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Evaluation of NRM & MER initiatives against the NSW Natural Resources MER Strategy

A report to the NSW Natural
Resources Commission

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1. Background

1.1. Background and aim

There are many different Natural Resource Management (NRM) Monitoring, Evaluation & Reporting (MER) initiatives in place within Australia and internationally. In New South Wales (NSW), the NSW Natural Resources MER strategy 2010-2015 has been implemented to guide monitoring, evaluating, and reporting efforts of natural resource management.

The aim of this review is to evaluate the intent, content, quality and processes of the NSW Natural Resources MER strategy against 13 other MER initiatives. A SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis was used to evaluate the strengths and weaknesses of the MER initiatives and to summarize the learnings and opportunities available to NSW from these initiatives.

The SWOT exercise is based on a set of criteria organized within a hierarchical assessment framework. The framework describes the important elements of contemporary NRM strategies.

1.2. Assessment framework

The framework arranges assessment attributes into logical levels of interrogation. The framework has three nested levels (Figure 1), comprised of themes, components and criteria.

Themes are broad divisions of thought relating to the conceptualisation, content and application of an NRM or MER initiative.

Components are key inclusions within the themes of an NRM or MER initiative. A good NRM or MER strategy should have a theoretical basis, be based on sound science, have community input, be policy relevant, have processes for community engagement, be cost effective and be flexible and adaptive.

Criteria relate to the achievement of components, that is, what we would expect to see demonstrated under each component in a good NRM or MER strategy. In this framework, 20 criteria have been developed (Figure 1).

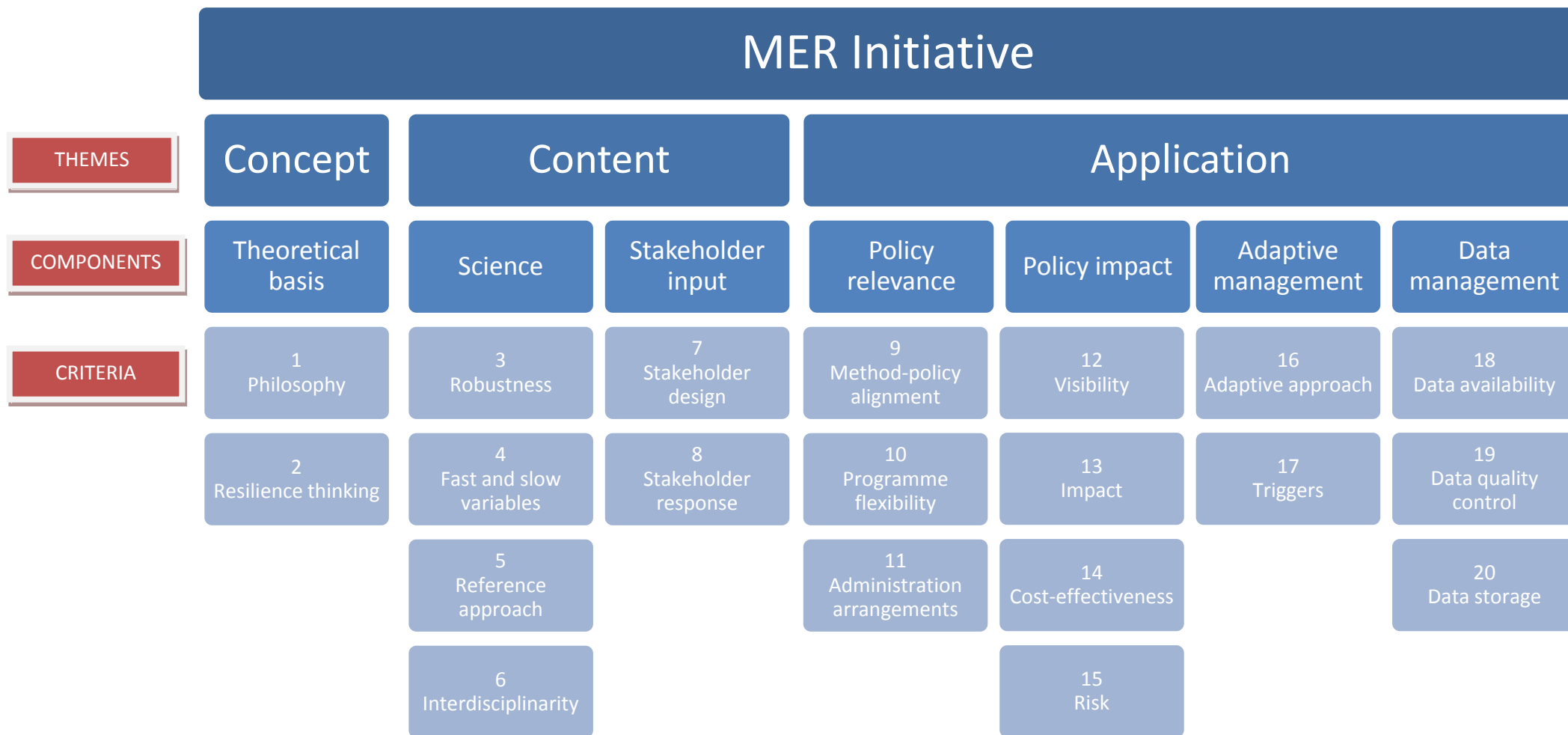


Figure 1. Hierarchical assessment framework.

1.3. Assessment criteria

Concept

Theoretical basis

1. Philosophy

How well does the initiative articulate a conceptual framework, embedded in scientific, NRM or some other theory?

Importance for MER

A sound theoretical basis ensures that the content and application of an MER initiative is underpinned by sound academic principles that support the environmental problem at hand – e.g. resilience, biodiversity, adaptive management, scale, environmental flows, sustainability.

(Lindenmayer and Likens, 2010)

2. Resilience thinking

How well does the initiative incorporate principles of resilience thinking (as described by Walker and Salt, 2006) such as dynamic systems, human values, fast and slow variables, thresholds and adaptive loops?

Importance for MER

Resilience thinking is a new element of NRM and is being applied in Australia and internationally (for example, the Natural Resources Commission's framework for assessing and upgrading NSW Catchment Action Plans, the Australian Government's framework for assessing environmental watering actions, and the United States' Environmental Policy Act). Ideally, going forward, MER strategies and systems at all scales should start to incorporate some of the fundamental elements of resilience thinking.

(Holling and Meffe, 1995; Benson and Garmestani, 2011a and 2011b)

Content

Science

3. Robustness

How well does the suite of indicators convey environmental change?

Importance for MER

Indicators must be scientifically relevant for the environmental changes they want to detect, within the context of the theoretical basis employed.

(Bunn et al., 2010; Lindenmayer and Likens, 2010)

4. Fast and slow variables

Does the initiative include fast and slow variables, that is, indicators operating at long and short time scales, and large or local spatial scales? If so, are the fast and slow variables delineated appropriately in the initiative?

Importance for MER

Environmental processes occur at multiple spatial and temporal scales. Degradation of an environmental process may be missed if variables are not measured at commensurate spatial and temporal scales.

(Parsons and Thoms, 2007; Harris and Heathwaite, 2011)

5. Reference approach

Does the initiative use a referential approach and if so, is the reference condition based on achievable targets for the area of application (e.g. pristine versus best achievable condition)?

Importance for MER

A referential approach provides a baseline against which environmental degradation is measured. A referential approach usually also includes processes to distinguish natural variation in an environmental process from anthropogenic influences on an environmental process.

(Bailey et al., 2004)

6. Interdisciplinarity

Does the initiative encompass multiple disciplines (e.g. ecology, hydrology, social science, economics) or is it focused on a limited range of disciplines?

Importance for MER

Ecosystems are complex social-ecological systems of interacting biophysical, social and economic processes. Holistic assessment of environmental degradation requires consideration of multiple disciplines.

(Waltner-Toews et al., 2003; Chapin et al., 2009)

Stakeholder input

7. Stakeholder design

Has the stakeholder community had a meaningful input into the design of the initiative?

Importance for MER

Contemporary philosophies of Natural Resource Management emphasize the importance of stakeholder ownership of decision making processes. Successful NRM programmes generally have a high degree of stakeholder engagement from the outset.

(Hillman et al., 2005; Rogers, 2006; Holmes, 2011)

8. Stakeholder response

Was the stakeholder community generally satisfied with the design of the initiative?

Importance for MER – Contemporary NRM philosophies emphasise how meaningful stakeholder engagement usually leads to high stakeholder satisfaction with outcomes and decisions

(Hillman et al., 2005; Rogers, 2006; Holmes, 2011).

Application

Policy relevance

9. Method-policy alignment

Is the methodology of the initiative aligned with the policy objectives under which the initiative operates?

Importance for MER

High-level policy objectives may not get translated into relevant MER components. For example, if the policy objective is about sustainability, then components of the MER initiative, especially indicators, should explicitly measure sustainability.

(Lindenmayer and Likens, 2010)

10. Program flexibility

Can the initiative be applied within a range of government programs, or only those dealing specifically with NRM?

Importance for MER

Successful MER initiatives have a clear framework and model that can be applied to other programs within government. For example, an initiative designed around adaptive management principles may be applied to programs across a range of public policy areas.

11. Administration arrangements

Do governance and administration arrangements enhance the uptake of the initiative?

Importance for MER

Administrative and governance accountabilities and responsibilities must be clearly defined to enhance the successful uptake of MER initiatives.

(Rogers, 2006; Lindenmayer and Likens, 2010)

Policy impact

12. Visibility

Does the initiative have strong visibility among stakeholders?

Importance for MER

Promoting high visibility among stakeholders enhances the uptake of outcomes in public policy.

(Holmes, 2011)

13. Impact

Does the initiative have clout with policy advisers and policy makers? Does it guide best practice within Government departments?

Importance for MER

Quality, well thought-out, clearly targeted MER initiatives are likely to be attractive to agencies and policy-makers, and hence have visibility and influence within policy making processes.

(Rogers, 2006)

14. Cost effectiveness

Is the initiative generally value for money, in that it delivers its objectives?

Importance for MER

Substantial resources can be wasted on flawed initiatives that achieve something very different from what they initially set out to do.

(Lindenmayer and Likens, 2010)

15. Risk

Is the initiative considered risky for Government to implement and/or use?

Importance for MER

Governments need to be able to assess the risks and uncertainties associated with the implementation of public policy, particularly from a budgetary perspective and in terms of public perception of action.

Adaptive management

16. Adaptive approach

Are the results of the initiative fed through an adaptive management or adaptive policy process?

Importance for MER

Adaptive management is a key principle of contemporary NRM. Active adaptive management entails ongoing learning, assessment and adaptation at all stages of the management cycle rather than just at the end of the management cycle.

(Rogers, 2006; Lindenmayer and Likens, 2009; van Wilgen and Biggs, 2011)

17. Triggers

Are there mechanisms within the initiative to trigger reporting of adverse environmental change?

Importance for MER

Environmental assessments need to be coupled with some mechanism to trigger policy or regulatory responses to adverse environmental findings.

(Rogers and Biggs, 1999)

Data management 18. Data availability

Are the data used in the initiative available through existing programs or are they collected specifically for the initiative?

Importance for MER

Unless linkages are carefully considered, data collected to meet the objectives of one program may not be suitable for meeting the objectives of a different program. For example, event driven data collected to comply with water quality regulations may not be suitable for use in State of the Environment reporting.

