

Title: Evaluating our coastal plans and policies: what's in a framework?

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Abstract: *Over the past two decades, many state and local governments across Australia have developed coastal policies and plans of management to guide protection and use of coastal areas and resources. Nationally, these documents have sought to introduce principles of ecologically sustainable development to the way we manage our coasts – that is, a balance for ecological, social and economic outcomes.*

After several years of implementation, many of these plans are to be reviewed. Despite evaluation being an accepted part of the planning cycle (plan – do – monitor – review), many of the policies were developed without clarity around the evaluation step. From an evaluation perspective, it is early days and a comprehensive and broadly accepted framework does not currently exist. In many cases, the history of the development of these plans and policies and the paucity of relevant monitoring data present challenges for those who will need to undertake these evaluations.

Much work on monitoring, evaluation and improvement has been undertaken recently in the allied fields of natural resource management, reef protection and fisheries management. Key elements from these approaches could form the foundations of a much needed evaluation framework for coastal policies and programs. This paper proposes some of the elements that should be included, such as a clear cause and effect hierarchy, setting of intermediate and long-term targets and making uncertainty around our current knowledge explicit in each of these.

This paper discusses the nature of these challenges with a focus on the Queensland context and argues that to address them, we require an evaluative framework and capacity tailored for the coastal management discipline.

This approach, developed for the Queensland context, has potential for wider application in coastal management planning and evaluation.

Acronyms

AFMA	Australian Fisheries Management Authority
GBRMPA	Great Barrier Reef Marine Park Authority
GESAMP	Group of Experts on the Scientific Aspects of Marine Protection
ICM	integrated coastal management
IUCN	International Union for Conservation of Nature
MERI	monitoring, evaluation, reporting and improvement
MSE	management strategy evaluation
NLWRA	National Land and Water Resources Audit
NHT	Natural Heritage Trust

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Background

In the 15 plus years since the Coastal Zone Inquiry (Resource Assessment Commission 1993), many are questioning how far, and if, we have progressed in delivering outcomes for coastal management. Despite new legislation, plans and policies and advisory structures, the question remains as to whether we have moved forward from the point of knowledge in the early 1990s about the pressures and potential threats facing the coast and the capacity of institutions to support dedicated coastal management programs. In the late 1990s, there was a high level of optimism and enthusiasm as a result of the many enhanced or new coastal initiatives and a general feeling that progress was being made. However, that optimism does not appear to have been sustained.

Dr Allan Dale, in his keynote address at the 2007 Queensland Coastal Conference and Professor Bruce Thom, in his submission to the Inquiry into Climate Change and the Environmental Impacts on Coastal Communities (2008) reinforced this view regarding the lack of progress in several critical areas.

Many in Queensland would agree that the potential of the coastal legislation including the preparation of a state-wide and regional coastal plans and the leadership role of the Coastal Protection Advisory Council has not been realised, and the coastal initiatives that supported local government and community groups in the first phase of the Natural Heritage Trust (NHT) have lost momentum under the delayed start-up and somewhat terrestrial focus of NHT2 and now, Caring for our Country program.

One of the important areas of potential that has not moved forward is the critical analysis of outcomes from programs and activities to ensure systemic improvements in coastal management practice – that is, the skills and capacities, and organisational systems and processes across all three levels of government and with industry and the community that underpin our ability to continue to improve our management of the coast. This featured in Queensland's coastal legislation under the banner of improving knowledge. However, as early as 1996, GESAMP (the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection) identified this need for an accepted approach for monitoring and evaluation in integrated coastal management as a priority 'emerging issue' (Olsen *et al.* 1997).

Clarke (2005), in the first comprehensive study of the activities and achievements of Coastcare, Australia's community-based stewardship program reported on the lack of critical analysis of the program's effectiveness and the implications for taking that knowledge forward into subsequent programs such as Envirofund. Prior to Clarke's work in Australia, several authors reported on the lack of evaluation of outcomes from integrated coastal management (ICM) programs on the world stage (e.g. Sorensen 1997, Cicin-Sain and Knecht 1998).

