Barriers to the evaluation of systematic conservation plans: Insights from landmark Australian plans

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Abstract

The evaluation of conservation programs is often inhibited by barriers such as time constraints and a lack of funding. Through an exploration of two internationally influential systematic conservation planning activities conducted in Australia in the 1990s and 2000s, I demonstrate this is also true for conservation planning programs. Forestry agreements in North East New South Wales and the rezoning of the Great Barrier Reef Marine Park popularised the now widely used planning software packages C-Plan and Marxan. Through 37 semi-structured interviews with senior stakeholders involved in decision-making around both plans, I examined barriers to evaluation, the factors underpinning these barriers, and, in the absence of program-wide evaluations, stakeholder perceptions of the effectiveness of the plans. My findings confirmed that the primary barriers to the evaluation of conservation planning exercises are a lack of suitable monitoring data, resource limitations and inadequate preparation. Respondents also shed light on the factors which shaped these barriers in a conservation context, such as the need for political expediency, a loss of momentum post-plan, and the presence or absence of necessary leadership. Perceptions of the effectiveness of the plans reflected interpretations of a) whether the planning process followed good practice, b) the fact a planning result was agreed upon and implemented, c) the longer-term influence of the plan, and, in contrast to much of the current literature on these case studies, d) the consequences of industry restructuring.

Highlights

- Barriers to evaluation were due to lack of resources and preparation
- Political context and organisational culture shaped barriers to evaluation
- Healthcare and other disciplines face similar challenges and can offer lessons
- New perspectives on project effectiveness are shared from senior decision-makers
- Perceptions of effectiveness also reflected the effects of industry compensation

Keywords

Biodiversity conservation; stakeholder perceptions; environmental management; environmental policy; evaluation; planning

Acronyms

GBR: Great Barrier Reef

GBRMPA: Great Barrier Reef Marine Park Authority

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NSW: New South Wales

RAP: Representative Areas Program

SAP: Structural Adjustment Package

1. Introduction

Conservation planning offers the opportunity to adopt a 'prevention is better than cure' approach to environmental policy making. The allocation of resources must be conducted advisedly and transparently if associated decisions are to be supported by affected stakeholders (Adams et al., 2018). Opportunities to shape future resource use and conservation agendas arise infrequently (Pressey et al., 2013). It is therefore important to learn from prior planning exercises, to maximise the efficiency and effectiveness of future conservation plans (Kapos et al., 2010). For the purpose of this article, the author defines effectiveness in a general sense, "the authority and ability of actors and instruments to achieve regime goals and respond to emergent problems" (Clement et al., 2019; Morrison, 2017) , although interviewees were invited to present their own interpretations of effectiveness.

Systematic conservation planning is a discipline centred on improving conservation decision-making. It is often used to design protected area networks and to prioritise conservation actions (Margules and Pressey, 2000; Watson et al., 2011). It is characterised by the setting of quantified conservation objectives and provides a platform for stakeholders to resolve issues around trade-offs associated with different planning options (McIntosh et al., 2017). Despite the influence of the discipline, there is a significant gap in the literature on the implementation and evaluation of systematic conservation plans (Knight et al., 2008; Mair et al., 2018). Only three rigorous evaluations of systematic conservation plans have been identified in a recent comprehensive study, meaning that our understanding of how, when and why they may or may not be effective is severely limited (McIntosh et al., 2018). If evaluations are rarely conducted, it begs the question of why, given that conservation planning often costs millions of dollars (Bottrill and Pressey, 2012; Didier et al., 2009) and funders presumably want to understand the value of their investments.

In this study, I interviewed senior stakeholders involved in landmark systematic conservation planning programs in Australia, to understand why rigorous evaluations of the programs had not been conducted. Here it is helpful to distinguish between implementation monitoring – concerning whether plans were implemented as intended, and effectiveness monitoring, concerning how effective the plans were in delivering conservation outcomes. Some ecological studies have taken place in both cases, but neither program has been evaluated in its entirety, as you might expect for a major policy or program. In the absence of evaluations, I also sought the views of these stakeholders on the effectiveness of the planning programs.

1.1 Key barriers to evaluation

Program evaluation refers to a process of making inferences about an unobserved counterfactual outcome from a program or policy, i.e. what would have happened in the absence of the intervention (Ferraro and Pattanayak, 2006). Best practice evaluation methods can be defined as "methods that account for the counterfactual and are able to attribute causality between a conservation policy and specific observable environmental and social impacts" (Curzon and Kontoleon, 2016; 466). This requires a distinction between outputs (e.g. reports), outcomes (the observed or assumed effects of conservation outputs (Pressey et al., 2017)) and impacts, as revealed through counterfactual analyses (McIntosh et al., 2017).

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Given the difficulties associated with undertaking counterfactual evaluations, it is also helpful to consider implementation and effectiveness monitoring where possible.

It has been claimed that conservation science lags behind similar crisis disciplines such as medicine and public health in the provision of high-quality evaluations (Game et al., 2014), and conservation scientists have been called on to improve efforts (Ferraro, 2009; Ferraro and Pattanayak, 2006). It is often assumed that the small number of rigorous program evaluations is primarily due to a lack of interest or knowledge on the part of conservation professionals (Ferraro and Hanauer, 2014; Pressey et al., 2017).

Recent work by Curzon and Kontoleon has challenged this assumption (2016). The authors surveyed conservation policy experts to understand the primary reasons why program evaluations are rarely conducted (Curzon and Kontoleon, 2016). Their respondents considered the use of experimental and quasi-experimental program evaluation methods as 'very important or quite important' (95% of respondents) and expressed a desire to conduct these more often (Curzon and Kontoleon, 2016). Respondents reported the top five barriers to implementing high-quality evaluations (using such methods) were: lack of funding, availability of baseline data, time constraints, lack of forward planning and availability of a suitable control group (Curzon and Kontoleon, 2016). In fact, 78% of participants agreed that the two most significant barriers were lack of funding and time constraints.

Conservation scientists and practitioners are not alone in facing barriers to evaluation. The primary barriers met by third sector organisations in healthcare settings also relate to organisational capacity (Bach-Mortensen and Montgomery, 2018). A study of how low carbon community groups in the UK approach monitoring and evaluation found that issues of capacity, resources and utility hampered attempts (Hobson et al., 2016). Participants were aware of the benefits but were wary of getting overly invested, concerned about taking on additional administrative burdens and cautious about interpreting impacts such as behaviour change. Furthermore, effects are often not observed for many years after a policy is implemented. One study of watershed management interventions suggested major milestones often took around 48 months to achieve (Leach et al., 2002).

In natural resource management, evaluation has been limited due to a lack of measurable goals and an undue focus on monitoring biophysical or economic performance criteria rather than social or political criteria (Bellamy et al., 1999). When it comes to applying complexity theory in evaluations across a range of public policy settings, a multiplicity of definitions, the dominance of existing approaches, perceptions of resources required and the purpose of the evaluation can all form barriers to application (Walton, 2016). Even in academic circles, such as UK universities, which are now required to include impact in Research Excellence Framework reporting, expertise does not equate to the ability to articulate research impact, nor imply that academics are always prepared to approach program evaluation strategically (Wilkinson, 2017).