19. Data quality control

Is there a QA/QC process associated with the acquisition of data for the initiative?

Importance for MER – Quality control and quality assurance processes need to be included to ensure the quality of environmental data. Apart from sampling and measurement quality control, data management for NRM should also encourage peer-review, technical advisory groups and analysis of whether data are fit for purpose.

(Shampine, 1993; Lindenmayer and Likens, 2010)

20. Data storage

Is there an archive and data storage process associated with the initiative?

Importance for MER

Data archiving and storage enable repeatability of assessments, access of stakeholders to information and can build to vital long-term environmental data sets.

(Shampine, 1993)

1.4. SWOT analysis

A rapid, modified SWOT analysis was used to evaluate the strengths and challenges of 13 MER initiatives. Information was obtained on each initiative using accessible written reports, information from websites, and interviews or correspondence with agency staff where available. The authors are confident that key written documents and information describing each initiative were sourced and absorbed for the SWOT analysis. However, specific regional applications or forward planning for the implementation of initiatives may not have been as easily accessible, and therefore, may have been unintentionally overlooked.

Each initiative was assessed for each of the 20 criteria listed above. Criteria were placed into one of two categories:

1. Key strengths of the initiative, or the criteria on which the initiative performs well; and,
2. Key challenges of the initiative, or the criteria on which the initiative has faced challenges or which are not comprehensively and successfully running in the initiative.

A criterion was not considered if it was not a feature of an initiative, or if information was unavailable to make an assessment of the initiative for that criterion. Thus, all 20 criteria were not necessarily considered for each initiative.

The key strengths of the initiative were then summarized as learnings and opportunities available to NSW.

1.5. Initiatives assessed

Thirteen MER initiatives were assessed in the SWOT analysis (Table 1). There are many other NRM & MER initiatives nationally and worldwide that could have been included in this project. Given the rapid assessment scope of this project, our intention was not to assess every available initiative. Rather, we wished to assess the properties of NRM and MER initiatives in relation to the properties and applications of NRM and MER in NSW. Thus, we used initiatives covering:

- Australian and International examples;
- Initiatives set at local, regional, national and international scales; and,
- Initiatives designed to support a range of applications including conservation, environmental assessment and water resource management.

Table 1. Natural Resource Management or Monitoring, Reporting and Assessment initiatives assessed in the SWOT exercise.

Agency	Initiative	Location	Length of operation
South African National Parks	Strategic Adaptive Management	South Africa	Began in the mid 1990s
European Environmental Agency	European State of the Environment Reporting	Europe	First European SoE report 1994
Australian Government Department of Sustainability, Environment, Water, Population and Communities	The National Plan for Environmental Information	Australia wide	First published 2010
Commonwealth Environmental Water Holder	Framework for determining Commonwealth environmental watering actions	Australia wide	Established under the Water Act 2007
Victorian Department of Sustainability and Environment	Victorian River Health Strategy	Australia (VIC)	Strategy established 2002
Healthy Waterways Partnership	South East Queensland Healthy Waterways strategy	Australia (QLD)	Implemented 2007
Northern Rivers Catchment Management Authority	Northern Rivers CMA Ecohealth Report Card	Australia (NSW)	Pilot study 2010
NSW Government Division of Local Government	NSW Integrated Planning and Reporting	Australia (NSW)	Act amended 2009, first adoption 2010
US Environmental Protection Agency	Environmental Monitoring and Assessment Program (EMAP)	United States	Ran from 1990 - 2006
Murray Darling Basin Authority	Sustainable Rivers Audit & Monitoring, Evaluation and Reporting strategy	Australia (MDB)	Began development in 2001
The Nature Conservancy	Conservation by Design	United States	Began in 1996
Mekong River Commission	State of the Basin Reporting	South East Asia	First SoE Report 2010
International Commission for the Protection of the Danube River	Danube River Basin management plan	Europe	Commission established 1991

2. Summary of findings

2.1. Key strengths of the NSW Natural Resources MER Strategy

The NSW Natural Resources MER Strategy is strong in its application of seven of the 20 criteria (Table 2). The NSW Natural Resources MER Strategy:

- uses indicators which are robust in conveying change in environmental condition - robustness is important because indicators must be scientifically relevant for the environmental changes they need to detect (Criteria 3).
- includes biophysical, economic and management indicators - ecosystems are complex social-ecological systems of interacting biophysical, social and economic processes which need to be considered holistically (Criteria 6).
- uses stakeholder input into the design of the strategy. In signing off on the strategy it appears that there is also reasonable stakeholder acceptance. Contemporary philosophies of Natural Resource Management emphasize the importance of stakeholder ownership of decision making processes. Successful NRM programs generally have a high degree of stakeholder engagement from the outset (Criteria 7 and 8).
- has the potential to be applied in different NRM situations. Successful MER initiatives usually have a clear framework and model that can be applied to other programs within government (Criteria 10).
- is supported by a data agreement that outlines the sharing and use of existing data, and the requirements for the storage and management of data. The strategy also shows good QA/QC provision at the specific indicator level. Sound data management is a critical element of NRM to ensure accurate environmental assessments (Criteria 18, 19 and 20).

2.2. Which initiatives provide key learning opportunities for NSW?

The modified SWOT analysis revealed opportunities for NSW to enhance its NRM and MER programs and strategies in several key areas (or 'components' as described in Figure 1).

Theoretical basis

Several initiatives are world renowned and are highly advanced in articulating a conceptual framework or a theoretical basis that underpins and guides the objectives and data collected in the initiative. South African National Parks' Strategic Adaptive Management and Australia's Framework for Determining Commonwealth Environmental Water Actions are both underpinned by a strong conceptual basis and include principles of resilience thinking (Tables 2 and 3).

Victoria's River Health Strategy and the Murray Darling Basin Sustainable Rivers Audit have a strong conceptual basis, but do not include principles of resilience thinking (Tables 2 and 3).

Science

Several initiatives are strong on the science criteria and can provide learning opportunities for the NSW Natural Resources MER Strategy. Fast and slow variables are important because degradation of an environmental process may be missed if indicators are not targeted at the correct scale for the process at hand. South Africa's Strategic Adaptive Management and Australia's Framework for Determining Commonwealth Environmental Watering Actions include indicators selected in a scale appropriate manner and which match the scale of the indicator to the scale of the process at hand (Tables 2 and 3).

A reference approach is often used in NRM programs, particularly monitoring components, because it provides a baseline against which anthropogenic change can be assessed, and allows natural variation to be distinguished from anthropogenic change. The United States' Environmental Monitoring and Assessment Program and Australia's Sustainable River's Audit are well-developed in their use of a reference approach (Tables 2 and 3).

Stakeholder input

While stakeholders have a strong input into the design of the NSW Natural Resources MER Strategy, stakeholders also need to be satisfied with the outcomes of, and decisions made through, NRM initiatives. South Africa's Strategic Adaptive Management, Queensland's Healthy Waterways Strategy and the United States' Conservation by Design have had excellent stakeholder response and satisfaction with the outcomes and decisions of the initiative (Tables 2 and 3).

Policy relevance

Several initiatives have strong method-policy alignment in that the design of the initiative is well-aligned to the policy settings in which it operates. South Africa's Strategic Adaptive Management is aligned closely with government's mandate to manage biodiversity in South Africa's national parks. Australia's Framework for Determining Commonwealth Environmental Watering Actions is aligned closely with the Water Act, 2007. The Victorian River Health Strategy is linked to whole-of-government policies on Ecologically Sustainable Development. The United States' Environmental Monitoring and Assessment Program is administered under the Clean Water Act. The Danube River Basin Management Plan is closely aligned to the requirements of the European Water Framework Directive.

Policy impact

Policy impact stands out as an area where much learning is needed and where all the initiatives are not placing heavy emphasis (Table 2). There are a few potential reasons for this:

- 1) The practice of NRM and the formulation of Government policy are often treated as different processes, despite interdependencies;
- 2) Scientists informing NRM are often unaware of the drivers and accountabilities of Government policy making; and,
- 3) These aspects of NRM or MER may only be considered in legislative drafting processes.

It is also possible, that in our rapid SWOT analysis, information on the impact of an initiative was not readily available in the descriptive literature. Rather, this information may be buried much deeper within records of Senate Estimates, within Department papers and political party mandates.

Adaptive management

Adaptive management is used widely in NRM to facilitate ongoing learning and policy improvement in complex, highly variable natural systems. Coupled with adaptive management, some mechanism for triggering management response is needed in response to adverse environmental change. South African National Parks' Strategic Adaptive Management has a strongly embedded adaptive approach and a strong mechanism for triggering management responses to environmental change, known as Thresholds of Potential Concern (Tables 2 and 3).

Queensland's Healthy Waterways Strategy has a strong adaptive management focus, whereby monitoring information is fed back into program review.

The United States' Environmental Monitoring and Assessment Program does not use an adaptive approach but has strong mechanisms for triggering management responses to environmental change.

2.3 Key messages for the NSW Natural Resources Commission

The modified SWOT analysis revealed opportunities for enhanced learning in six out of the seven components of the hierarchical assessment framework, covering concept, content and application themes (see Figure 1). Policy impact is a particular area for enhanced learning as none of the policy impact criteria were well-embedded into any of the analysed NRM or MER initiatives. Thus, there are opportunities for NSW to enhance the conceptual underpinnings, scientific and community content and practical application of its NRM and MER programs.

There are three options for NSW to improve its MER strategy:

- 1) **Business as usual** – continue with these criteria as currently used because they are strengths of the NSW Natural Resources MER Strategy;
- 2) **Pick up elements from other initiatives** – adopt criteria 'off the shelf' from initiatives which perform strongly; and,
- 3) **Invest in research and development** – invest in methodology development, application protocols, capacity building and collaborative learning for criteria that could be enhanced.

Pick up elements from other initiatives

Under this investment strategy, South Africa's Strategic Adaptive Management offers strengths in theory, science, stakeholder input, policy relevance and adaptive management. Strategic Adaptive Management has been used in Kruger National Park for over 15 years and is associated with a wealth of literature, learning and operational experience. Elements of Strategic Adaptive Management could be adopted 'off the shelf' into NSW NRM or MER strategies, although elements such as thresholds, objectives and management triggers would need to be adapted to local operating environments.

In an Australian context, the Framework for determining Commonwealth environmental watering actions, South East Queensland healthy waterways strategy and the Sustainable Rivers Audit also offer 'off the shelf' elements that can be adopted to enhance NSW NRM or MER strategies.

Invest in research and development

This investment strategy pertains largely to policy impact, which is not well-embedded into any NRM or MER initiative assessed. We believe that investment in policy impacts of NRM and MER initiatives will make NSW a world leader in this area.

Table 2. Summary of key learnings for NSW from 13 NRM and MER initiatives.

Green boxes indicate areas of key strength and learning. As indicated by the dashes, the NSW Natural Resources MER Strategy is considered to be strong in its Robustness, Interdisciplinarity, Stakeholder design, Program flexibility, Data availability, Data quality control and Data storage and therefore there were no learnings contributed in these areas from other initiatives.