In Australia, a number of jurisdictions have developed coastal plans and policies (e.g. Tasmania 1996, New South Wales 1997, Queensland 2001 and Victoria 2008) and planning and administrative reviews of coastal zone management systems have been undertaken in several states (e.g. Victoria and Queensland).

While the outcomes and process of these reviews are often documented e.g. the Oceans Policy review (TFG 2002, Vince 2008a, Vince 2008b), the frameworks and approaches central to the evaluations are often not well recorded or reported in the literature.

Some work on the topic of monitoring and evaluation frameworks for the coastal context is evident in the international literature. Several key authors have discussed the need for a consistent approach (e.g. Olsen *et al.* 1997) and investigated frameworks and indicators for assessing progress (e.g. Butterworth and Punt 1999, Bowen and Riley 2003, Olsen 2003). A broader dialogue regarding the need for sound adaptive management frameworks including monitoring and evaluation has occurred in the context of other objectives e.g. conservation outcomes (Salafsky *et al.* 2001, Salafsky and Margoluis 2003) and natural resource management (Leach *et al.* 2006). However, a comprehensive discussion regarding monitoring and evaluation frameworks for coastal management practice in Australia appears less evident.

It is worth considering at the outset the key characteristics that are required in a monitoring and evaluation framework tailored for integrated coastal management in this country. Majone (1988) suggests that from a research and policy analysis perspective, ‘the real challenge for evaluation... is to... emphasize **learning** and **adaptation** rather than expressing summary judgements of pass or fail’ (emphasis added).

Given that in coastal management as in other natural resource management fields, there is uncertainty with regard to which management interventions will deliver long term outcomes, it is essential that we track the progress of our activities, evaluate and reflect on results and improve our programs over time.

As part of these considerations regarding the key characteristics of a monitoring and evaluation framework for coastal management, it is useful to look at the *National Cooperative Approach to Integrated Coastal Zone Management* as well as frameworks that have developed in related fields and assess what they offer us. The benefits of establishing common frameworks, approaches and languages related to evaluation of different natural resource management and conservation fields are clear (Salafsky and Margoluis 2003, Stem *et al.* 2005).

To this end, a brief review of other disciplines and their approach to monitoring and evaluation has been undertaken. This involved the authors’ knowledge of these approaches, augmented by discussions with practitioners from the fields of application and desktop analysis of reports and publications. This does not claim to be a comprehensive review. Such an analysis might form the body of a future work. However, this paper does seek to present some ideas for debate and discussion with other coastal management practitioners with a view to developing a ‘communities of practice’ around this aspect of our discipline.

Conceptual framework for monitoring and evaluation in ICM

Two key outcomes are generally sought from monitoring and evaluation activities, namely answers regarding 1) accountability; and 2) adaptive learning (Ehler 2003). In general, evaluation activities aim to lead to improved management and resource allocation decisions while promoting accountability and transparency and supporting greater involvement of community and stakeholders.

Importantly, evaluation is an essential component of coastal management and needs to be considered at each stage of investment planning and implementation for coastal programs and projects. Evaluation can be undertaken prior to the beginning of a program, after a period of implementation, immediately following a program or some time after a program's completion. Owen and Rogers (1999) have identified the different purpose, typical questions and approaches for each type of evaluation (Table 1).

Table 1: Different aspects of the five evaluation types (Owen and Rogers 1999)

