relevance to managers (Hockings et al. 2004, 2006). Both sets of criteria cover issues of measurement and accuracy.

Principle 7. Evaluation and feedback are conducted systematically and in relation to goals, the process is iterative, social and ecological uncertainties are considered, processes and experimental lessons are documented, and failures and unexpected results are treated as learning exercises

This principle has adaptive management at its heart, especially in terms of addressing uncertainty, complexity and unexpected surprises. It leads more than any other principle to the need for adaptable, flexible, learning institutions. Institutional necessities identified by Australian managers in Brown’s et al. (2006) study included: research funding for developing and applying visitor planning frameworks; partnerships with universities to test models; a website with proformas for models; and training to build a network of skilled users. University researchers interviewed as part of the same study wanted resources directed to capacity building, and specifically training and extension regarding the existing frameworks. Because visitor frameworks suffer from a lack of implementation and are not institutionalised, the loop is

not closed and performance against this principle appears poor. For these reasons visitor frameworks received one star for this principle.

In contrast, PAME is becoming institutionalised because of the commitment by several Australian park agencies to state of the park reporting. Both Victoria and NSW are into their third or fourth assessment cycle with evaluations being conducted in a systematic way and internal process have been established for application of the results (Growcock et al. 2009; T. Varcoe pers. comm., April 2011). For these reasons PAME received three stars for this principle.

Management implications and conclusion

The most crucial implication from this analysis for managing visitor use of protected areas is the essential, ongoing task of institutionalising monitoring, evaluation and feedback. Both methodologies provide a means for doing so, with greater success achieved in Australia to-date with PAME assessments than with visitor planning frameworks. Institutionalisation is important because it enables learning, a core element of adaptive management (Stankey 1997; Stankey et al. 2005). A second implication relates to developing and evaluating options. Both methodologies performed poorly against this principle. Meaningful engagement of stakeholders beyond agency employees is the third and final implication addressed.

Lessons for success and further improvements in institutionalising these methodologies can be drawn from the experiences in NSW and Victoria with state of the parks reporting. Growcock et al. (2009) attributes success in NSW to institutional support from senior managers, and building staff capabilities and systems to manage data collection, storage and use. Stankey et al. (2005) emphasised the importance of committed staff at all levels. Although these PAME assessments are institutionalising monitoring and evaluation, several issues affecting managers' ability to engage in them remain. Included are agency discomfort with qualitative scoring (subjective judgements by managers) that necessarily are part of PAME assessments, with this discomfort reflecting the scientific training and professional culture of many staff (Jacobson et al. 2008; Cook & Hockings 2011), and evaluation data being collected and not used (Griffin et al. 2010).

The lack of implementation of visitor planning frameworks is an institutional issue. Brown et al. (2006) suggest developing a national training program and reference materials on applying visitor frameworks in protected areas, and examining potential ways to standardise visitor frameworks and methods in Australia as potential solutions. These authors also note the lack of indicators and standards as an impediment to adoption. A potential solution is to learn from Leverington et al.'s (2010) global analysis of PAME assessments which produced a list of 32 'headline indicators' resulting from coding and analysing over 1800 indicators. A synthesis of visitor planning framework indicators could similarly provide uniformity and guidance for future monitoring efforts.

An obvious reason for lack of implementation is the failure to integrate visitor planning and management with business planning. Without the latter, there can be no certainty in the allocation of staff or resources. Difficulties in undertaking business planning, even as a separate enterprise to visitor planning and management, could be due to one or more of the following: a lack of familiarity with pricing visitor services and facilities and integrating this information in visitor planning and

management; lack of professional competency in tourism and visitor management; and poor capacity to deliver effective management (Eagles 2013).

Although agencies can and do keep managing without these visitor management frameworks (and management plans), and in the absence of PAME assessments, there are associated risks and missed opportunities. Both facilitate and require monitoring followed by evaluation and feedback into management, all of which must improve decision making. Leverington et al. (2010), in their global evaluation of PAME assessments for protected areas, report a strong link between research and monitoring and overall management effectiveness, and between management planning and overall management effectiveness.

Developing and evaluating future options was a challenge for both methodologies and is an essential element of learning. Stankey et al. (2005) remind us of the centrality of experimentation – involving hypotheses, controls and replication – to adaptive management. Such experimentation provides a means of evaluating options through direct action, scenarios or simulations. It requires, as with all other elements of adaptive management, institutional commitment, structures and expertise.

Meaningfully engaging stakeholders in these methodologies is a fruitful area for future development. Planning frameworks, such as TOMM, have relied on and included a diverse array of stakeholders in all stages of planning (Newsome et al. 2013). In contrast, engagement of external stakeholders in PAME assessments in Australia has been more limited. Jacobson et al. (2009) suggest engagement occurs through seeking agreement on management problem(s) through to involving stakeholders in data interpretation and management choices. Lu et al. (2012) involved agency, community and non-government stakeholders in their assessment efforts in Taiwanese protected areas.

In conclusion, both methodologies facilitate adaptive management of protected areas. This facilitation has been enhanced for PAME assessments through its institutionalisation by agencies. These methodologies provide great opportunities for moving adaptive management from ideal to reality for protected areas. They can also help address the added complexities and uncertainties of protected area management associated with climate change, another worldwide concern.

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