Initiative	Assessment themes, components and criteria																			
	Concept		Content						Application											
	Theory		Science				Stakeholder input		Policy relevance			Policy impact			Adaptive management		Data management			
	1 Philosophy	2 Resilience thinking	3 Robustness	4 Fast & slow variables	5 Reference approach	6 Interdisciplinarity	7 Stakeholder design	8 Stakeholder response	9 Method-policy alignment	10 Program flexibility	11 Admin arrangements	12 Visibility	13 Impact	14 Cost effectiveness	15 Risk	16 Adaptive approach	17 Triggers	18 Data availability	19 Data quality control	20 Data storage
NSW Natural Resources MER Strategy																				
Strategic Adaptive Management			-			-	-			-							-	-	-	
European State of the Environment Reporting			-			-	-			-							-	-	-	
National Plan for Environmental Information			-			-	-			-							-	-	-	
Framework for Commonwealth environmental watering actions			-			-	-			-							-	-	-	
Victorian River Health Strategy			-			-	-			-							-	-	-	
South East Queensland healthy waterways strategy			-			-	-			-							-	-	-	
Northern Rivers CMA Ecohealth report card			-			-	-			-							-	-	-	
NSW Integrated Planning and Reporting			-			-	-			-							-	-	-	
Environmental Monitoring and Assessment Program			-			-	-			-							-	-	-	
Sustainable Rivers Audit			-			-	-			-							-	-	-	
Conservation by Design			-			-	-			-							-	-	-	
Mekong State of the Basin Reporting			-			-	-			-							-	-	-	
Danube River Basin Management Plan			-			-	-			-							-	-	-	

Table 3. Modified SWOT analysis of 13 NRM and MER initiatives.

a)

Strategic Adaptive Management (South Africa)
What are the key strengths of this initiative?
Criteria: Philosophy, Resilience thinking, Robustness, Fast and slow variables, Interdisciplinarity, Stakeholder design, Stakeholder response, Method-policy alignment, Program flexibility, Visibility, Impact, Risk (12 of the 20 criteria)
<i>Strategic Adaptive Management:</i>
<ul style="list-style-type: none">• is strongly embedded in principles of social-ecological systems, viewing ecosystems as dynamic and heterogeneous. Strategic Adaptive Management also considers elements of resilience thinking such as thresholds, human values and dynamic systems. A strong philosophical or theoretical basis is important because it ensures that the initiative is underpinned by sound academic principles.• uses conceptual models to link indicators to environmental processes directly relevant to park management, and at appropriate spatial and temporal scales. This ensures that indicators are scientifically relevant for the environmental changes they need to detect and do not miss processes occurring at other scales.• includes objectives and indicators covering biophysical, management and social elements of park management. Ecosystems are complex social-ecological systems of interacting biophysical, social and economic processes which need to be considered holistically.• uses stakeholder input as a key part of setting the desired state of the system. Stakeholders have high buy-in to the management processes and are generally satisfied with outcomes. Strategic Adaptive Management also has high visibility among South African conservation managers and scientists.• is aligned closely to the government’s mandate to manage biodiversity in South African National Parks.• is flexible because it allows elements such as vision setting, the objectives hierarchy and thresholds of potential concern to be applied in different NRM situations. Successful MER initiatives usually have a clear framework and model that can be applied to other programmes within government.• has high impact in conservation management worldwide. Quality programs tend to have higher impact and be more attractive to agencies and policy makers.• is low risk for governments because the initiative embraces consensus decision making principles in line with South Africa’s constitution.• is founded on adaptive principles and an active management approach that entails constant learning, assessment and adaptation.• contains a embedded process where exceedence of Thresholds of Potential Concern triggers a management review and response. Environmental assessments need coupling with some mechanism to trigger policy or regulatory responses to adverse environmental findings.

a) cont.

What are the key challenges this initiative has faced?

Criteria: Reference approach, Administration arrangements, Data availability, Data quality control, Data storage

Strategic Adaptive Management:

- sets targets for indicators and objectives but these are not set against a reference baseline. A referential approach is able to distinguish natural variation in environmental processes from anthropogenic influences on these processes.
- has encountered challenges integrating with NRM agencies responsible for managing areas outside National Parks. Administrative and governance accountabilities and responsibilities must be clearly defined to enhance the successful uptake of MER initiatives.
- collects data specifically for the program and does not have any formalized quality control processes, although a data management system is being developed. Sound data management is a critical element of NRM to ensure accurate environmental assessments.

What important things could the NSW Natural Resources MER Strategy learn from this initiative?

From Strategic Adaptive Management, the NSW Natural Resources MER Strategy could learn about:

- setting the NSW MER in a strong theoretical framework that operationalizes elements of resilience thinking.
 - developing scientifically robust and scale appropriate indicators.
 - engaging stakeholders in a meaningful way by making them central to the process.
 - aligning NRM with government policy.
 - using active adaptive management that triggers management actions when indicator thresholds are exceeded.
-

b)

European State of the Environment Reporting (European Union)

What are the key strengths of this initiative?

Criteria: Philosophy, Robustness, Method-policy alignment, Administration arrangements, Cost-effectiveness, Interdisciplinarity, Risk, Data availability, Data quality control, Data storage (10 of the 20 criteria)

European State of the Environment Reporting:

- uses indicators that convey trends of change in many different environmental parameters, and uses a Driving forces, Pressure, State, Impact, Response model to select indicators. This robustness and conceptual approach to indicator selection is important because indicators must be scientifically relevant for the environmental changes they need to detect.
- is aligned with specific legislative requirements under the European Parliament. The coordinating agency (European Environmental Agency - EEA) also administers the collation of environmental data from member states.
- has a strong data quality control and data management element. The EEA maintains a publicly accessible database to specifically collate, manage and store EU environmental data. Sound data management strategies enhance accuracy in assessments of environmental change.
- attempts to report in an interdisciplinary sense. One report in the reporting series considers global social, technological, economic, environmental and political megatrends. Thus, important social and economic factors that may influence the European state of the environment are considered.

What are the key challenges this initiative has faced?

Criteria: Resilience thinking, Fast and Slow Variables, Reference Approach, Adaptive approach, Triggers

European State of the Environment Reporting:

- does not include variables operating at different time scales. Environmental states occurring at temporal and spatial scales other than that measured may be missed by this initiative.
- does not use a reference approach, making it difficult to distinguish natural variation from anthropogenic influence.
- uses a five-yearly reporting cycle but there are no adaptive learning mechanisms built into the initiative. Adverse environmental trends do not necessarily trigger management responses, but the State of the Environment Report series does provide broad information for governments. Mechanisms to learn from findings, through review or through policy response, are an essential part of successful NRM initiatives.

b) cont.

What important things could the NSW Natural Resources MER Strategy learn from this initiative?

From European State of the Environment Reporting, the NSW Natural Resources MER Strategy could learn about:

- complex data management strategies that include maintaining a publicly accessible database of information in a cross-jurisdictional environment.
 - linking the Driving forces, Pressure, State, Impact, Response model to specific policy questions and indicators (and decision-making processes more broadly).
 - reporting the influence of global social, technological, economic, environmental and political megatrends.
-

c)

National Plan for Environmental Information* (Australia)

What are the key strengths of the initiative?

Criteria: Program Flexibility, Administration Arrangements, Data Quality Control, Data Availability, Data Storage (5 of the 20 criteria)

The National Plan for Environmental Information:

- will provide a structured inventory and access point for environmental data collected by the Australian Government. This approach could be adapted to suit other types of information.
- clearly sets out the administration arrangements of the initiative in that the Bureau of Meteorology will become the government authority on environmental information.
- aims to review existing data in terms of developing catalogues of key data and assessing it for utility value and condition.
- the initiative is configured to facilitate improved discovery, exchange, review and storage of environmental data. This is strength of this initiative.

What are the key challenges this initiative has faced?

Criteria: Philosophy, resilience thinking

The National Plan for Environmental Information:

- appears to be configured to provide a practical means of accessing and organizing data collected and held by the Australian Government. Therefore, there is little emphasis placed on the philosophical underpinnings of the initiative nor resilience thinking.

What important things could the NSW Natural Resources MER Strategy learn from this initiative?

From The National Plan for Environmental Information, the NSW Natural Resources MER Strategy could learn about:

N/A

* it should be noted that the amount and quality of information that was available for this initiative to undertake the SWOT analysis was significantly less than for other initiatives. This appears to be in part a result of the early stage the initiative is in. This limited the degree to which learning's and challenges could be determined for this initiative.

d)

Framework for determining Commonwealth environmental watering actions (Australia)

What are the key strengths of this initiative?

Criteria: Philosophy, Resilience thinking, Robustness, Fast and Slow Variables, Interdisciplinary, Method-policy alignment, Adaptive Approach, Triggers, Data Availability (9 of the 20 criteria)

The Framework for determining Commonwealth environmental watering actions:

- presents conceptual and practical information which places the framework into a scientific context. A strong philosophical or theoretical basis is important because it ensures that the initiative is underpinned by sound academic principles.
 - recognises aspects of resilience thinking such as system variability and the different nature of assets, functions and connections within the Murray Darling Basin. The framework is also broad enough to allow adaptive changes at later stages. Resilience thinking is an emerging paradigm of NRM. It is being applied in many initiatives worldwide, including in NSW.
 - is robust in the context of determining and prioritising environmental watering opportunities. Robustness is important because indicators must be scientifically relevant for the environmental changes they need to detect.
 - considers assets and functions operating at different spatial scales across the basin. The initiative also allows for consideration of longer term watering goals. Environmental processes occur at multiple scales and environmental degradation can be missed if indicators are not targeted at the correct scales.
 - allows for monitoring and assessment which then feeds back into conceptual models early in the process. Adaptive management is a key principle of contemporary NRM. It entails ongoing learning, assessment and adaptation at all stages of the management cycle rather than just at the end of the cycle.
 - appears to be set up to utilize information and data gathered from a range of stakeholders. Incorporating data gathered from multiple sources improves efficiencies and is more economic overall, as long as QA/QC processes are in place to ensure data is fit for purpose.
 - is aligned closely with relevant federal legislation (Water Act 2007, Environmental Watering Plan outlined in the proposed Basin Plan). It is important that high-level policy objectives get translated into relevant MER components.
 - outlines the administration arrangements in terms of where the strategy fits in with relevant legislation and who will be responsible for decisions to be made within the framework. Administrative and governance accountabilities and responsibilities must be clearly defined to enhance successful uptake of MER initiatives.
-

d) cont.

What are the key challenges this initiative has faced?

Criteria: Reference Approach, Stakeholder Design, Data QA/QC, Data Storage

The Framework for determining Commonwealth environmental watering actions:

- incorporates a range of future flow scenario's rather than a referential approach to assessing environmental condition. A referential approach is able to distinguish natural variation in environmental processes from anthropogenic influences on these processes.
- initially displayed limited stakeholder input into the framework, though it does appear as if stakeholders will contribute to future refinements of the framework. Contemporary philosophies of Natural Resource Management emphasize the importance of stakeholder ownership of decision making processes.
- does not explicitly outline QA/QC processes for data acquisition or how data is to be archived or stored after collection. Sound data management is a critical element of NRM to ensure accurate environmental assessments.

What important things could the NSW Natural Resources MER Strategy learn from this initiative?

From the Framework for determining Commonwealth environmental watering actions, the NSW Natural Resources MER Strategy could learn about:

- setting the NSW MER in a strong theoretical framework that operationalizes elements of resilience thinking.
- developing scientifically robust and scale appropriate indicators.
- aligning NRM with government policy.

e)

Victorian River Health Strategy (Australia)

What are the key strengths of this initiative?