Types of Evaluation	Form A Needs analysis	Form B Design clarification	Form C Process evaluation	Form D Monitoring	Form E Impact evaluation
Purpose	Clarifying the needs which the project is intended to meet	Determining / evaluating the logic behind the project	Improvement	Accountability and learning	Describing & evaluating impact - in terms of needs of critical reference group
Timing	Before project starts	In development phase of a project	When the project is settled	Throughout the project	When project is settled/ complete. Or at the end of phase 1 to inform 2 nd phase
Typical Questions	Who are users & what are their strengths/ requirements? What are the expected benefits compared to the costs of the investment	What is the theory of action behind the project? Are the goals congruent with the action proposed? What assumptions are being made?	How can we improve our work to ensure we meet the needs of the poorest sectors? Have we considered gender in all aspects of our work -how can we improve?	How many people are participating in village level groups? How many groups are operating? Have we reached our milestones?	To what extent did project achieve its goals? What were the unexpected impacts? Where users' needs met? What was the economic return?
Typical approaches	Needs assessment, review of best practice, research synthesis, benchmarking	Program logic, logframe analysis, accreditation	Implementation studies, action research, responsive evaluation, process evaluation	Program monitoring, use of performance indicators over time	Objectives-based outcome evaluation, needs-based evaluations, economic assessment of cost-benefit of program

A national framework for coastal management

In considering a framework for monitoring and evaluation in the Australian context, it is worth looking at national policy as a starting point. Monitoring and evaluation of the *National Cooperative Approach to Integrated Coastal Zone Management* (Natural Resource Management Ministerial Council 2006) is in accordance with the National NRM Monitoring and Evaluation Framework and it is the responsibility of the Marine and Coastal Committee to prepare an annual

report on progress. The objective of this report is to assess progress towards improved water quality, conservation of biodiversity and protection of the economic base of the coastal zone. While these resource condition and economic aspects are important, other critical elements are omitted e.g. governance and institutional capacity, and protection and management of cultural values and social values e.g. scenic amenity and recreational values.

Through work with the states, the National Land and Water Resources Audit has developed a set of 19 nationally agreed indicators for coastal, estuarine and marine habitats (NLWRA 2008). They are aimed at resource condition (both habitat extent and condition) and include physio-chemical and biological indicators of system health. Other indicators of intermediate outcomes are also likely to be relevant, (e.g. social indicators of improved community capacity for coastal management) but are absent from the list.

While there will be annual reporting on implementation of the national cooperative approach, the details of the approach that will be used in that assessment is not available on the Ministerial Council's website and as noted above, the scope would appear to miss several key aspects. It is understood that the intent of the national document was not developed with a comprehensive agenda to address these other matters and therefore, we will need to look further afield for direction for the monitoring and evaluation framework that could be adopted for coastal management.

Approaches from other fields

Over the past decade, a number of disciplines in Australia have investigated and developed robust data gathering and evaluation frameworks as a critical part of business in their field. These include approaches to determine how effective management interventions have been; predict the implications of alternative management options; and articulate – through cause and effect hierarchies – the relationship between outcomes, targets, indicators and evaluation questions. Three key examples include:

- **Management effectiveness evaluation** – used internationally in assessments for protected areas e.g. in Hockings *et al.* (2006) for the IUCN World Commission on Protected Areas; and in Australia, 'State of Parks' reports for NSW (NSW Department of Environment and Conservation 2005); and currently in the development of GBRMPA's first Outlook Report (in prep.);
- **Management strategy evaluation** – used in Australia to consider the implications of alternative management strategies for natural resources, such as single fish stocks (e.g. Smith *et al.* 1999) or control of invasive marine species (Dunstan and Bax 2008); and as part of the SEQ Healthy Waterways Strategy (Healthy Waterways Partnership 2007); and
- **Monitoring, evaluation, reporting and improvement framework** – used in Australia in the regional and local natural resource management programs (e.g. Dart 2007, Commonwealth of Australia 2009) and as part of the adaptive management framework protocol for Water Quality Improvement Plans developed by CSIRO (Eberhard 2008).

Each of these approaches is examined briefly below.

1. Management effectiveness evaluation

Management effectiveness evaluation is defined as the assessment of how well protected areas are being managed – primarily the extent to which management is protecting values and achieving its goals and objectives (Hockings *et al.* 2006, p.xii). The evaluation framework is based on the principle that good protected area management should follow the management cycle (Figure 1), which consists of six important elements to determine management effectiveness, namely: context, planning, inputs, process, outputs and outcomes (Hockings *et al.* 2006, p.11). This is based on an understanding that while outcome assessment is vital, assessing other parts of the management cycle as well gives the evaluation greater explanatory power and can include information that is easier to obtain and interpret than outcome data.