Barriers such as these can only be overcome by understanding their causes or 'facilitating factors' (Figure 1). These are often out of the hands of conservation practitioners and may be shaped by considerations outside the scope of a particular project. According to research from other (non-conservation related) disciplines , facilitating factors that help promote evaluation can include: ensuring appropriate support, an organisational culture that supports evaluation, and the motivation to be accountable to stakeholders (Bach-Mortensen and Montgomery, 2018). Senior healthcare policy makers reported the following themes as influencing their ability to perform evaluations: political influence, financial resources, timelines, organisational culture around evaluation, cautious attitudes to expected results and the skills of relevant staff (Huckel Schneider et al., 2016).

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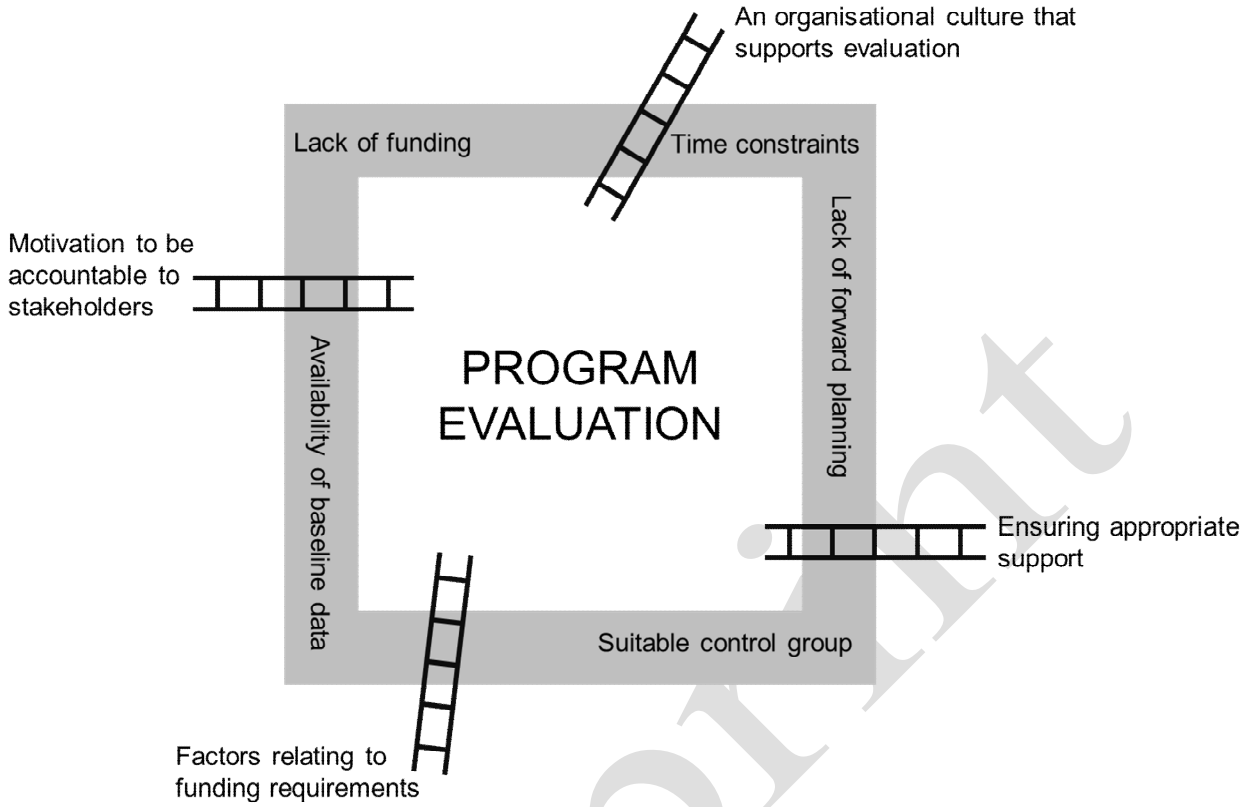

Figure 1: Illustration of the relationship between barriers (shaded box) and facilitating factors (ladders) relating to the conduct of program evaluations (examples drawn from Curzon and Kontoleon (2016) and Huckel Schneider et al. (2016)).

1.2 Aims & research questions

I was interested to explore the primary barriers to the evaluation of systematic conservation plans, and the factors influencing these barriers. I selected two case studies of high-profile natural resource planning processes in Australia that were completed over a decade ago. They represent early applications of systematic conservation planning principles and tools and have influenced conservation activities across Australia and around the world. My primary research questions were:

- What barriers were reported as having limited the evaluation of the planning programs?
- What were the inhibiting factors which created these barriers or the enabling conditions which assisted evaluation efforts?
- How were perceptions of the effectiveness of the conservation plans constructed by different stakeholders (in the absence of program-wide evaluations)?

The intent was not to conduct program evaluations myself, nor to collate all available social and ecological monitoring data as evidence from these case studies. Instead I sought to understand from those most closely involved in decision-making, what evidence they are aware of, and how they justify their perceptions of effectiveness.

1.3 Systematic conservation planning case studies

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In this study I focused on two landmark examples, forest agreements in North East New South Wales and the Great Barrier Reef Marine Park rezoning.

1.3.1 Forest agreements, North East New South Wales

In the 1980s and 1990s, the 'forest wars' were regular front-page news in Australia, with large scale protests in native forests and logging trucks blockading Parliament House (McCulloch, 2005). This precipitated the National Forest Policy Statement (Commonwealth of Australia, 1992) and the requirement for states to sign twenty-year Regional Forest Agreements (RFAs) with the Federal (Commonwealth) Government to protect environmental values and promote ecologically sustainable forest management (Davey et al., 2002; Department of Urban Affairs and Planning, 1999; Lane, 1999; Musselwhite and Herath, 2005; Slee, 2001). Two of the ten national RFAs are the subject of this study: the Upper and Lower North East New South Wales (NSW) RFAs. They stretch between Sydney and the NSW/Queensland border covering an area of almost 100,000 km^2, including the Central Eastern Rainforest World Heritage Area. Leading up to the signing of the combined Upper and Lower NE NSW RFA in 2000 (Commonwealth of Australia and State of New South Wales, 2000) there was a moratorium on native timber logging in 1996. An interim assessment process was conducted (Pressey et al., 2002), which kickstarted the use of the planning software C-Plan to help prioritise habitats for protection (Pressey et al., 2009). This was followed by Comprehensive Forest Agreements in 1999 (Commonwealth of Australia and New South Wales Government, 1999), which provided the scientific basis for, and were overridden by, the RFAs. The result was the reservation of over 7,000 km^2 of forest as National Parks, large areas of which were transferred from management by State Forests to the National Parks and Wildlife Service in NSW (Flint et al., 2004).