Criteria: Philosophy, Robustness, Stakeholder design, Method-policy alignment, Administration arrangements, Visibility, Impact, Cost-effectiveness (8 of the 20 criteria)

The Victorian River Health Strategy:

- is based on scientific concepts of connectivity, diversity and ecological processes.
- is robust in conveying environmental change. The Strategy sets regional targets for river protection and uses biophysical parameters to measure achievement towards these targets over a 10 year period.
- engages stakeholders in the processes of setting regional targets for river protection, which facilitates buy-in to the achievement of these targets, and gives the Strategy visibility among stakeholders.
- has clearly stated governance roles at the Federal, State, CMA and local government levels. The initiative is also aligned to various Victorian Government policies, including the Victorian Government's commitment to Ecologically Sustainable Development. Thus, there is a link between the objectives of the Strategy and the objectives of government policy, giving the strategy impact among policy makers.
- is cost-effective in that Victoria is well-placed to deliver their 2011 targets for river health.

What are the key challenges this initiative has faced?

Criteria: Resilience thinking, Fast and slow variables, Reference approach, Interdisciplinarity, Adaptive approach, Triggers, Data availability, Data quality control, Data storage, Program flexibility

The Victorian River Health Strategy:

- uses the language of resilience thinking (e.g. thresholds, social-ecological systems, dynamics), but the word resilience only appears twice in the Strategy and does not appear to form the conceptual basis for the Strategy.
- does not include variables operating at different time scales. Environmental changes occurring at temporal and spatial scales other than that measured may be missed under the Strategy.
- adopts a passive approach for monitoring results to inform management and research priorities. Active adaptive management, including clear triggers for reporting adverse environmental change, could improve the Strategy.
- does not stipulate a clear data management strategy covering data availability, quality control and storage. Sound data management is a crucial element of assessments of environmental change through time.

e) cont.

What important things could the NSW Natural Resources MER Strategy learn from this initiative?

From the Victorian River Health Strategy, the NSW Natural Resources MER Strategy could learn about:

- engaging stakeholders to set regional targets for river protection.
 - integrating river health across State-government policy.
 - setting regional targets for river protection.
-

f)

South East Queensland Healthy Waterways Strategy (Australia)

What are the key strengths of this initiative?

Criteria: Interdisciplinarity, Stakeholder Design, Stakeholder Response, Method-Policy Alignment, Adaptive Management, Visibility, Impact, Administration Arrangements, Risk (9 of the 20 criteria)

The South East Queensland Healthy Waterways Strategy:

- includes objectives and indicators dealing with ecology and hydrology, with a focus on the social acceptance of outcomes. Ecosystems are complex social-ecological systems of interacting biophysical, social and economic processes which need to be considered holistically.
 - is very strong in terms of stakeholder involvement in terms of both the design and acceptance of the initiative. There are a broad range of program partners (govt. research, private, community groups) involved in the design and undertaking of the initiative.
 - has good recognition of existing and parallel action plans and making sure existing objectives, targets and actions plans align with the strategy. It is important that high-level policy objectives get translated into relevant MER components.
 - has high buy-in among stakeholders and a strong community focus, meaning that visibility and impact of the initiative should be high
 - has a strong adaptive management focus throughout the initiative documentation. Adaptive management is a key principle of contemporary NRM. It entails ongoing learning, assessment and adaptation at all stages of the management cycle rather than just at the end of the cycle.
 - has low risk given the extensive stakeholder participation and relatively general objectives.
 - is administered through a small 'partnership office group' and is guided by a standing committee, scientific expert panel and a number of sub-regional groups. Administrative and governance accountabilities and responsibilities must be clearly defined to enhance the successful uptake of MER initiatives.
-

f) cont.

What are the key challenges this initiative has faced?

Criteria: Reference Approach, Resilience thinking, Robustness, Fast and Slow Variables, Data Quality Control, Data Storage.

The South East Queensland Healthy Waterways Strategy:

- sets targets for indicators and objectives but these are not set against a reference baseline. A referential approach is able to distinguish natural variation in environmental processes from anthropogenic influences on these processes.
- is very focused on water quality and nutrient loads, and how humans influence these. While conceptual models are presented in regard to these aspects of NRM, they are still limited in scope. This reduces the conceptual scope of the initiative and also its robustness in terms of detecting wider ecosystem change.
- is focused on localized point measurements, although these will be collected over long time periods. This increases the potential to miss some level of environmental degradation by not targeting indicators at larger spatial scales.
- does not contain mechanisms to trigger policy or regulatory response to adverse environmental findings, rather it monitors longer term changes over time.
- does not have provision for QA/QC of data collected for the initiative. In addition there is no mention of data storage processes associated with the initiative. Sound data management is a critical element of NRM to ensure accurate environmental assessments.

What important things could the NSW Natural Resources MER Strategy learn from this initiative?

From The South East Queensland Healthy Waterways Strategy, the NSW Natural Resources MER Strategy could learn about:

- engaging stakeholders in a meaningful way through both the initial program design and ongoing acceptance and support for the initiative.
- aligning NRM with government policy.

g)

Northern Rivers CMA Ecohealth Report Card (Australia)

What are the key strengths of this initiative?

Criteria: Stakeholder design, Triggers, Data quality control, Data storage, Administration arrangements, Visibility (6 of the 20 criteria)

The Northern Rivers CMA Ecohealth Report Card:

- is based on a strong partnership between the Northern Rivers CMA and the local councils which will use the report cards. Methods designed with input from stakeholders are likely to have greater success.
- thresholds for indicators are set, although it is not entirely clear how management actions are triggered when thresholds are exceeded. It is important to have mechanisms for reporting adverse environmental changes.
- has a technical reference group overseeing and reviewing the report cards. Environmental data are also stored in a central data base managed by the CMA. Sound data management procedures help to support the accuracy of environmental trend assessments.
- is part of the Our Living Coasts program, which runs at local council level and is highly visible to local communities.

What are the key challenges this initiative has faced?

Criteria: Philosophy, Robustness, Fast and slow variables, Reference approach, Interdisciplinarity, Adaptive approach, Method-policy alignment, Cost effectiveness

The Northern Rivers CMA Ecohealth Report Card:

- does not use an underlying scientific or NRM philosophy to underpin its reporting parameters.
- uses standard, small-scale biophysical monitoring indicators. Trends of environmental change may not be able to be detected with these parameters, particularly without a reference approach. The initiative also states that it is for conducting resource condition trend assessments under legislative requirements, but does not seem to specify a method for assessing trend.
- does not specify an adaptive approach for integrating the learnings from monitoring results.

What important things could the NSW Natural Resources MER Strategy learn from this initiative?

From The Northern Rivers CMA Ecohealth Report Card, the NSW Natural Resources MER Strategy could learn about:

- partnerships with local councils.
- the use of ecohealth report cards as an environmental assessment tool.

h)

NSW Integrated Planning and Reporting (Australia)

What are the key strengths of this initiative?

Criteria: Interdisciplinarity, Stakeholder design, Method-policy alignment (3 of the 20 criteria)

NSW Integrated Planning and Reporting:

- uses a quadruple bottom line approach covering economic, environmental, social and civic leadership factors. The integrated nature of these factors is recognized.
- stakeholders have considerable input into the development of strategic plans. The community identifies its main priorities and aspirations for their future. This type of approach assists stakeholder to own their future and engage in the decision making process.
- works well as a framework designed to strengthen planning and reporting at local government level.

What are the key challenges this initiative has faced?

Criteria: Philosophy, Resilience thinking, Robustness, Adaptive approach

NSW Integrated Planning and Reporting:

- is not consistently based on any one management, scientific or NRM philosophy, including resilience thinking. Individual plans can be based on different concepts, depending on community input.
- does not use pre-defined indicators. Each plan must identify assessment methods for determining the achievement of objectives, and the process for doing this is well-defined. However, there is little guidance on ensuring that indicators are scientifically relevant to the change they wish to detect, or that they cover processes operating at multiple scales.
- plans are reviewed every four years, but the review is not explicitly formalized into an adaptive process. Active adaptive management could assist the uptake of learning from program activities.

What important things could the NSW Natural Resources MER Strategy learn from this initiative?

From NSW Integrated Planning and Reporting, the NSW Natural Resources MER Strategy could learn about:

- integrating economic, environmental, social and civic leadership in NRM planning.
- capturing and translating community aspirations into forward-looking plans and strategies.

i)

Environmental Monitoring and Assessment Program (EMAP – United States)

What are the key strengths of this initiative?

Criteria: Robustness, Reference approach, Triggers, Data quality control, Data storage, Method-policy alignment, Administrative arrangements, Impact, Cost effectiveness (9 of the 20 criteria)

The Environmental Monitoring and Assessment Program:

- used a comprehensive research program to determine the relationships between indicators and environmental change. Thus, indicators are scientifically relevant for the changes they wish to detect.
 - incorporates a reference approach, where natural variation can be distinguished from environmental degradation.
 - indicators can become biocriteria under the Clean Water Act, thereby becoming legislative and regulatory instruments.
 - has sound quality control processes, particularly on biological sampling, and is supported by a data storage program.
 - aimed to design better monitoring programs and more cost-effective environmental indicators . The program achieved this aim and the US EPA administers the use of the monitoring programs under the Clean Water Act. Thus, the program has clear method-policy alignment and administrative arrangements set within legislation. It also has high impact among policy makers because of its legislated function.
-

i) cont.

What are the key challenges this initiative has faced?

Criteria: Philosophy, Resilience thinking, Fast and slow variables, Interdisciplinarity, Stakeholder design, Adaptive approach, Program flexibility, Visibility

The Environmental Monitoring and Assessment Program:

- although founded on a strong monitoring research program, EMAP does not use a clearly stated conceptual premise, and does not include elements of resilience thinking.
- does not include indicators operating at different time or spatial scales. Degradation occurring at temporal and spatial scales other than that measured may be missed by this initiative.
- focuses on biophysical indicators of environmental degradation, and does not consider the influences that social or economic factors may have on environmental change.
- is generally designed by scientists, for agency scientists, with a heavy focus on rigorous statistical methods. Input from stakeholders other than scientists has been limited. EMAP is highly visible within the EPA but not necessarily outside the organization, apart from the science community.
- does not use active adaptive management to adopt new information gleaned through the monitoring program.

What important things could the NSW Natural Resources MER Strategy learn from this initiative?

From The Environmental Monitoring and Assessment Program, the NSW Natural Resources MER Strategy could learn about:

- the philosophy and application of a referential approach to environmental assessment.
- the use of indicators as triggers within a legislative environment.

j)

Sustainable Rivers Audit & Monitoring, Evaluation and Reporting Strategy (Australia)

What are the key strengths of this initiative?