Using information gathered from various sources, ratings are given to a matrix of questions for each of the six elements. This information can then be aggregated to give a visual representation of the results that is easily communicated and understood (Figure 2). While this approach has been developed and tailored to protected area management, there is the potential to adapt it to suit the needs of coastal managers. Some of the strengths of this approach include the ability to tease out aspects of context, process and planning and the ability to present the results of how the parks are tracking in terms of management initiatives in a highly visual form. The framework has been used to develop many different methodologies of evaluation, ranging from rapid assessments based on questionnaires to detailed evaluation exercises including in-depth monitoring and feedback.

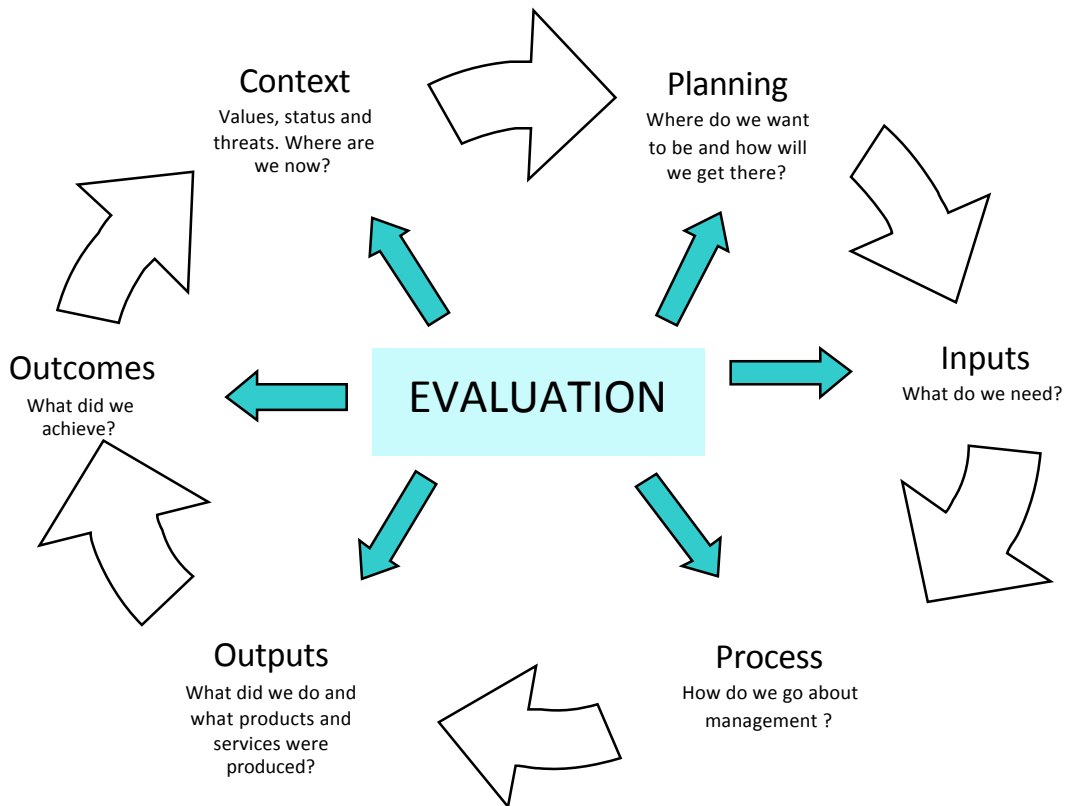


Figure 1 Framework for assessment management effectiveness of protected areas (after Hockings *et al.* 2006)