I refer to 'NE NSW forest agreements' throughout as collectively referring to the interim, comprehensive and RFA processes for upper and lower NE NSW, unless referring to one planning stage or region specifically.

1.3.2 Representative Areas Program and Structural Adjustment Package, Great Barrier Reef Marine Park

The Representative Areas Program (RAP) was undertaken by the Great Barrier Reef Marine Park Authority (GBRMPA) from 1999 to 2004, to re-zone permitted activities in the Great Barrier Reef Marine Park (GBR or 'reef'). Encompassing an area over 340,000 km^2, the marine park falls under both Queensland and Commonwealth Government jurisdictions and largely overlaps with the Great Barrier Reef World Heritage Area. At the commencement of the program, approximately 4% of the marine park was closed to fishing in no-take marine zones (called 'green zones'). By the time The Great Barrier Reef Marine Park Zoning Plan 2003 (GBRMPA, 2003) was accepted by the Australian Parliament, 33% was in green zones (Day, 2016; Fernandes et al., 2005). The previous zoning was primarily focused on coral reefs (Day, 2016), therefore broader biophysical operational principles were established, including a goal to protect at least 20% of each of 70 bioregions. Expert committees were established, including one to assess the representativeness of the existing and proposed reserve networks (Day et al., 2003; Fernandes et al., 2009), which helped to popularise the software Marxan (Ball and Possingham, 2000). Two rounds of public consultation (in 2002 and 2003) resulted in over 30,000 submissions (Day, 2017; GBRMPA, 2003) and a Structural Adjustment Package (SAP) was established to compensate displaced fishers (Gunn et al., 2010; Macintosh et al., 2010; Olsson et al., 2008).

In this article I will address both the RAP and the SAP, referring to them jointly as the 'GBR rezoning'.

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1.4 Novel approach

Existing literature on the outcomes of systematic conservation plans typically represents the views of planners and scientists only (Giakoumi et al., 2018; McIntosh et al., 2018). This is also true for articles about the case studies in this paper (Day et al., 2003; Fernandes et al., 2005; Pressey et al., 2002). In this study I have attempted to engage a wider range of stakeholders involved with, and affected by, the plans. My interviewees often mentioned that they felt existing narratives around these plans were incomplete, and they were keen to ensure that a broader understanding of events was reported.

2. Material and methods

2.1 Selection of interviewees

Interviewees were purposefully selected to represent views from across the sectors involved in high level negotiations around the planning case studies. They were categorised as: public servants, politicians, environmental and industry representatives and scientific advisors (Table 1). Interviewees were numbered (non-sequentially) and marked with an N or a G to enable tracing of views by sector and case study.

These were broken into two types. The first type of interviewees were referred to as 'stratified interviewees', those with direct involvement in negotiations around the design and approval of the plans (n=22). These interviewees were representative of all the major organisations involved in plan design and negotiations at a senior level in each case study (i.e. at least one interviewee from each government department, lobby group or other relevant organisation involved in the negotiations). They do not include all people involved in either planning instance, who number in the hundreds, but rather, the most senior negotiators and decision-makers from each organisation or sector.

The second type of interviewees are referred to as 'key informant interviewees', who were closely associated with the case studies at a senior level but not involved directly in the negotiations at the time e.g. took on a senior management role immediately after the plans were completed (n=15). Key informant interviewees included evaluators and staff currently in senior management roles within relevant organisations.

Table 1: Breakdown of interviewees by case study and sector.

Sectors represented in interviews	**NE NSW forestry agreements** [1995-2000]	**Great Barrier Reef rezoning** [1999-2004]
Public service (e.g. forestry, national parks, planning departments)	N09; N16; N28; N36; N48; N88	G07; G13; G31; G33; G45; G55; G69
Politics (e.g. environment minister)	N08	G19; G79; G99
Environmental representative (e.g. NGO)	N22; N46; N58; N62	G27
Industry (e.g. forestry, workers union, fisheries, tourism)	N44; N56; N84; N98	G01; G43; G77; G82
Scientific advisory (e.g. academic)	N32; N52; N76	G23; G63; G71; G89

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TOTAL	**18**	**19**

Potential interviewees were initially identified based on publicly available documentation relating to the case studies and organisations involved in negotiations, then via snowball sampling. They were approached by email or phone with an invitation to participate, combined with further information. Response rates to email and phone requests to interview were high (90%), with only four non-replies and no refusals.

2.2 Interview method

Interviews were conducted in person in Brisbane, Sydney and Canberra or by phone during July and August 2016 and lasted from one to four hours. Interviews involved semi-structured questioning and interviewees were asked to reflect on their role during the planning process, how planning unfolded, about any monitoring or evaluations, and whether they thought the planning process had been effective.

2.3 Analysis and interpretation

Subject to interviewee consent, interviews were digitally recorded and transcribed, and organised using the qualitative data analysis software NVivo (QSR International Pty Ltd. Version 11, 2015). Relevant sections of the transcripts were labelled according to key concepts, i.e. to identify data associated with the areas of interest for this study: barriers to evaluation, inhibiting factors or enabling conditions associated with evaluations, and perceptions of effectiveness. A concept refers to a common meaning or characteristic which can be used to group data and reduce the amount of raw data to work with during more detailed analysis (Corbin and Strauss, 2015, p. 220).

Within each conceptual dataset, open coding ("breaking data apart and delineating concepts to stand for interpreted meaning of raw data"; Corbin and Strauss, 2015, p. 239) was used to identify key ideas and themes from the data. These were then grouped according to relatedness, resulting in a smaller set of overarching themes within each conceptual dataset.

Where possible, claims made by interviewees were cross validated by responses from other interviewees and documentary evidence was used to confirm key claims, where indicated in the results.

3. Results

3.1 Barriers to evaluation

In general, interviewees were able to identify more documentary evidence that had been collected in relation to the GBR rezoning than to the forestry agreements in NE NSW. Examples included ecological monitoring (GBRMPA, 2014a), social and economic monitoring (Marshall et al., 2017), and periodic assessments of states and trends (GBRMPA, 2014b). Such information can be correlated with policy changes and can inform targeted evaluations (e.g. interviewees frequently mentioned the GBR Outlook Reports (GBRMPA, 2014a)), however it is not a replacement for program evaluations.

Open coding and the categorisation of interview responses regarding barriers to evaluation led to the identification of three main themes: inadequate monitoring data, limited resources, and inadequate preparation (Figure 2).

3.1.1 Inadequate monitoring data

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The inadequacy or absence of data with which to conduct evaluations was the first barrier identified. A shortage of suitable baseline data was often reported. One former GBRMPA employee [G07] stated, in hindsight, they should have implemented an ecosystem monitoring program prior to the rezoning, to enable tracing of the impacts before and after. This sentiment was echoed by a fishing lobbyist who stated this failure to establish baseline monitoring was "the worst thing they [GBRMPA] did" [G43].