Criteria: Philosophy, Resilience Thinking, Robustness, Referential Approach, Stakeholder Design, Visibility, Adaptive Approach, Data Quality Control. (8 of the 20 criteria)

The Sustainable Rivers Audit & Monitoring, Evaluation and Reporting strategy:

- has a good conceptual basis for the themes which it considers. A strong philosophical or theoretical basis is important because it ensures that the initiative is underpinned by sound academic principles.
- acknowledges resilience and the influence of humans, variability of flow and scale. Resilience thinking is an emerging paradigm of NRM. It is being applied in many initiatives worldwide, including in NSW.
- is robust in that it considers indicators that cover a range of ecosystem components. Robustness is important because indicators must be scientifically relevant for the environmental changes they need to detect.
- explicitly uses a referential approach. A referential approach is able to distinguish natural variation in environmental processes from anthropogenic influences on these processes.
- uses stakeholder input from regional, state and national programs which link to the SRA through shared conceptual models. Stakeholders have high buy-in to the management processes and are generally satisfied with outcomes. Contemporary philosophies of Natural Resource Management emphasize the importance of stakeholder ownership of decision making processes. Successful NRM programmes generally have a high degree of stakeholder engagement from the outset.
- is well known and respected throughout the stakeholder community. Promoting high visibility among stakeholders enhances the uptake of outcomes in public policy.
- incorporates flexibility and accessibility into its design to allow for future revisions of the program. Adaptive management is a key principle of contemporary NRM. It entails ongoing learning, assessment and adaptation at all stages of the management cycle rather than just at the end of the cycle.
- uses data from a number of state and territory agencies, which is scrutinized using a range of QA/QC procedures. Sound data management is a critical element of NRM to ensure accurate environmental assessments.

j) cont.

What are the key challenges this initiative has faced?

Criteria: Fast and Slow Variables, Triggers

The Sustainable Rivers Audit & Monitoring, Evaluation and Reporting strategy:

- includes variables that relate to a range of spatial and temporal scales, although there is a tendency to lump up smaller scale attributes to larger scales, which is not hierarchically sound.
- monitors environmental health, and therefore has the potential to identify adverse environmental change, however, there does not appear to be any specific mechanism to trigger a policy or regulatory response to this. Environmental assessments need to be coupled with some mechanism to trigger policy or regulatory responses to adverse environmental findings.

What important things could the NSW Natural Resources MER Strategy learn from this initiative?

From The Sustainable Rivers Audit & Monitoring, Evaluation and Reporting strategy, the NSW Natural Resources MER Strategy could learn about:

- setting the NSW MER in a strong theoretical framework that operationalizes elements of resilience thinking
- using a reference approach for the monitoring of environmental change over time.
- building visibility among the stakeholder community.

k)

Conservation by Design (United States, applied to projects worldwide)

What are the key strengths of this initiative?

Criteria: Philosophy, Interdisciplinarity, Stakeholder design, Stakeholder response, Method-policy alignment, Administration arrangements, Visibility, Impact, Cost effectiveness, Adaptive approach (10 of the 20 criteria)

Conservation by Design:

- is based on principles of adaptive management. A strong philosophical or theoretical basis is important because it ensures that the initiative is underpinned by sound academic principles.
 - is strongly interdisciplinary and includes biophysical, social and economic factors in the design of projects.
 - uses stakeholder input as a key element of the design of each project. The initiative recognizes that conservation does not work without stakeholder involvement.
 - is part of a not-for-profit organization whose activities align with their conservation goals. Thus, the initiative has strong method-policy alignment.
 - uses its status as a not-for-profit organization to leverage against related initiatives and attract funding from government and business sources.
 - is part of a well respected organization with over a million members and high visibility in many countries. High visibility of conservation projects enhances their uptake into public policy.
 - is cost-effective by being accountable to members of the Nature Conservancy. This reduces the chance of money being wasted on flawed initiatives.
-

k) cont.

What are the key challenges this initiative has faced?

Criteria: Resilience thinking, Robustness, Fast and slow variables, Reference approach, Data availability, Data quality control, Data storage

Conservation by Design:

- does not consider systems holistically, from a resilience perspective, although social indicators are included.
- collects indicators specific to programmes, but these indicators are not necessarily linked to the environmental processes at hand.
- does not include variables at multiple scales, to reflect the environmental processes at hand.
- does not use a reference approach to assess environmental condition. Thus, it is difficult to differentiate natural variation from anthropogenic influences.
- does not have formalized quality control, data storage and data management processes in place for its projects. This may reduce the utility of project data, particularly environmental monitoring data.

What important things could the NSW Natural Resources MER Strategy learn from this initiative?

From Conservation by Design, the NSW Natural Resources MER Strategy could learn about:

- incorporating biophysical, social and economic factors into programs.
 - becoming highly visible to stakeholders and the public.
 - working with stakeholders to design conservation and other projects.
-

l)

Mekong River Commission State of the Basin Reporting (South East Asia)

What are the key strengths of this initiative?

Criteria: Interdisciplinarity, Stakeholder design, Stakeholder response, Method-policy alignment, Impact (5 of the 20 criteria)

The Mekong River Commission State of the Basin Reporting:

- the State of the Basin reporting includes social, environmental and economic trends. There is recognition that social, environmental and economic trends are closely linked to the State of the Basin in this inter-country, multi-party reporting exercise.
- has good stakeholder buy-in. The Mekong River Commission is a multi-party group that has impact and is well supported in the region.

What are the key challenges this initiative has faced?

Criteria: Philosophy, Robustness, Fast and slow variables, Reference approach, Adaptive approach, Triggers, Data availability, Data quality control, Data storage

The Mekong River Commission State of the Basin Reporting:

- is not set within an underlying scientific or NRM philosophy. Rather, it reports the state of key parameters.
- indicators convey the important social, environmental and economic factors in the Basin, but the reporting has only been conducted once, so it is difficult to assess whether indicators are relevant for detecting change.
- does not include indicators measured across different spatial and temporal scales.
- does not use a reference approach to distinguish natural variation from anthropogenic influences.
- has no adaptive learning mechanisms built into the initiative. Adverse environmental trends do not necessarily trigger management responses, but the State of the Basin Report does provide broad information for governments. Mechanisms to learn from findings, through review or through policy response, are an essential part of successful NRM initiatives.
- uses data that are generally collected by member countries with individual quality control procedures. The State of the Basin report is not accompanied by an accessible central database of information.

What important things could the NSW Natural Resources MER Strategy learn from this initiative?

From the Mekong River Commission State of the Basin Reporting, the NSW Natural Resources MER Strategy could learn about:

- integrating social, environmental and economic trends in multi-party reporting.

m)

Danube River Basin Management Plan (Europe)

What are the key strengths of this initiative?

Criteria: Robustness, Method-policy alignment, Impact, Data quality control, Data storage (5 of the 20 criteria)

The Danube River Basin Management Plan:

- is closely aligned with the requirements of the Water Framework Directive. A joint programme of measures describes improvements in water status, based on each national programme of measures. Thus, the Plan supports high-level policy objectives within and between countries of the basin.
- uses environmental indicators derived for use in the Water Framework Directive. These indicators are derived within a Driver, Pressure, State, Impact, Response model, which links indicators with pressures on aquatic ecosystems.
- is a multi-lateral instrument in which agreements between countries need to be strong and well-defined. To achieve this, the policy has to be high impact among policy makers and governments.
- uses data collected in the Transnational Monitoring Network, which is accompanied by well-defined data quality control and storage requirements. A database of Danube River Basin environmental data is also available online.

What are the key challenges this initiative has faced?

Criteria: Philosophy, Fast and slow variables, Reference approach, Interdisciplinarity, Stakeholder design, Adaptive approach, Triggers

The Danube River Basin Management Plan:

- does not use an underlying scientific or NRM philosophy to underpin its reporting parameters.
- uses standard, small-scale biophysical monitoring indicators, rather than indicators at a range of temporal and spatial scales or across environmental, social and economic domains. Trends of environmental change may not be able to be detected with these parameters, particularly without a reference approach.
- does not specify an adaptive approach for managing the Danube River Basin.
- can grant stakeholders observer status to the Commission, but it is not sure how much input stakeholders have into the Basin Plan.
- uses ranges of parameters to describe improvements in water status, but it is not clear whether a management response is triggered if parameters fall outside these ranges.

m) cont.

What important things could the NSW Natural Resources MER Strategy learn from this initiative?

From The Danube River Basin Management Plan, the NSW Natural Resources MER Strategy could learn about:

- implementing a Basin Plan within a multi-lateral legislative environment.
 - data management strategies in a multi-lateral environment.
-

3. Factsheets

Factsheets were developed to summarize the background, policy context and MER content of each initiative.

The factsheets cover:

Name of organization

Location

Audience and use – the general audience of the initiative and the policy setting

Key policy & management issues – the key policy mechanisms or management issues driving the initiative

Budget – amount allocated to the initiative or the organization. Notes on the budget information are provided in the List of Information Sources at the end of this document.

Linkages with NSW MER – links in policy or legislation between the initiative and the NSW MER strategy

Broad approach to monitoring, evaluation and reporting – overview of how the initiative goes about monitoring, evaluating and reporting on the NRM issues at hand

Initiative	Strategic Adaptive Management
Organization	South African National Parks
Location	South Africa-wide Strategic Adaptive Management originated in Kruger National Park (KNP), but is currently being implemented by all South African National Parks (SANParks).
Audience and use	The National Environment Management: Protected Areas Act No. 57 of 2003 (NEM: PAA) requires that SANParks produces management plans for all national parks in consultation with stakeholders. In addition to NEM: PAA the preparation of park management plans by SANParks is governed by: <ul style="list-style-type: none"> • Related legislation such as the <i>National Environmental Management Biodiversity Act</i> (NEM: BA); • National policy; and, • International conventions that have been signed and ratified by the South African Government.
Key policy & management issues	The primary mandate of SANParks is to conserve South Africa's biodiversity. Strategic Adaptive Management is a tool used to conserve and manage biodiversity in national parks.
Budget	The total audited budget of SANParks in 2009/10 was R912 million (approximately AU\$130 million), of which 47% was used in the conservation program. The projected budget for conservation management within Kruger National Park for 2009/10 was R21.3 million (approximately AU\$3 million).
Linkages with NSW MER	None established
Broad approach to monitoring, evaluation and reporting	Strategic Adaptive Management is: <p>Strategic – acting with foresight and purpose;</p> <p>Adaptive – learning while doing; and,</p> <p>Participatory – engaging and empowering stakeholders.</p> <p>A key element of Strategic Adaptive Management is to develop a <u>shared vision</u> for the desired state of the park. Stakeholders must agree on the social, technical, economic and political context and attributes of the system to be managed, and the values and principles that guide management.</p> <p>Objectives are defined and arranged into an <u>objectives hierarchy</u>. Kruger National Park's objectives hierarchy has four broad themes:</p> <ul style="list-style-type: none"> • Biodiversity and ecosystem; • Integrating (parks as social-ecological systems); • People (constituency and cultural resources); and, • Enabling (support to enable other objectives).

Objectives are then broken into lower and lower levels until they represent priority, achievable and measurable goals for management. Once the vision and objectives are clearly defined, and agreed to by all stakeholders, park management has a defensible purpose and clear focus. Objectives hierarchies are reviewed every five years.

Monitoring the desired state uses Thresholds of Potential Concern (TPCs). TPCs are upper and lower boundaries of change in selected indicators. TPCs acknowledge that system parameters fluctuate in space and time, but can also be used to set targets to strive towards. When the indicator approaches the undesirable zone the desired state may be in jeopardy, and managers are alerted. Modelling can be used to predict the behavior of an indicator and thus give an early warning to managers that a TPC is likely to be breached.