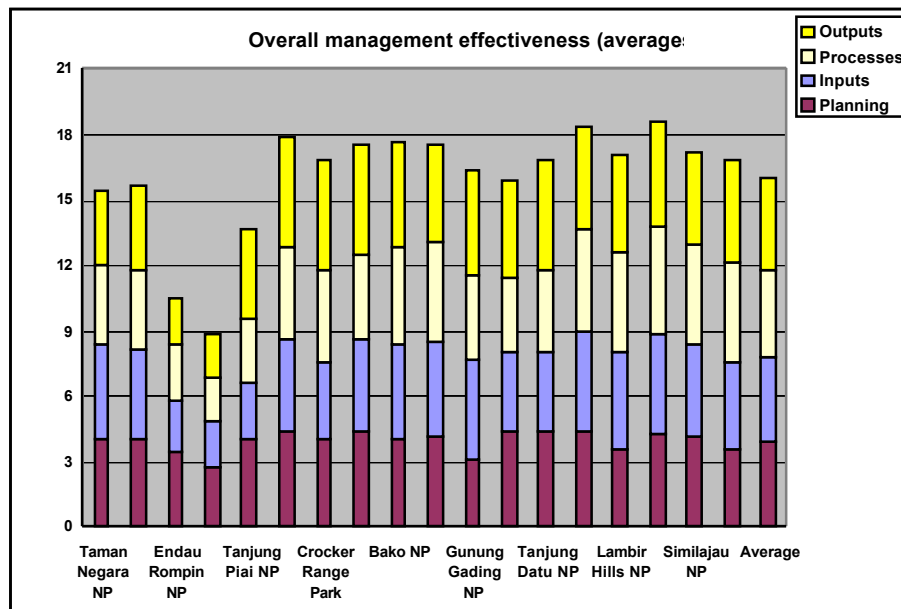


Figure 2: An example of management effectiveness summary reporting done for Malaysian protected areas. (Source: Malaysian Ministry of Natural Resources and the Environment 2006)

Olsen (2003) also looked at the management cycle as a basis for coastal indicators and actions. This was in the context of program improvement for coastal development. Step 5, Evaluation included the following recommended actions:

- Program outcomes documented.
- Management issues reassessed.
- Priorities and policies adjusted to reflect experience and changing social/environmental conditions.
- External evaluations conducted at junctures in the program's evolution.
- New issues or areas identified for inclusion in the program.

The usefulness of this approach is the explicit statement of some of the implementation aspects such as the links between evaluation and learning and program adjustment.

2. Management strategy evaluation

Management strategy evaluation (MSE) involves assessing the consequences of alternative management options and presenting the results in a way that lays bare the trade-offs in performance across a range of management objectives (Smith 1993). It provides an objective basis for short or long-term management decisions. An important feature of this approach is that it seeks to provide decision-makers with information on which to base management directions, rather than prescribing the outcomes of a decision, and as such, is closely related to those set of approaches that have stemmed from decision analysis (Smith *et al.* 1999).

Smith *et al.* (1999) conducted a review of MSE implementation as part of the AFMA partnership model for fisheries management and used the example of the contentious gemfish fishery.

The strengths of the approach include: an ability to deal with uncertainties; and use of modelling which can reinforce the scientific rigour of the approach and strengthen the understanding and 'testability' of the outcomes. However, the analyses can be complex and very time consuming. Some managers saw the approach as a threat to their role and autonomy and experienced frustrations as there was not a single 'right' answer (Smith *et al.* 1999).

3. Monitoring, evaluation, reporting and improvement

A monitoring, evaluation, reporting and improvement (MERI) framework has been developed for the Australian Government to assess the effectiveness, appropriateness and impact of natural resource management programs. At the regional level, MERI frameworks also have been developed by regional natural resource management groups for the same reasons – better tracking of progress and assessment of impact of their programs. The approach grew largely out of the need for the regional groups to report to the Australian and State Governments on performance beyond the NHT1 style of output reporting (e.g. 10 workshops and field days held, 40 participants, 6 newsletters developed etc.) which gives little

information about program impact. Initial attempts to monitor and report were largely driven by narratives that sought to tell the story of progress and discernable impact e.g. improved community capacity. However, without a better understanding of the intermediate outcomes that might arise from investment activities, there was largely a ‘leap of faith’ from the activities on the ground to the resource condition changes sought for the specific catchment or region.