Additionally, a lack of monitoring following plan implementation was often mentioned. Interviewees were generally unable to direct me to specific monitoring results for either environmental impacts or social impacts of the NE NSW forestry agreements. Legislative requirements have meant that some monitoring has occurred in forestry compartments (e.g. pre-logging surveys) but to a lesser degree within the protected areas managed by the National Parks and Wildife Service [N56]. A view shared by environmental and forestry representatives as well as former public servants, was the lack of a concerted effort or interest by the relevant government agencies to conduct the necessary monitoring. An assumption that protection automatically equates to improved condition was widespread at the time and continues today despite ongoing problems with invasive species and other threats in national parks [N76, N56]. One scientist argued that 'net conservation impact' should be based on whether the condition of habitats and species across both protected and unprotected areas increased or decreased relative to what would have otherwise occurred [N52]. To interpret net conservation impact would require use of counterfactual analyses and would be extremely challenging to undertake, but this comment represents the kind of thinking that is necessary.

Poor data management [N09] and a lack of compliance confounded attempts to establish impacts (via counterfactual analyses). In NSW, compliance issues related to a lack of political will for enforcement of forestry prescriptions, and the complication of 'one arm of government taking another arm of government to court', resulting in a situation where, "our regulator is missing-in-action." [N22]. In the GBR, poor compliance, primarily related to illegal fishing (both within and outside no-take zones), made it difficult to accurately compare the effects of no-take zones [G55, G63] (Williamson et al., 2014). External factors such as climate change and crown of thorn outbreaks further complicated attempts to attribute the impacts of the rezoning (De'ath et al., 2012).

3.1.2 Limited resources

A lack of resources, including time, money and motivation to undertake monitoring or evaluation exercises was also frequently raised. Underresourcing of relevant agencies was reported in NSW [N22, N62] and in the GBR [G07]. In both cases, departmental restructuring occurred shortly after the plans were completed e.g. following the Review of the Great Barrier Reef Marine Park Act (Commonwealth of Australia, 2006). A lack of budgetary transparency and commitments to monitoring was also raised in a recent review of the NSW RFAs (Waller, 2018).

In both contexts, staff exhaustion and limited capacity to adequately plan for monitoring was cited as part of the reason post-implementation monitoring activities were not undertaken. Staff did not have the energy to consider what happened 'post-plan' [G13]. The personal cost of investing heavily in the lead up to the plan being accepted meant that once it was completed, staff were ready to return to their families and to step back from the intensity of the previous months.

3.1.3 Inadequate preparation

The third main barrier identified was inadequate preparation and planning for monitoring or evaluation (including the collection of baseline and post-implementation measurements).

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Scientists and planners commented that there had been no 'succession plan' or preparation for monitoring after the plans were developed, as the exercise was seen as a one-off activity. Evaluation and reporting were not a priority at the time, "…it was just straight on to the next big challenge…" [N52]. In addition, it was not clear whose responsibility it would be to undertake monitoring [G07].

Senior management at GBRMPA had planned to author an account of the rezoning process, to ensure it was accessible to audiences outside of the scientific literature. Funds had been allocated for this and technical write ups did occur (e.g. GBRMPA, 2003), but not to the extent initially intended [G07, G89]. Had this been a higher priority at an earlier stage of planning, it would have been more likely to occur.

3.2 Inhibiting factors and enabling conditions

Barriers to evaluation do not arise in isolation. I also asked interviewees to discuss the inhibiting factors which prevented evaluation and the enabling conditions (opportunities) which facilitated evaluation in other circumstances. Inhibitory factors included: the need for political expediency and a loss of momentum post-plan. Enabling conditions included: value tied to monitoring and the capacity to undertake it, as well as the presence of strong leadership (Figure 2).

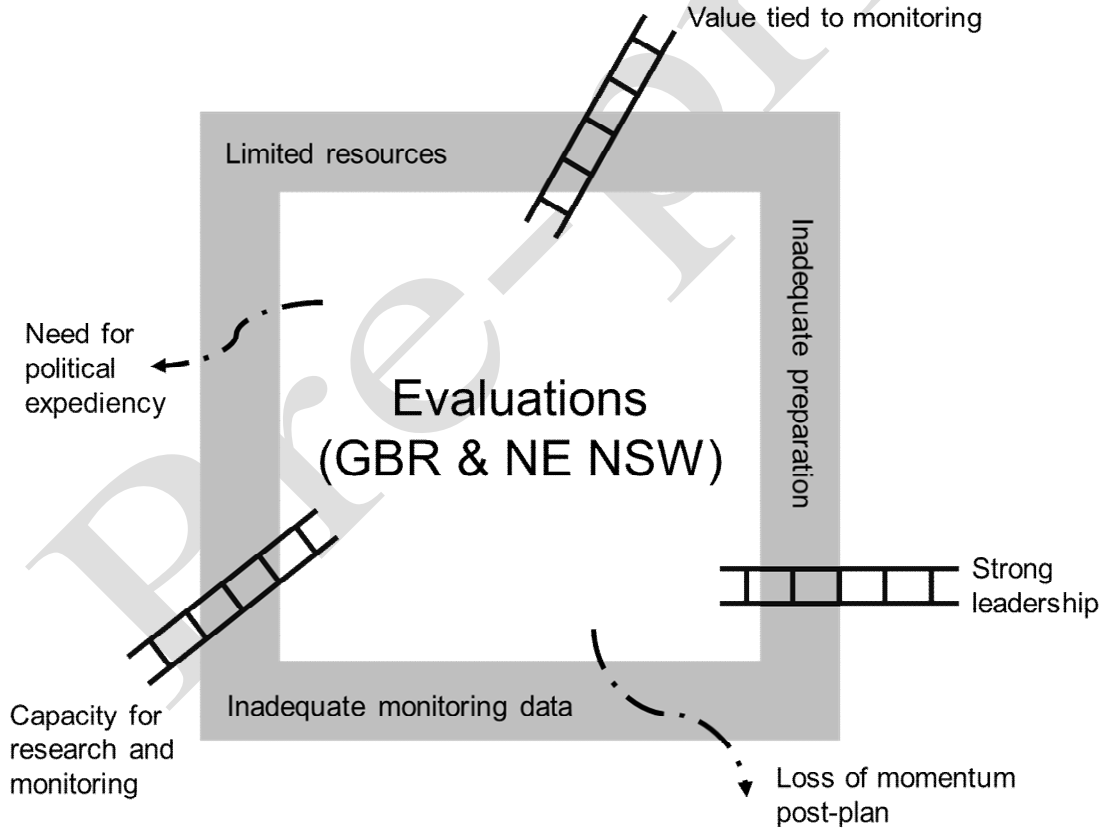

Figure 2: Primary barriers (shaded box), inhibiting factors (snakes/dashed arrows) and enabling conditions (ladders) relating to the conduct of evaluations in the GBR rezoning and NE NSW forest agreements case studies (for comparison with Figure 1).