Many TPCs are still under development, particularly for the integrating and people objectives. The following TPCs have been tabled for Kruger National Park:

- Plant and animal dynamics
- Fire
- Species of conservation concern
- Degradation
- Heterogeneity
- Invasive alien biota
- Bovine tuberculosis
- River geomorphological diversity, terrestrialisation and sedimentation
- River flow and water quality
- River health, specified through fish assemblages

Monitoring against TPCs takes place according to the spatial and temporal scales at which the indicator operates. For example, geomorphological diversity is measured every 5 years from aerial photographs, because geomorphological change is linked to the hydrological regime at that scale.

Reporting on the state of TPCs is currently done internally within a park. There are plans to implement an annual State of Biodiversity Report for KNP.

Initiative	European State of the Environment Reporting
Organization	European Environment Agency
Location	32 European Union Countries
Audience and use	<p>The European Environment Agency is an agency of the European Union. The EEA provides sound, independent information on the environment and is a major information source for those involved in developing, adopting, implementing and evaluating environmental policy, and also the general public. The EEA also coordinates the European environment information and observation network (Eionet).</p> <p>The EEA's main clients are policy makers including the European Union institutions (the European Commission, the European Parliament, the Council), the 32 member countries, and other EU institutions such as the Economic and Social Committee and the Committee of the Regions. The business community, academia, non-governmental organisations and other parts of civil society are also important users of EEA information.</p>
Key policy & management issues	<p>The European Environmental Agency exists under Regulation (EC) No 401/2009 of the European Parliament of 23 April on the European Environment Agency and the European Environment Information and Observation Network (Codified version).</p> <p>Under Article 2, the EEA is required to to publish a report on the state of, trends in and prospects for the environment every five years, supplemented by indicator reports focusing upon specific issues.</p> <p>The Agency also has responsibility for other functions related to the recording, collation and communication of environmental data across the EU member states.</p>
Budget	In the 2009 financial year, the budget for integrated environmental assessments was EUR 327,387. The total operating budget for the European Environmental Agency in the same year was EUR 15,870,218. Staff costs were an additional EUR 18,195,510.
Linkages with NSW MER	None established
Broad approach	<p>The 2010 State of the Environment Report is a large, comprehensive set of documents, reporting individual themes, individual countries, global megatrends and an overall summary.</p> <p>Thematic assessments (13) – one report on each of understanding climate change, mitigating climate change, adapting to climate change, biodiversity, landuse, soil, marine & coastal environment, consumption & environment, material resources & waste, water resources: quantity & flows, freshwater quality, air pollution, urban environment.</p> <p>Country assessments (38) – each report includes a country profile, national and regional stories and environmental themes (climate change mitigation, landuse, nature protection and biodiversity, waste, freshwater, air pollution).</p> <p>Assessment of global megatrends (1) – one report covering social,</p>

technological, economic, environmental & political megatrends.

Synthesis report (1) – one report summarizing the thematic assessments, country assessments and global megatrends.

Data for the State of the Environment Report are provided by member countries, and coordinated using a system database called the European Environment and Information Observation Network. Data are available online.

State of the Environment Reporting uses a Driving forces, Pressure, State, Impact, Response (DPSIR) to guide the selection of indicators in reports. The state (S) is the result of specific drivers (D) and pressures (P), positive or negative, which impact (I) the environment. The responses (R) represent the solutions (e.g. policies, investments) for what should then be done to improve or maintain that state. The report also looks at "outlooks" (O) for the state of the environment – namely, what will happen to that state over time (e.g. 2020, 2050) based on various scenarios. Data are presented in each report to address each component.

The State of the Environment Report is the EEA's flagship report published every five years.

The 2010 State of the Environment Report also attempts to articulate the implications of its findings for European transport, energy, agricultural, fisheries, structural, biodiversity, climate change, water, air and waste policy.

Initiative	The National Plan for Environmental Information
Organization	Australian Government Department of Sustainability, Environment, Water, Population and Communities
Location	Australia-wide
Audience and use	The National Plan for Environmental Information (NPEI) initiative is aimed at improving the quality and coverage of Australian environmental data and information. The initiative will consider Government collected data and will streamline the environmental information functions of the Government, with a view to prioritising data collection in the future and to make existing data more available.
Key policy & management issues	This initiative is focused on information relating to the environment across four themes (air, land, oceans and water). The theme will also address better integration and collaboration between different Government initiatives relating to the collection, storage and analysis of environmental information.
Budget	\$18 million over 4 years
Linkages with NSW MER	May potentially look to incorporate information collected as part of MSW initiatives.
Broad approach	<p>The National Plan for Environmental Information initiative appears to be still in the early stages of development. The initiative consists of a number of inter-related elements revolving around:</p> <ul style="list-style-type: none"> • An independent review to look at Australian Government activity and processes for the management, use and investment in environmental information. This will hope to identify opportunities for consolidation, integration and better collaboration between different initiatives. • The development of legislation to provide a mandate for the Australian Governments environmental information activity. • A strategic plan outlining the Australian Governments long term plan for environmental information. • Developing priority setting arrangements to determine whole-of-government priorities for environmental information. • A data review to develop catalogues of key data sets of relevance to the NPEI initiative and stratify these according to their condition and value. • The development of an environmental information infrastructure to provide a scalable environmental data management system which preserves and exposes the country's investment in environmental data. • The development of demonstrator products and data services across four environmental themes (air, land, oceans and water). • Developing standards to facilitate efficient data discovery; enable ease of data exchange between software and people; aggregate

	<p>data across spatial scales of reporting units and; support novel interoperability-dependent technologies.</p> <ul style="list-style-type: none">• Develop an environmental accounting framework focusing on scoping the feasibility of developing national environmental accounts for Australia. <p>The National Plan for Environmental Information initiative plans to establish the Bureau of Meteorology as the Australian Government authority on environmental information.</p>
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Initiative	Framework for Determining Commonwealth Watering Actions
Organization	Commonwealth Environmental Water Holder
Location	Murray-Darling Basin
Audience and use	The Commonwealth Environmental Water Holder (CEWH) has been established as a holder and manager of tradable water entitlements, and sits under the federal Department of the Environment, Water, Heritage and the Arts. The Framework for determining Commonwealth environmental watering actions within the Murray-Darling basin was developed and implemented over the period 2009-2011, prior to the development of the Environmental Watering Plan (EWP) within the MDBA's Basin Plan. The framework will be adapted in accordance with the EWP once it becomes available.
Key policy & management issues	The framework sits within the broader water resource management reforms occurring within the Murray-Darling Basin in response to the <i>Water Act 2007</i> . Specifically the framework deals with how best to use held environmental water to benefit key environmental assets and ecosystem processes across the basin.
Budget	The Commonwealth Water Holder anticipates \$14.6 million for the environmental water holdings special account between 2009 and 2011.
Linkages with NSW MER	None established
Broad approach	<p>The framework outlines a process by which the CEWH can make determinations on the use of available environmental water in any given year. This process will need to match water availability with water demand and should be based on a robust, scientifically defensible decision framework, in accordance with multi-year ecological and operational considerations, and be flexible to changing conditions and knowledge.</p> <p>The framework for determining environmental watering actions will help ensure that the Commonwealth's water is used for the best environmental outcomes that can be achieved with the volume of water that is available, and under the operational constraints that will limit options on its use. It will be based on clear ecological and management objectives and be supported by a consistent decision making process; one that allows a prioritization of actions to occur in consideration of both immediate and longer-term needs.</p> <p>The framework outlines a four step process by which to prioritise environmental water in the Basin. This involves;</p> <ol style="list-style-type: none"> 1. <i>Assessing total water availability</i> <p>This involves knowing how much and when water will become available and also its location and where it can be successfully delivered.</p> 2. <i>Determining the watering options in-scope at each asset</i> <p>At the start of each watering year it will be important that there is an understanding of all the options in-scope across the Basin. This will be</p>

a combination of current water needs of an asset (taking into consideration recent flow history) and the forecast of total water availability for that year.

3. *Determining ecological priorities for the year*

This would involve a prioritisation based on the basin-wide ecological significance of each asset, its ecological functions in the context of the basin and the nature of the biodiversity affected.

4. *Determining watering actions for the year*

Assessment of ecological objectives is then prioritised based on watering risks, management arrangements, cost effectiveness, follow-up water requirements and ecological opportunities costs to determine the feasibility and most effective use of available water.

In addition the framework also outlines a three step process for co-operative environmental watering with other environmental water holders and managers throughout the Basin. This includes:

1. *The scoping and consultation phase – strategic overview*

Clarifying the amount of water available across the basin and the aims and objectives of delivery partners water programs

2. *The prioritisation phase*

This would allow each watering partner a chance to prioritise specific actions based on the water volume that they expect to have available to them. By working collaboratively, this would allow for the formulation of a basin-wide list of priority actions to be undertaken by each partner

3. *The delivery phase*

This step would ensure complementary and cost-effective use of water, including the opportunity of multiple uses for the same water release.

Initiative	Victorian River Health Strategy
Organization	Victorian Department of Sustainability and the Environment
Location	Victoria
Audience and use	<p>The Victorian River Health Strategy (VRHS) provides the framework in which the Government in partnership with the community will make decisions on the management and restoration of Victoria’s rivers.</p> <p>The Victorian Government is committed to the concept of Ecologically Sustainable Development. It aims to build principles of Ecologically Sustainable Development into the process of decision making across the whole of Government. The Victorian Government is also a signatory to the 1994 Agreement on Water Reform by the Council of Australian Governments.</p> <p>The Victorian River Health Strategy will ensure that rivers are managed in accordance with other relevant Victorian Government policies such as the <i>State Environment Protection Policy</i>, the <i>Victorian Biodiversity Strategy</i>, the <i>Victorian Nutrient Management Strategy</i>, <i>Victoria’s Salinity Management Framework</i> and the <i>Victorian Coastal Strategy</i>.</p>
Key policy & management issues	<p>Rivers bring substantial economic and social benefits to Victoria, but many are also degraded or under enormous pressure. Decisions about how to use rivers will require consideration of the tradeoffs between use and environmental condition.</p> <p>The challenge is to improve the current pattern of river condition to one which will provide for the needs and aspirations of all Victorians now and in the future, whilst promoting sustainable regional development. This requires a management framework for the State that will ensure that responsible community decisions are made about how we use and manage rivers.</p> <ul style="list-style-type: none"> • a common vision for the management of rivers in Victoria; • statewide targets for river restoration; • a planning framework which: <ul style="list-style-type: none"> - is based on community decision-making within an integrated catchment management (ICM) context, - balances environmental, economic and social needs, - integrates the management of all activities impacting on rivers, and - is based on the best available scientific understanding of river functioning and is responsive to new knowledge; • criteria for priority setting for investment in river protection and restoration; • an overview of government policy relating to the management of activities affecting river health, including • environmental flows and water allocation; and • the institutional arrangements for the management of river health in Victoria.