Improvements in reporting came with the introduction of a MERI approach. An important component of the MERI framework is the consequence hierarchy (or program logic) as it seeks to describe the relationship between:

- **foundational activities** – activities to inform investment, including planning, benchmarking, assessment and prioritisation.
- **immediate activities and outputs** – easily identifiable activities and related immediate goods, services and infrastructure.
- **intermediate outcomes** – a combination of biophysical and non-biophysical results that lead to change by way of maintenance of or improvement in NRM asset condition and
- **long-term outcomes** – tangible and measurable changes resulting from maintenance of and/or improvements in NRM assets (Commonwealth of Australia 2009).

The application of the MERI framework has occurred in a number of contexts including: as a process to assist plan reviews; to set performance measures; to determine project/program outcomes; and at several different scales including: regional and local levels. One of the strengths of this approach is the ability for a range of stakeholders to participate and contribute. The participatory process has resulted in shared language of common issues and a greater understanding of other participants’ perspectives as well as the program/region as a whole. The authors’ experience has included use of this framework with a range of community stakeholders – graziers, Indigenous Traditional Owners, recreational fishers, local government (elected representatives and staff) and conservation interests. This approach has resulted in anecdotes of greater understanding of what the program is trying to achieve following these processes – while limited in repeatability this information aligns with other studies’ findings. The values of participation in evaluation have been confirmed by a study which found that accuracy, completeness, acceptance and use of evaluation results were all increased by community involvement (Paleczny and Russell 2005).

The process of making explicit cause and effect relationships, assumptions about the logic and potential barriers to delivery of outcomes is a powerful one. It is possible to render a complex program as a program logic that is more easily understood and communicated with others. Explanations of how an outcome will be achieved (from top of logic to bottom) and the justifications for investing in certain activities (from the bottom of the logic to the top) are more readily explained (Figure 3).

Another strength of this approach is the ability to identify and tease out different kinds of outcomes according to timeframes and geographical application. In the

original planning structure of aspirational / resource condition / management action targets, there was often a missing step at the intermediate outcome level. This affected the ability to report on the impacts of the interventions, as many resource condition changes were of longer timeframes (e.g. ten to 20 years) compared with the reporting (every six to 12 months).

Three different categories of intermediate outcomes are identified – aggregate changes to the way a catchment/ region is managed; practice and attitude change; and reduction in risks or threats. These three intermediate outcomes have proven to be important in plan reviews, target setting, monitoring and reporting on changes from program activities. They are the ‘stepping stone’ from interventions to long-term outcomes that can be more accessible in time and data compared with resource condition changes.

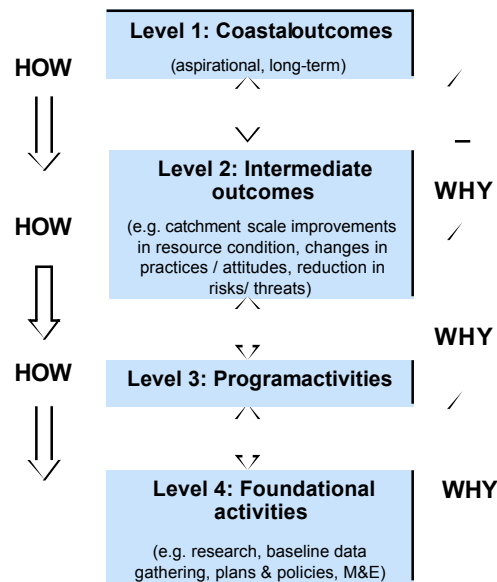


Figure 3: Program logic or outcomes hierarchy – (explanation of how outcomes are reached from top to the bottom, justification for investing in activities from bottom to the top).

Olsen (2003) has a comparable framework in his ‘Order of Outcomes’. Table 2 outlines the similar elements between Olsen’s ‘order of outcomes’ and the program logic component of the MERI framework (as used in Australian NRM programs).