3.2.1 Political expediency

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The need to seize a window of political opportunity demanded that planning personnel focus on immediate tasks to get plans approved, rather than on laying the foundations for implementation and future monitoring and evaluation. For example, after receiving 21,000 submissions in the second public consultation phase around the GBR RAP, a revised version of the plan had to be presented to parliament in less than four months. This involved a Herculean effort from GBRMPA staff to process an unprecedented number of submissions and revisions, yet the timing was absolutely key, "the reality is if we missed that window, the whole planned could've been thrown out ahead of the elections coming up" [G13].

However, establishing protected areas can be seen as 'one-off' investments, making going back to Cabinet to ask for more money for management very difficult [N08]. Five-yearly reviews of the RFAs were required, but they were not conducted as frequently as intended (twice between 1999 and 2016 (Spencer, 2009; Waller, 2018)) and were considered box ticking exercises [N22]. Accusations that the state government had no interest in transparency were common amongst environmentalists [e.g. N62] and scientists [e.g. N76] but also former senior staff in forestry [e.g. N16].

3.2.2 Loss of momentum

Another less obvious inhibiting factor was a loss of momentum to prepare for evaluation after the planning processes were concluded. A practical challenge included that staff moved on, prohibiting follow through. In NSW many of the staff working in the National Parks and Wildlife Service 'drifted off' [N09] and the corporate knowledge and centralised records were lost [N88]. GBRMPA had not been given additional resources to undertake the rezoning and had relied on internal restructuring of resources and staff time. This meant that after the rezoning, staff resumed their primary roles.

Political attention also moved on quickly after plans were completed. There was a federal election months after the GBR RAP took effect in 2004, and the attention of key players in GBRMPA was directed towards a review of the GBRMP Act (Commonwealth of Australia, 2006), which led to changes in the authority's independence (Morrison, 2017). In NSW the forestry agreements were finalised shortly before the Sydney Olympics commenced in 2000 and "all the money for doing anything around this just disappeared..." [N09]. An environmental NGO representative explained it in terms of a finite amount of political capital, which can only be directed towards crises and dissipates once a crisis has been averted [N58].

3.2.3 Value tied to monitoring

The principal enabling condition associated with successful monitoring and evaluation efforts was value tied to monitoring. For example, a desire to improve for future processes was cited as a motivation for a review of the Structural Adjustment Package (SAP) in the GBR [G63]. Many interviewees with a scientific background saw the value of monitoring, and senior managers in GBRMPA emphasised that the declaration of a conservation plan is not the end, "but really also the start of a whole new process of management" [G07]. Where monitoring was considered a lower priority by those responsible for allocating budgets in the relevant agencies, it appeared to be less common. The perception that the five-yearly reviews of the NE NSW RFA was not taken seriously further emphasised this impression [N16, N46].

3.2.4 Capacity for research and monitoring

The second enabling condition was capacity of the management agency and related organisations to undertake ecological or social research which could subsequently support evaluations. Research agencies associated with the reef, such as the Australian Institute of

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Marine Science and research groups at James Cook University and elsewhere have meant significant research capacity in the region. Many interviewees [e.g. G63, G89] readily pointed to examples of ecological studies on the effects of marine reserves within the Great Barrier Reef (e.g. McCook et al., 2010; Russ et al., 2008).

Such capacity has been largely absent in relation to the NE NSW forestry agreements, where basic monitoring was under-resourced, let alone investigative research programs. One interviewee [N56] commented that the capacity of the National Parks and Wildlife Service to adequately manage the expanded estate was not discussed at the time. Even prior to the signing of the RFA, an independent expert working group had concluded that mechanisms for the effective management of the proposed reserved and forestry areas were not well developed (Raison et al., 1998).

3.2.5 Leadership

The presence or absence of strong leadership was key as to whether monitoring and reporting took place. Interestingly, in each case study a single individual emerged as the primary leader or champion, whose efforts, passion and skill influenced the planning process more than anyone else (for example, all NSW interviewees mentioned the influence of one environmental representative). A lack of leadership and responsibility with regards to monitoring and evaluation was reported amongst Ministers and the NSW National Parks and Wildlife Service. Despite many submissions and requests for action, leaders were seen to "nod their heads and go 'Mmm' and nothing happens" [N22].

3.3 Perceptions of effectiveness

To ascertain interviewees' opinions about the planning processes, they were asked 'was the planning process effective?'. The majority of respondents replied that the scientific and consultative aspects of both planning processes were largely effective, but that the handling of associated industry restructuring and compensation was not. Open coding of responses identified four key themes in interviewees' perceptions of effectiveness, relating to: 1) whether the planning process followed best available evidence and procedures, 2) the fact a planning result was agreed upon and implemented, 3) the longer-term influence of the plan, and 4) the consequences of industry restructuring. Note, respondents often used the terms 'effective' and 'success' interchangeably.

3.3.1 NE NSW forestry agreements

One respondent commented that both 'extremes' (referring to the conservation and forestry lobbyists) would report the forestry agreements as a failure because neither got everything they wanted. However, responses from interviewees were nuanced, with shared interpretations of the earlier interim forest agreements as having been more effective than the later RFA negotiations, where federal and state politics dominated [N16].

A key factor associated with perceptions of effectiveness was efforts to follow best available evidence and procedures, presumably on the assumption that good quality information and consultation processes lead to better outcomes. Referring to the interim forest agreements, a policy maker reported that they had never experienced a process before where data and the 'best ideas and tools' were so central [N28]. Clear 'rules of engagement' during the negotiations were valued by interviewees from all sectors. By the time the formal negotiations started, everyone had signed off on what data and tools (e.g. C-Plan and the Forest Resource and Management Evaluation System (FRAMES) (Forestry Corporation of NSW, 2016)) would be used, so discussions focused on how to act based on the available information [N09].

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The intersection of rigorous science and strategic politics was also associated with good practice. One politically affiliated interviewee emphasised how politically resource intensive such policy debates are, and that they only work if you have a necessary level of commitment [N08]. However, environmental and forestry lobbyists alike felt that corruption of the political process towards the finalisation of the RFA rendered the investment of millions of dollars improving the underlying data meaningless [N46].

The fact a planning result was agreed upon and implemented was also a benchmark used to report effectiveness [N84, N44]. One interviewee stated that their measure for success was the fact people were chaining themselves to trees before the forestry agreements but were not afterwards [N36]. Those closest to Premier Carr's election commitment to expand national parks reported his leadership to have been key, whilst another less satisfied with the RFA outcome reported that Carr and others lacked the political resolve to see it through adequately at the final stages [N28].

The longer-term influence of the plan was the most frequently cited dimension of the perceived effectiveness of the forestry agreements. For some, the fact the plans remained in place influenced their definitions of success, "we always said if the reserves lasted 10 years, we'd be happy" [N28]. However, interviewees were often not able to report whether the net outcome for biodiversity had been positive because of a lack of monitoring, limited management of threats in the national parks and concerns over compliance breaches with forestry operations. One interviewee noted that only a third of the area added to the reserve network would have been suitable for logging anyway (i.e. two thirds had not been at risk) [N09].