Budget	The Victorian River Health Program is delivered in partnership with catchment management authorities. The Program is responsible for the delivery of the Victorian River Health Strategy and meeting Government's commitment to significantly improve the health of Victoria's rivers, floodplains and estuaries. With an annual budget of over \$30 million, this is the one of the largest river health programs in Australia.
Linkages with NSW MER	None established
Broad approach	<p>The Victorian River Health Strategy starts with a vision for the management of rivers in Victoria:</p> <ul style="list-style-type: none"> • Our rivers that are of the greatest value to the community will be protected as part of our natural heritage; • Our rivers will be ecologically healthy, managed within healthy catchments; • Our communities will be confident and capable, appreciating the values of their rivers, understanding their dependency on healthy rivers and actively participating in decision-making. <p>An integrated management framework is then derived to implement management approaches needed to achieve the vision. The management framework consists of:</p> <ul style="list-style-type: none"> • Protection of high value rivers; • Maintenance of ecologically healthy rivers; and, • Overall improvement in the environmental condition of the remainder of Victoria's rivers. <p>Five and ten year regional targets are set for river protection and restoration through community driven regional planning processes. These targets are the mechanisms within regions for protecting high value rivers, maintaining healthy rivers and improving the remainder of Victoria's rivers. Targets include:</p> <ul style="list-style-type: none"> • Managing and improving environmental flow • Riparian restoration • Instream habitat and connectivity • Water quality • Protecting community assets <p>The Victorian River Health Strategy of 2002 is due for review in 2011 as the Victorian Strategy for Healthy Rivers, Estuaries and Wetlands.</p>

Initiative	South East Queensland Healthy Waterways Strategy
Organization	Healthy Waterways Partnership (approx. 110 partners)
Location	South East Queensland (SEQ)
Audience and use	<p>The SEQ Healthy Waterways Strategy is an integrated set of activities which the SEQ Healthy Waterways Partners have committed to initiating during the period 2007 to 2012 as part of a longer-term program for achieving the SEQ Healthy Waterways Vision by 2026. This vision states:</p> <p style="text-align: center;"><i>By 2026, our waterways and catchments will be healthy ecosystems supporting the livelihoods and lifestyles of people in South East Queensland, and will be managed through collaboration between community, government and industry.</i></p>
Key policy & management issues	The strategy is primarily concerned with improving the ecosystem health of eastern draining waterways within south east Queensland. More specifically it addresses the following management areas; point source pollution, non-urban diffuse source pollution, water sensitive urban design, protection and conservation, coastal algal blooms, ecosystem health monitoring, communication, education and motivation and lastly management strategy evaluation.
Budget	Approx \$36.6 million over the period 2009 – 2013.
Linkages with NSW MER	None established
Broad approach	<p>The south east Queensland healthy waterways strategy is a special collaboration for the SEQ region between government, industry, researchers and the community. These Partners work together to improve catchment management and waterway health in the eastward-draining rivers of SEQ (between Noosa and the Queensland-New South Wales border) and Moreton Bay. The Partners and supporting organisations were responsible for developing and implementing the South East Queensland Regional Water Quality Management Strategy (SEQRWQMS 2001) and have now developed its successor, the SEQ Healthy Waterways Strategy or SEQHWS.</p> <p>The SEQ Healthy Waterways Strategy is an integrated set of activities which the SEQ Healthy Waterways Partners have committed to initiating during the period 2007 to 2012 as part of a longer-term program for achieving the SEQ Healthy Waterways Vision by 2026.</p> <p>SEQ's waterways support a range of Environmental Values (EVs) that underpin both the regional economy and the lifestyles of the residents. The SEQHWS deals with aquatic ecosystem health and water quality issues in SEQ, and contains measures by which the impacts of human activities on aquatic ecosystems can be avoided or ameliorated.</p> <p>The Strategy:</p> <ul style="list-style-type: none"> • Aims to ensure that the health of SEQ's waterways is maintained or improved in the face of one of the highest rates of population growth in Australia;

- Recognises that the growing significance of long-term security of water supplies in SEQ highlights the importance of maintaining water quality – a key aspect of waterway health, and a key benefit of healthy aquatic ecosystems;
- As the successor to the South East Queensland Regional Water Quality Management Strategy 2001, builds on many years of cooperative effort by the SEQ Healthy Waterways Partnership;
- Works toward a SEQ Healthy Waterways Vision for twenty years hence;
- Has a nominal five-year timeline but contains many actions with longer timelines;
- has been collaboratively prepared by the Partnership, which includes State Government agencies, all SEQ local Councils, and a range of industry and community groups;
- is an important component of the group of plans and strategies which together put the SEQ Regional Plan into effect; and,
- Supports or puts into effect key elements of many other State and regional policy and planning documents, including the SEQ Regional Coastal Management Plan and the Strategy for the Conservation and Management of Queensland Wetlands, as well as supporting Australia’s commitments under international agreements such as the Ramsar Convention, Japan-Australia and China-Australia migratory bird agreements.

The strategy has set up a number of resource condition and community targets, which revolve around improving or maintaining waterway ecological condition, water quality, flow regimes, and promotion of community involvement in natural resource management. To reach these targets the strategy has established a number of action plans. These include:

Issue-based Action Plans

1. Point Source Pollution Management Action Plan
2. Non-Urban Diffuse Source Pollution Management Action Plan
3. Water Sensitive Urban Design Action Plan
4. Protection and Conservation Action Plan
5. Coastal Algal Blooms Action Plan

Enabling Action Plans

6. Ecosystem Health Monitoring Program
7. Communication, Education and Motivation Action Plan
8. Management Strategy Evaluation Action Plan

Area-Based Action Plans

9. Moreton Bay Action Plan
10. Northern Catchments Action Plan
11. Bremer Catchment Action Plan
12. Logan-Albert Action Plan

Initiative	Northern Rivers CMA Ecohealth Report Card
Organization	Northern Rivers Catchment Management Authority
Location	Coastal North-eastern NSW
Audience and use	<p>The purpose of the Northern Rivers CMA is to engage regional communities in Natural Resource Management priorities and to facilitate NSW Government funded NRM programs and policy priorities at a regional level to assist in achieving targeted State NRM outcomes.</p> <p>The Northern Rivers CMA Vision is for the Northern Rivers community to be actively engaged in maintaining and restoring natural resources to sustainable levels.</p>
Key policy & management issues	<p>The Northern Rivers CMA has a suite of responsibilities under the Catchment Management Authorities Act. The organization's MER Strategy addresses Australian and NSW Government reporting requirements, including annual reports on resource condition trends.</p> <p>The Northern Rivers Aquatic Ecosystem Health Monitoring Program (Ecohealth) is a catchment based estuarine and freshwater monitoring and reporting program currently being trialed by Councils in the Northern Rivers Catchment Management Authority area. The trial takes place within the NSW Integrated Planning and Reporting framework.</p> <p>The information generated by the Ecohealth Report Card allows Local Government and other natural resource managers to better manage aquatic ecosystems and evaluate natural resource management activities for their effectiveness.</p> <p>A pilot Ecohealth Report Card was produced for the Bellinger and Kalang Rivers in 2011.</p>
Budget	Unknown
Linkages with NSW MER	The CMA's MER Strategy addresses Australian and NSW Government reporting requirements, including annual reports on resource condition trends.
Broad approach	<p>Scientifically robust, quality-assured data generated by Ecohealth gives a complete picture of the current state of the region's waterways, using standardized sampling and analysis, centralised data management and interpretation, catchment-wide reporting, standard triggers for action and targeted management responses, and enhanced community awareness.</p> <p>The Ecohealth Report Card provides an assessment of four system elements to assess ecosystem health of individual waterways and catchments:</p> <ol style="list-style-type: none"> 1. Water quality 2. Riparian (river bank) vegetation condition 3. Fish assemblage 4. Macroinvertebrates <p>The calculation of standardized scores for the Ecohealth program involves the</p>

use of 'trigger values' or thresholds where, when exceeded, may result in an impact on the health of the system. Condition scores are then calculated based on whether, and how often the measured values exceeded environmental guidelines. At each site, indicators are then graded along a continuum of Excellent, Good, Fair, Poor or Very Poor condition.

The Ecohealth Report Card, issued yearly, is designed to inform the community about the health and specific needs of waterways in their local catchments. It provides quality information in an easy to understand summary format. Regular sampling updates are also provided to partner organisations.

Initiative	NSW Integrated Planning and Reporting
Organization	NSW Government Division of Local Government
Location	New South Wales
Audience and use	<p>Integrated Planning and Reporting is a new planning and reporting framework for NSW local government. It replaces the former Management Plan and Social Plan with an integrated approach that recognizes the integrated nature of environment, community, economy and politics.</p> <p>The role of the Division of Local Government in the planning process is to build the framework, to provide guidance and assistance to councils in implementing it and to check that it is working. Each council's role is to use the planning process creatively, for the benefit of their communities.</p>
Key policy & management issues	<p>As part of the NSW Government's commitment to a strong and sustainable local government system, the Local Government Amendment (Planning and Reporting) Act 2009 was assented to on 1 October 2009. The specific aims of the Integrated Planning and Reporting framework are to:</p> <ul style="list-style-type: none"> • improve integration of various statutory planning and reporting processes undertaken by councils as required by the Local Government Act 1993, the Department's Guidelines and the Environmental Planning and Assessment Act 1979; • strengthen councils' strategic focus; • streamline reporting processes; and, • ensure that the Local Government Act 1993 and the Integrated Planning and Reporting Guidelines support a strategic and integrated approach to planning and reporting by local councils.
Budget	Unknown
Linkages with NSW MER	None known
Broad approach	<p>NSW Integrated Planning and Reporting has several integrated components:</p> <ol style="list-style-type: none"> 1. Prepare a community strategic plan <p>The purpose of the plan is to identify the community's main priorities and aspirations for the future and to plan strategies for achieving these goals. The community strategic plan must cover a period of at least 10 years. It is up to each community to decide what the underpinning principles will be for its Community Strategic Plan. However, the community strategic plan must incorporate social justice principles (equity, access, participation, rights) and the quadruple bottom line (social, environmental, economic, civic leadership).</p> <p>The Community Strategic Plan must identify assessment methods for determining whether the objectives are being achieved.</p> 2. The resourcing strategy <p>The resourcing strategy identifies the time, money, assets and people</p>

needed to carry out the community strategic plan. The resourcing strategy consists of long term financial planning, workforce management planning and asset management planning.

3. **The delivery program**

This program translates the community's strategic goals into actions.

4. **The operational plan**

The operational plan is an annual plan setting out the details of the individual projects and activities that will be undertaken to achieve the commitments made in the delivery program.

5. **Annual report**

The Annual Report focuses on Council's implementation of the Delivery Program and Operational Plan because these are the plans that are wholly the council's responsibility.

Reporting and evaluation timeframes differ for each component:

Community strategic plan - From 2012, each newly elected council must review the Community Strategic Plan within nine months of the local government elections and roll the planning period forward by at least 4 years (so that it is always a 10 year minimum plan). The review must include a report on the implementation and effectiveness of the past 4 years, a review of the content of the original plan, and engagement with the community.

Resourcing strategy - Councils must report on the condition of their assets in their annual financial statements in line with the Local Government Code of Accounting Practice and Financial Reporting.

Delivery programme - The General Manager must ensure that progress reports are provided to the council, with respect to the principal activities detailed in the Delivery Program, at least every 6 months. The General Manager must ensure that progress reports are provided to the council, with respect to the principal activities detailed in the Delivery Program, at least every 6 months. Council must review its Delivery Program each year, before preparing the Operational Plan.

Operational plan - Council must have an annual Operational Plan, adopted before the beginning of each financial year, outlining the activities to be undertaken in that year, as part of the Delivery Program. The responsible accounting officer of council must report quarterly (except the June quarter) to council on the budget in the Operational Plan.