Table 2: Comparison of Olsen’s ‘Order of Outcomes’ and program logic framework (as used in MERI)

Order of Outcomes (Olsen 2003)		Comparable level in MERI (Cth of Aus 2009)
Outcome	Description	
1 st order outcomes	‘enabling’ projects or programs <i>Indicators:</i> e.g. new plans, laws, formal commitments to implement plan/law, institutional capacity, resources/funding and support across key organizations for ICM	Foundational activities level (Level 4)
2 nd order outcomes	changes in people’s behaviour <i>Indicators:</i> e.g. good siting of coastal development and infrastructure, changes in behaviours that directly impact on coastal resources such as land uses that pollute coastal waters	Intermediate outcomes – practice and attitude change (part of Level 2)
3 rd order outcomes	‘the harvest’ of changes in enabling actions and behaviours – improvements in some coastal ecosystem qualities <i>Indicators:</i> e.g. improvements in water quality / fisheries stocks within a catchment/ area, reduction in algal blooms	Intermediate outcomes – aggregate improvements in the way catchment is managed, improved condition of catchment and reductions in risks/threats (part of Level 2)
4 th order outcomes	Sustainable development outcomes	Long-term outcomes (Level 1)

Implications

Each of the existing monitoring and evaluation frameworks currently employed in resource management has different strengths when considering application to the coastal management context. These include:

- Management Effectiveness Evaluation –
 - follows the management cycle which is generally well understood and accepted in the coastal management arena
 - has an ability to tease out the important components of context, planning and input
 - is supported by a tailored set of questions for headline indicators which can be tailored to the coastal management context.
- Management Strategy Evaluation
 - Is a process that includes a decision support tool to predict outcomes from a range of management options
 - Includes strong links to modelling of key elements of the system that drive the predicted outcomes.
- MERI framework
 - Emphasis placed on assets – both intrinsic and utilitarian values

- Based on a cause and effect hierarchy which models how change will occur over time
- Has a high degree of resolution regarding outcomes – long-term resource condition outcomes and intermediate outcomes (aggregate changes in the way an area is managed, practice and attitude change and reductions in threats and risks)
- Outcomes hierarchy is a good visual tool for communicating program intent and means to achieve the identified goals.

In general, evaluation can differ around its purpose, scope and timing, the intended audience and the nature of the participation. Despite these differences, there are some common characteristics that should be included in an evaluation framework for coastal management, including:

- an ability to clearly define the conceptual model of how change will occur and the long-term coastal outcomes reached;
- a means of testing outcomes from various management options;
- a means of identifying key evaluation questions and monitoring data;
- an ability to work with both quantitative and qualitative evidence;
- inclusive of participatory processes to build capacity across levels of government and with sectoral groups and the broader community; and
- a method of visually representing the outcomes of the evaluation activities to support communication and understanding.

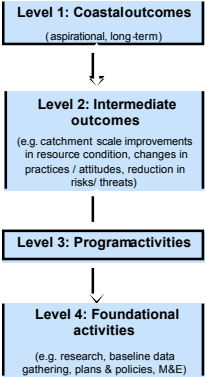
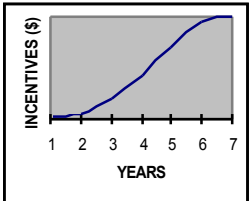
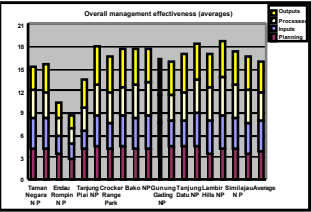
Adaptive Management Protocol

One recent project that has investigated an approach to achieve improved management within the natural resource management context is the adaptive management framework protocol for Water Quality Improvement Plans developed by CSIRO (Eberhard 2008). This project has developed a comprehensive approach to improving management from implementation actions and includes elements of the MERI Framework (concept model) and MSE (modelling performance trajectories).

The protocol is proposed as the basis for an approach, along with elements from other approaches, to a monitoring and evaluation framework for coastal management.

Table 3 illustrates an adaptation of key components of the protocol for the coastal management context.