The consequences of industry restructuring raised most comments about ineffectiveness. For example: "If they hadn't caved to the industry at the end, (they were so close!)… it could have been a really historic agreement otherwise" [N28]. Interviewees from all sectors mentioned that native forestry timber yields from State Forests had been overestimated during the planning process, locking State Forests into contracts they could not meet (and later had to pay out (Goodwin, 2014), 'selling the forest twice' [N56]). This was perceived as having led to significant mismanagement and over extraction from remaining forestry compartments in later years, which has made the industry unsustainable [N46] and represents a "callous disregard for the core principles of forestry" [N76]. Some went so far as to suggest there should be an admission that the RFA process failed and destroyed the future of the native timber industry [N84].

3.3.2 Great Barrier Reef rezoning

Similar themes emerged in terms of perceptions of the effectiveness of the GBR rezoning. The intersection of high-quality scientific advice with political leadership was key, for example,

> "If you had the political without the scientific underpinning it, it would have been shit, and if you had a scientific underpinning without political process it would have never gotten anywhere, so it would have meant nothing. So, they are both equally important." [G69]

Strong leadership was particularly attributed to the then CEO of GBRMPA, the late Virginia Chadwick. Her political skills (as a former state government minister) were regularly cited as having shaped the course of the planning process because "she set the tone for actually talking with these people, not at them" and "everybody suddenly start[ed] to walk in tune" [G01]. This element of effectiveness is rarely reported in scientific documentation (with the exception of Turner et al. (2016)), but as another interviewee observed "…there's a whole lot

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of stuff behind the scenes, where you're basically advocating politically with key decision-makers…" [G07].

GBRMPA's work to ensure widespread engagement across stakeholder groups and the broader Australian public also contributed to perceptions relating to the rigour and quality of the planning process. The Australian public is deeply invested in the GBR and "everybody has an opinion about it" [G01] so "at the end of the day it's the people who decide" [G07].

Interviewees rarely referred directly to the degree to which the original plans were implemented ('implementation monitoring'), although this was indirectly addressed in relation to the adequacy of intended monitoring activities. The fact the RAP was ultimately signed off by the Australian parliament and implemented was also commonly linked with perceptions of effectiveness and perceived as a relevant outcome for reporting purposes. One politician made it clear that this was their primary performance measure:

> "Yes. It is effective because it got the outcome [parliamentary approval]."
>
> Interviewer asked, "Is that the sole determinant?"
>
> "What other determinate is there of effectiveness?" [G79]

As with the forestry agreements, the longer-term influence of the GBR rezoning was commonly cited in relation to perceptions of effectiveness. Interviewees often reported that the reef's health and resilience has improved, or at least been maintained relative to inaction, "Had we not done this, we would be in a far worse place. There's no doubt about that." [G01].

However, the longer-term influence of the Structural Adjustment Package (SAP) for displaced fishers was perceived by some as having "killed the future agenda" because the Environment Minister "opened the chequebook" [G31]. Many interviewees expressed strong opinions that the effectiveness of the Representative Areas Program (RAP), which was implemented independently of discussions about compensation, should be considered as separate from the SAP. However, frustration with the latter was regularly raised [e.g. G63, G71, G79, G89]. Approximately AUD $250 million was spent, twenty times that initially predicted and budgeted for, in part due to a looming election and the influence of marginal electorates along the GBR (Macintosh et al., 2010). This money was also seen as having had little impact on the overall amount of fishing in the GBR, given that small boat registrations continued unabated [G89] and commercial fishermen often shifted their fishing grounds elsewhere [G63].

Those who saw the RAP itself as ineffective largely did so because of a sense of inequality about who bore the burden of the decisions. Many are still angry at the way the commercial fishing industry was treated, with livelihoods lost and fishers ultimately excluded from many parts of the GBR [G99]. Recreational fishers were believed to have been listened to more than commercial fishers when they requested their preferred fishing grounds be excluded from the new no-take zones [G77].

4. Discussion

Senior decision-makers involved in the NE NSW forestry agreements and the GBR rezoning displayed a strong investment in the outcomes of the plans they painstakingly developed. Most interviewees viewed the planning and execution of these programs, as a source of great pride. However, for many, this was the first time they had been formally asked to speak about the effectiveness of the planning processes. Whilst they were generally very willing to recount their personal contributions, it was not uncommon for an interview to commence

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with a reminder that the version of events reported in the existing literature bore little resemblance to their experiences. This underscores the value of case study research and in-depth interviews, particularly in capturing a range of interpretations and perspectives around conservation planning exercises (Giakoumi et al., 2018).

4.1 Barriers to evaluation can be overcome

The primary barriers to evaluation identified in these case studies: a lack of suitable monitoring data, resource limitations and inadequate preparation (Figure 2), broadly matched those logistical considerations found in an earlier study involving conservation policy experts (Curzon and Kontoleon, 2016) (Figure 1). However, none of my interviewees referred to the lack of a suitable control group as a barrier. This was perhaps because of a reduced emphasis on methodology in my questions and in the evaluation expertise of selected interviewees. These barriers confirm that the principal issues are not simply a lack of knowledge or inclination to conduct evaluations amongst conservation professionals. Counterfactual analyses are extremely challenging to conduct in practice and require those involved to place a value on monitoring as well as on research.

The barriers reported here are also not unique to conservation and reflect those common in healthcare (Bach-Mortensen and Montgomery, 2018), community energy projects (Hobson et al., 2016), natural resource management (Bellamy et al., 1999) and academia (Wilkinson, 2017). However, a key difference in my respondents' comments was that they rarely mentioned the difficulty of designing program evaluations as a reason not to have attempted them. This may be because I interviewed senior decision-makers who would have been contracting out evaluations to others, as in the case of the review of the SAP (Gunn et al., 2010).

The real value of these comparisons lies in improving our understanding of the inhibitory factors preventing evaluation, such as the need for political expediency and a loss of momentum post-plan, as well as the enabling conditions/opportunities for evaluation, namely the value tied to monitoring, relative capacity to undertake research, and securing the necessary leadership (Figure 2). Similar factors have been reported in other policy sectors in Australia e.g. healthcare (Huckel Schneider et al., 2016), but also in vastly different governance contexts such as conservation programs in Samoa (Bottrill et al., 2011).

A key difference in the facilitating factors associated with conservation planning rather than other disciplines, is the significance of loss of momentum post-plan and drifting of political priorities. The time required to complete, implement and then measure the effects of a plan, can require decades, well beyond the terms of office of key decision-makers. In sectors with more structured and centralised monitoring and reporting standards e.g. healthcare (Craig et al., 2008; Moore et al., 2015), this may be less likely to influence commitments to evaluation. As the conservation policy sector matures, it is hoped that will become less of a risk, and independent standards of best practice are increasingly being adopted across the sector (e.g. Conservation Measures Partnership, 2013; Marine Conservation Institute, 2018).

The fact that monitoring exercises were reported as having taken place in the GBR more often than in NE NSW may be due to greater public and international pressure, a stronger mandate within GBRMPA (than in NSW government departments) and the involvement of diverse reef user groups (e.g. tourism representatives were not mentioned amongst influential stakeholders in NE NSW) (Marshall et al., 2018). Differences in staffing, budgets and overall capacity may also be relevant, and have been shown to be the strongest predictors of conservation impact (Gill et al., 2017). Without sufficient access to suitable data to undertake evaluations, and without careful design and preparation to ensure reporting of program

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outcomes, basic evaluations are unlikely, let alone high-quality evaluations involving counterfactual analyses.

4.2 Perceptions of effectiveness vary by stakeholder group

In both the NE NSW forestry agreements and GBR rezoning, most interviewees responded that the planning process and use of systematic conservation planning tools had largely been effective, but that the management of industry compensation had not been. Some chose to treat the two as distinct when it came to evaluating results and assessing contributions to later planning processes, however, others saw them as inseparable (more often those who were not responsible for the scientific aspects of planning, or who were impacted by the mishandling of compensation).

Perceptions of success and failure of conservation planning have been predominantly linked to contextual factors such as governance and socio-economic characteristics (e.g. degree of stakeholder support and overall cost of implementation), rather than elements of protected area design (Giakoumi et al., 2018; Janßen et al., 2019). In the case of the GBR RAP, the responses I received broadly matched the two primary views reported in the Review of the Great Barrier Reef Marine Park Act (particularly findings 20 and 21) (Commonwealth of Australia, 2006, p. 166), that the RAP was a) a "significant conservation achievement" according to stakeholders associated with tourism, science, conservation, shipping and some community groups, or b) a dissatisfying process, in which "the Authority [GBRMPA] was biased against them", a view reported by stakeholders from recreational and commercial fishing and associated industries.

It is no surprise that there is a link between the nature of experienced outcomes and stakeholder perceptions of effectiveness (Gurney et al., 2015; McNeill et al., 2018). Surveys have confirmed the low levels of trust commercial fishers continue to have for GBRMPA (Mackeracher et al., 2018; Turner et al., 2016), and the importance of values in shaping recreational fishers' attitudes to the rezoning (Sutton and Tobin, 2009). Closely connected is the finding that stakeholder engagement is amongst the most important factors associated with marine protected area success (Giakoumi et al., 2018). This view was shared by my interviewees, and stakeholder engagement was closely associated with perceptions about the quality and trustworthiness of the planning processes.

Seizing windows of political opportunity to enact the conservation plans was highly significant in the GBR and NSW, as in other conservation planning case studies (Pressey et al., 2013; Radeloff et al., 2013). Implementation was often reported by my interviewees alongside claims of effectiveness, however, the fact a plan was agreed on does not guarantee conservation impact. As was demonstrated in the case of NSW national parks, assumptions that protection equates to improved conditions for species and ecosystems, can be dangerous (Kapos et al., 2009; Pressey et al., 2015).

An alternative approach would be to define success in relation to initial program objectives, but this was uncommon amongst my interviewees, who were often thinking much more broadly about the consequences of the policies. While valuable for some stakeholders, limiting interpretations of effectiveness to such technical definitions or perspectives would be unsuitable for others (Axford et al., 2008). It may be that even where the impact of a conservation intervention is difficult to demonstrate, there is a motivation to report impact based on actions taken. This could be subconscious, or a deliberate decision by lobby groups or organisations who feel the need to report success to their members or funders regardless of the quality of the plan (Pressey et al., 2017).

4.3 Opportunities to facilitate future evaluations

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625 The value of learning from the orchestrators of major policies cannot be understated (Selwyn,
626 2013) and a shift in incentives to promote the sharing of information about how plans are
627 developed and implemented is much needed. Efforts to rectify this information gap are
628 encouraging (e.g. Day, 2016, 2017) as some of my interviewees felt the lessons from these
629 planning processes have been underutilised. However, greater support needs to be provided
630 by the organisations responsible for developing plans. Academic partnerships can also help to
631 ensure write ups of how plans are conducted, closer to the point of implementation (e.g.
632 Jumin et al., 2018). Systems for reporting among donors and proponents also help to shape
633 the likelihood and nature of evaluations (Bottrill et al., 2011; Wilkinson, 2017).

634 Given the range of audiences and interested parties involved in spatial planning, these stories
635 should not be restricted to academic audiences either. This means extending funding and
636 personnel contracts after the conclusion of a project and encouraging presentations of
637 findings to a range of stakeholder groups, not just other scientists. As one interviewee
638 emphasised, most people will never read academic publications.

639 To promote the conduct of rigorous program evaluations, it may also help to
640 compartmentalise evaluations to focus on particular aspects of a planning process, for
641 example assessing why the SAP compensation dramatically exceeded expectations (Gunn et
642 al., 2010). Promoting a relationship between evaluators and conservation scientists (much
643 like that between medical researchers & clinicians) and reducing incentives to exaggerate
644 claims of effectiveness could also help to improve the evaluation of conservation plans
645 (Baylis et al., 2016). When it comes to reporting impact in relation to academic exercises, a
646 large majority of respondents in a recent study suggested that a focus on impact needs to be
647 embedded early on in a project (Wilkinson, 2017), and arguably so should any attempts to
648 undertake counterfactual analyses e.g. two neighbouring regions which follow different
649 planning approaches. Other supportive factor include an understanding that research impact is
650 on an organisation's agenda, and an improved understanding of what research impact means
651 (Wilkinson, 2017).

652 Based on lessons from other disciplines and related studies, when promoting future
653 evaluations, government departments will want to consider the implications of high staff
654 turnover, cumbersome approval processes, existing evaluation standards, as well as the role
655 of leadership and 'champions' (Bottrill et al., 2011; Huckel Schneider et al., 2016).
656 Conservation champions played a prominent role in both case studies, where one person was
657 consistently mentioned more than any other, based on their personal qualities, not necessarily
658 seniority (Giakoumi et al., 2018).

659 **4.4 Sharing lessons learnt**

660 Documenting case studies like these helps to expose the range of perspectives on the success
661 or failure of conservation planning initiatives and how to overcome barriers to the reporting
662 of these outcomes. However, these case studies are not just history, they directly influence
663 conservation policy today. The 'forest wars' over management of the native timber industry
664 (Lane, 1999) are back in Australia (Borschmann, 2018), along with a decision to renew the
665 RFAs indefinitely beyond their original twenty-year lifetime without having assessed their
666 effectiveness (NSW Government, 2018). Marine protection also remains highly contentious
667 in Australia (Phillips, 2017) and those who were involved with or affected by past planning
668 decisions are often still highly influential.

669 A surprising observation was how frustrated interviewees were that important lessons had not
670 been learnt. In a recent Senate debate on the future of the RFAs and the native forestry
671 industry in Australia, Liberal senator Anne Ruston, Assistant Minister for Agriculture and

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Water Resources claimed we have 'learnt a lot in the last 20 years' yet accused "an industry of scientists who have made a fortune trying to come up with inconveniently ill-informed and unfactually based misinformation because it suits their purposes" (Commonwealth of Australia, 2018, p 644). This devaluing of science appears to be on the rise in Australia (Lindenmayer, 2017) and worldwide (Lubchenco, 2017), threatening our ability to manage our resources effectively and efficiently.