Table 3: Components of a proposed coastal management monitoring and evaluation framework (adapted from Eberhard 2008)

Component	Objective of the component	Notes
<p>Conceptual model</p> 	<p>To describe how the coastal management program is expected to address the coastal management issues</p>	<ul style="list-style-type: none"> • identify key process steps • identify cause-effect relationships from activities to outcomes • agree on intermediate outcomes—ie. practice and attitude changes, improved management of discrete part of coast and reduction risk or threats • agree on long-term outcomes—ie. improvement in state of the coastal resources • the conceptual model should be agreed by the major stakeholders • present in a visual form e.g. program logic as used in the MERI framework
<p>Learning objectives</p>	<p>To address key uncertainties within the conceptual model</p>	<ul style="list-style-type: none"> • describe major uncertainties and responses • often question cause-effect relationships e.g. how an activity achieves practice change, or how practice delivers an intermediate resource condition outcome • articulate management questions ie. answering the question would have a clear link to a management response
<p>Performance trajectories</p> 	<p>To describe progress for key coastal values and resource towards outcomes over time</p>	<ul style="list-style-type: none"> • articulate expectations of performance against targets over time • be based on the best available science and expert judgment and may be highly uncertain (particularly at the resource condition end of the model) • inform key milestones or trigger points for review and response • present in a visual form e.g. as graphed responses use in MSE
<p>Feedback loops</p> 	<p>To describe how performance measures and learning objectives will be monitored, assessed and communicated</p>	<ul style="list-style-type: none"> • articulate the roles and responsibilities for data collection and assessment • describe the communication products or process, and timing for these • agreed by key stakeholders, including those undertaking the assessment, and those whose actions will be assessed (directly and indirectly) • present outcomes of evaluation in a visual form e.g. as graphed results used in management effectiveness evaluation
<p>Scenarios and responses</p>	<p>To describe alternative actions based on anticipated feedback scenarios</p>	<ul style="list-style-type: none"> • describe responses i.e. "What if... and then?" • discuss with key stakeholders and document

Conclusions

A fundamental issue with monitoring and evaluating in coastal planning is that we develop the plan and expect ‘magic to happen’, that is, after we write the plan and at some point in the future, we reach improved coastal resource condition in the form of healthy coastal, estuarine and marine ecosystems and protection of lifestyle and livability of coastal areas. What has been lacking to date is clarity about how we get there (beyond the setting of policies and conditioning of development) as well as clearly documenting the assumptions we have made along the way.

While there are clearly multiple options for progressing monitoring and evaluation for coastal management programs, discussing and defining the characteristics of the approaches needed for different circumstances will enable us to better match method to the situation. What is important is that we start on this journey perhaps with more intent than we have managed to date.

The authors also acknowledge that establishing a monitoring and evaluation framework and doing an evaluation is only the first step in the process of gaining the critical learnings and then acting upon those learnings. These two subsequent steps are often no small feat either. However, if we don’t build the skills and capacity and a bit of momentum around undertaking evaluations of our coastal initiatives, we will still be wandering in the dark having this conversation at the 2019 Queensland Coastal Conference.

This paper has sought to present some ideas for debate and discussion with other coastal management practitioners. The desire is to develop a ‘communities of practice’ around this aspect of our discipline linking in with others in the evaluation field and in allied areas of resource management.

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Glossary of terms

Evaluation	systematic process that is focused on assessing the impact of our activities
Integrated coastal management	a continuous and dynamic process which aims to manage human use of coastal resources in a sustainable manner by adopting a holistic and integrative approach between terrestrial and marine environments; levels and sectors of government; government and community; science and management;

	and sectors of the economy (Harvey 2004).
Management effectiveness	the assessment of how well protected areas are being managed – primarily the extent to which management is protecting values and achieving its goals and objectives (Hockings <i>et al.</i> 2006)
Monitoring	on-going process of routinely collecting quantitative measures.
Natural resource management	the sustainable management of Australia's natural resources (our land, water, marine and biological systems) to ensure our ongoing social, economic and environmental wellbeing

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