When undertaking planning it is essential to remember the unique context of each plan (Adams et al., 2018) and it would be inappropriate to directly transpose the conclusions presented here directly onto other contexts. The scale, level of conflict between resource users, degree of political capital invested, availability of planning expertise and quality of underlying biological data makes these plans stand out. However, the majority of systematic conservation plans have been undertaken in similar, developed world contexts to date, in the USA, South Africa and Australia (Álvarez-Romero et al., 2018; Kukkala and Moilanen, 2013; Sinclair et al., 2018), so general lessons are likely to be of value.

4.5 Conclusions

Spatial planning and natural resource management decisions are contentious for good reasons. They shape the economic, social and environmental prospects of regions for decades or more, and inevitably involve value-laden decision-making which results in winners and losers. For these and many other reasons, sharing lessons learnt is essential and can help to optimise future decision-making (Pendleton et al., 2018). Breaking down barriers to evaluation and knowledge sharing is an important first step.

4.6 Declaration of interest

The author has no competing interests to declare.

4.7 Supplementary materials

Supplementary materials include example questions used in the semi-structured interviews and further information about case study selection and interviewer positionality.

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Supplementary materials

Semi-structured interviews: example questions

Interviewee background details

- Role(s) during the case study conservation planning process and timing/duration of each role
- Current associations with the case study or key individuals involved in the case study
- Involvement in any other conservation planning activities at any time

Reflections on the planning process

- How the planning process unfolded.
- Would there have been anything you would have done differently or would do differently in terms of the process followed?
- The tool (e.g. Marxan, C-Plan) was used during the planning process, what was your involvement with this aspect of the planning process?
- What personalities were involved in the development of the plan?
- What other local concerns were present at that time?
- Do you have an idea of the approximate cost of the planning process?
- Since the plan was completed, do you think it has had any impacts on other conservation plans? If so which, and why?

Outcomes

Interviewees were invited to discuss the outcomes they perceived to have arisen from the planning process according to a framework which breaks down natural, social, financial, human and institutional capital outcomes into a series of subcategories (Bottrill et al., 2012). The results of the questionnaire and associated interview discussions have not been included here and will be published separately.

Evaluations

- Would you describe the planning process as having been effective? Why/why not?
- How do you predict the outcomes may have been different in the absence of the plan?
- Are you aware of any evaluations having been conducted in relation to this planning process or its subsequent outcomes (informal or formal)?
- Why do you think monitoring/evaluations were not undertaken?

Closing remarks

- In light of our discussion, is there anything you would change or add to your responses?
- Do you have any recommendations for other people I should contact?

Case study selection

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The promotion of science-informed natural resource planning approaches in Australia in the 1990s and 2000s included aspirations towards a 'comprehensive, adequate and representative (CAR) system of reserves' (Commonwealth of Australia, 1999). This, and advancements in computational tools, led to the adoption of systematic conservation planning approaches by several government agencies.

In this study I focus on two landmark examples, forest agreements in North East New South Wales, which kickstarted the use of the planning software C-Plan (Pressey et al., 2009), and the Representative Areas Program (RAP) in the Great Barrier Reef Marine Park, which popularised the software Marxan (Ball and Possingham, 2000). My intention was not to directly compare the case studies, but to showcase them as informative examples which have been in place for long enough to potentially have had meaningful evaluation of their outcomes. The availability of literature and documentation (including assessments of aspects of each planning process (Fernandes et al., 2005; Flint et al., 2004; Gunn et al., 2010; Macintosh et al., 2010; Pressey et al., 2002), as well as accessibility of key participants, were important considerations in case study selection.

Additional detail regarding the interview methods

Interviewer positionality

The structure of this study and choice to undertake key informant interviews reflects my personal interest in how conservation policies are shaped by influential stakeholders and the relative role of scientific advice and knowledge during this process. An underlying assumption was that non-scientific stakeholders would have access to different information and perceive the role of scientific inputs as less influential. I have experience working in environmental policy and conservation practice in Australia and have contacts who provided initial introductions in relation to both case studies.

The people who chose to speak with me and the information they shared is likely to reflect the fact I was independent of any Australian institution at the time and approached my interviewees as a young researcher from a respected university, keen and eager to learn. The fact I am Australian, with familiarity with the case study contexts and management challenges and that I was often introduced to my interviewees by an existing contact of theirs, added to the potential openness of responses. In addition, many interviewees had a personal interest in sharing their story given the significant role these events played in their lives.

Challenges and opportunities with retrospective interviews

In both case studies there were a small number of relevant individuals I was unable to interview, either because I could not locate current contact details, they did not reply to my invitations to interview or they had passed away since the planning process. There are many others with a great deal of knowledge and expertise about these case studies, however the objective here was to present the views of senior decision makers at the time. Requesting my interviewees to reflect on events a decade or more ago made the interviews highly susceptible to bias (Selwyn, 2013), therefore document analysis was undertaken to verify key claims and to clarify timelines and procedural information.

Another dimension that was an important consideration during interviews and in my subsequent interpretation of interviewee responses, was what interviewees have gone on to do since the planning process. Some had moved between related sectors (e.g. out of the public service, into environmental activism or into politics), others were still in similar roles in the same organisations, and others having retired or left related sectors altogether. Their degree of involvement with conservation planning programs and management challenges

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since clearly shaped responses, and the state of the Great Barrier Reef and NSW forests was also at the front of many minds.

My interviewees had difficulty naming specific Queensland Government and Federal Government staff they remembered having been involved, and suggested representatives of Indigenous Australians did not play a major role in high level negotiations. Given my focus on key influencers, those who had prominent roles were more likely to have been recommended and interviewed based on snowball sampling, although I attempted to follow up where other participants had been listed in procedural documentation. Furthermore, those who were still in an ongoing role linked to the case study in question were less candid than those who were retired or independent. All seemed very keen to establish and share their personal legacies, reflecting both the significance of events to their careers, and the tendency towards assertiveness in Australian culture.

Another dimension to conducting retrospective interviews is the influence of hindsight and group-think to arise as people discuss their interpretations of events, especially within any one organisation or sector. One evaluator I interviewed reported this had been true even five years after plan completion. In my analysis I was very conscious to avoid over emphasising any one view point and attempted to reach a wide range of interviewees rather than many from one sector (even though they may have been more easily accessible).

This study was focused on senior decision makers on the assumption they would have the greatest awareness of the factors which shaped the eventual form of the plans and be heavily invested in the consequences of the plans. They were often in positions of responsibility for commissioning or requesting monitoring (rather than undertaking it themselves) so were deemed to have valuable insights into the factors which facilitate or hinder evaluation. Hence the material presented here will not have mentioned all related monitoring exercises, nor will it reflect the perceptions of effectiveness held by members of the general public or other reef or forest users.

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