Annual report - Council must prepare an annual report within five months of the end of the financial year. The main focus of the Annual Report is Council's progress in implementing its Delivery Program and Operational Plan. The State of the Environment report is now due once every four years. It is to be included in the Annual Report in the year of the ordinary election. It must report on the environmental objectives in the Community Strategic Plan.

Initiative	Environmental Monitoring and Assessment Program (EMAP)
Organization	United States Environmental Protection Agency (US EPA)
Location	US-wide
Audience and use	<p>The Environmental Monitoring and Assessment Program was a research program run by EPA's Office of Research and Development to develop the tools necessary to monitor and assess the status and trends of national ecological resources.</p> <p>EMAP aimed to advance the science of ecological monitoring and ecological risk assessment, guide national monitoring with improved scientific understanding of ecosystem integrity and dynamics, and demonstrate multi-agency monitoring through large regional projects. EMAP developed indicators to monitor the condition of ecological resources. EMAP also investigated designs that addressed the acquisition, aggregation, and analysis of multi-scale and multi-tier data.</p> <p>EMAP collected field data from 1990 to 2006. Monitoring of aquatic resources is now being routinely conducted by the National Aquatic Resource Surveys, run by EPA's Office of Water.</p>
Key policy & management issues	<p>The EMAP approach is to remove the scientific uncertainties associated with developing State-based statistical monitoring designs for aquatic resources in support of Section 305(b) of the Clean Water Act. The power of this approach is that the designs provide:</p> <ul style="list-style-type: none"> • The framework for an unbiased, representative assessment of the condition of these resources with a known confidence level; • Aggregation of State data to the national level; and, • Scientifically defensible measures of changes in condition in support of the Government Performance and Results Act (GPRA). <p>EPA's focus on improving monitoring and assessment methodology derived from the need to characterize and assess environmental risk. This goal required scientific advances in the way aquatic ecosystems and their associated landscapes are measured, modeled, maintained, and restored; these issues form the basis of the Ecological Research Strategy of EPA's Office of Research and Development.</p>
Budget	Unknown
Linkages with NSW MER	None established
Broad approach	<p>To assess environmental risk, the current condition of the environment must be known and an estimate of the rate of change in that condition must be available. Through a probability-based sampling design, the EMAP approach provides a statistically-valid basis for determining aquatic ecological condition.</p> <p>EMAP recognizes that variability, both natural and anthropogenic, can reduce the accuracy of estimates of aquatic ecosystem condition. A reference condition establishes the basis for making comparisons and for detecting use</p>

impairment. It should be applicable to an individual water body, such as a stream segment, but also to similar water bodies on a regional scale.

Index sites are localized study areas that offer opportunities for intensive research and monitoring. They permit detailed research on ecological processes and mechanisms, and can serve as known points along a condition gradient. Continual monitoring at these sites can also provide estimates of seasonal variability and capture catastrophic events.

Most of the current EMAP aquatic community or assemblage indicators come from analysis of the fish, benthic macroinvertebrate and plant communities in streams, estuaries and wetlands. Indicators are selected to ensure several criteria:

- Feasibility of indicator measurement;
- Indicator responsiveness;
- Indicator variability; and,
- Indicator demonstration.

Initiative	Sustainable Rivers Audit & Monitoring, Evaluation and Reporting Strategy
Organization	Murray Darling Basin Authority (MDBA)
Location	Murray Darling Basin states (QLD, NSW, VIC, SA)
Audience and use	<p>The MDBA have several monitoring, evaluation and reporting strategies aimed at different internal programs:</p> <ul style="list-style-type: none"> • The Sustainable Rivers Audit (SRA) provides a long-term assessment of the condition and health of the 23 river valleys in the Murray—Darling Basin. • The River Murray Water Quality Monitoring Program (WQMP) is a program set up to periodically report and assess water quality, to understand the variability and to determine trends, which in turn will guide management actions along the River Murray and the lower reaches of its tributaries and storages. • The Monitoring and Evaluation Program for the Basin Plan will enable evaluation of whether the Basin Plan has been effective in achieving its objectives, and will also measure progress against targets and other outcomes.
Key policy & management issues	The MER strategies employed at the MDBA cover a range of programs concerned with managing risk to shared resources throughout the Murray-Darling Basin. Some of the key programs where these MER strategies are relevant include the Basin Plan, Native Fish Strategy and the Living Murray.
Budget	Unknown
Linkages with NSW MER	<p>Regional, state and national programs are linked to the SRA through shared methods, data, reports and conceptual frameworks. State programs include ‘State of the Environment’ reporting and monitoring the Monitoring, Evaluation and Reporting Program in New South Wales.</p> <p>The WQMP has strategic working relationships with the relevant jurisdictional organisations and has strong research partnerships with scientific organisations and academic institutions.</p> <p>One of the principles established to define the Basin Plan monitoring and evaluation program is the establishment of effective partnerships between the Australian Government and Basin states by defining clear responsibilities and obligations for Basin Plan monitoring and evaluation activities.</p>
Broad approach	<p>The SRA combines information about the status and trends of groups of environmental indicators, called Themes, in each of 23 Valleys in the Basin. These themes relate to Hydrology, Fish, Macroinvertebrates Vegetation and Physical Form. Each Theme represents a key ecosystem component.</p> <p>To facilitate comparisons between Valleys, allowing for different background conditions, the SRA employs a concept of <i>Reference Condition</i>. This describes the patterns and processes that would be expected to prevail now had there been no significant human intervention in the landscape. It is open to some uncertainty, because it is estimated rather than measured, but it is a</p>

consistent benchmark for each Theme and Valley (and Zone) in the Basin.

The design of the SRA incorporates flexibility and accessibility, in the spirit of adaptive management. Virtually all facets of the program are open to revision as more data are gathered, as environmental conditions change, and as ideas change. The data obtained by sampling or analysis are available to all interested parties, including the public, but the levels of detail, analysis, synthesis and interpretation needed by these parties may differ. With this in mind, the program is designed to provide information at several levels, from summary assessments of condition and health down to the 'raw data' for each Theme at different sites and times in each Valley.

The SRA was initiated by the Murray-Darling Basin Ministerial Council in late 2000. A framework (Whittington *et al.* 2001) was trialed in an SRA Pilot Audit of four Valleys in 2002–03 (MDBC 2004a–e), and the program formally commenced in 2004. The SRA operates on six-year cycles, with the most comprehensive reports issued at the end of each cycle.

Two kinds of reports are produced in each six-year cycle:

- *Implementation and Operations Reports* are scheduled in Years 1-2 and 4-5. These are concerned mainly with data collection, processing and analysis and quality assurance. They may contain updates about program operations and preliminary assessments of data, but not comparisons between Valleys. Such reports were issued in 2004–05 and 2005–06.
- *Audit Reports* are scheduled at three-year intervals, and will provide assessments of Condition for each Theme and Ecosystem Health for each Valley.

For the WQMP, physico-chemical parameters at 36 sites along the River Murray and the lower reaches of its tributaries, have been collected since 1978. Depending on the class of station, between 5 and 18 physico-chemical parameters are measured at weekly, monthly and quarterly intervals. The WQMP region where samples are collected is defined by Clause 45 (Schedule of the *Water Act 2007*), where the Authority must establish, maintain and operate consistent protocols for the collection and monitoring of the quality of the River Murray and the lower reaches of its tributaries.

The WQMP also has specific water quality and legislative responsibilities for the Hume Catchment which includes the major upper Murray storages of Lake Hume and Dartmouth Dam. Other basin storages include Lake Mulwala, Menindee Lakes, Lake Victoria, Lake Alexandrina and Lake Albert.

A Water Quality Advisory Panel provides jurisdictional comment and expert advice with regard to the Murray Darling Basin Authority's obligations and commitments to maintain the water quality of the River Murray, its tributaries and storages.

The monitoring and evaluation framework will address six key elements of the Basin Plan:

- ecosystem outcomes from the implementation of the Environmental Watering Plan;
- water quality outcomes from implementing the Water Quality and

	<p>Salinity Management Plan;</p> <ul style="list-style-type: none">• reporting on critical human water needs;• risks to the condition and availability of Basin water resources;• water trading and transfer rules effectively implemented; and,• socioeconomic impacts minimised.
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Initiative	Conservation by Design
Organization	The Nature Conservancy (TNC)
Location	Based in the US, but projects are world-wide in 30 countries. Protects 41 million ha of land internationally and six million ha in the United States.
Audience and use	<p>The Nature Conservancy is an NGO with over one million members. The Nature Conservancy pursues non-confrontational, pragmatic, market-based solutions to conservation challenges.</p> <p>The Nature Conservancy works collaboratively with a range of partners:</p> <ul style="list-style-type: none"> • Government agencies • Companies • Non-profit organizations • Local stakeholders • Indigenous and traditional communities • Multi-lateral and bi-lateral institutions <p>A substantial amount of leverage is gained through these collaborations.</p>
Key policy & management issues	<p>The mission of the Nature Conservancy is to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. The conservation focus is not on single species, but on entire ecosystems.</p> <p>The Nature Conservancy uses a collaborative, science-based conservation approach and a common set of analytical methods to identify the biodiversity that needs to be conserved.</p>
Budget	<p>In 2009/10, the Nature Conservancy spent US\$34.9 million on conservation activities and actions and US\$20.4 million on purchases of conservation land and easements. The organization spent US\$9.9 million on administration.</p> <p>Annual monitoring costs for evaluating the effectiveness of conservation strategies range from negligible to hundreds of thousands of dollars.</p>
Linkages with NSW MER	None established
Broad approach	<p>Conservation by Design uses an adaptive management framework with four parts:</p> <ul style="list-style-type: none"> • Setting goals and priorities – based on the best available scientific information • Developing strategies – work with others to design innovative strategies that meet the need of people and ecosystems • Taking action – including land and water protection, science investment, strengthening institutional capacity and creating and maintaining supportive public policies, practices and incentives • Measuring results – measuring direct biodiversity outcomes, and

effectiveness of programmes

To achieve adaptive management, or Conservation by Design, three analytical methods are commonly used – Global Habitat Assessments, Ecoregional Assessment and Conservation Action Planning.

Global Habitat Assessments data are used to estimate the current level of effective conservation within and across ecoregions in each major habitat type on earth, and to set 10 year goals for advancing effective conservation.

Ecoregional Assessments data are used to set long-term conservation goals within an ecoregion, and to establish ecoregional priorities for resource allocation.

Conservation Action Planning translates priorities into conservation strategies and actions. Planning involves ten steps:

1. Identify people involved
2. Define scope and focal targets
3. Assess viability
4. Identify critical threats
5. Situation analysis
6. Develop strategies
7. Establish methods
8. Develop work plan
9. Implement plan
10. Analyse, adapt, learn and share

The data arising from each of these methods are used to provide baselines against which to measure:

- The effectiveness of strategies and actions;
- Gauge progress towards project objectives; and,
- Adapt conservation strategies to changing circumstances.

Measurable objectives and indicators of a strategy are referred to as Strategy Effectiveness Measures (SEM). Repeated monitoring of indicators over time is used to analyze progress towards measurable objectives. Using the results of monitoring to make course corrections in strategies allows the practice of adaptive management. In the wider non-profit community, the application of SEM and monitoring is often referred to as “monitoring & evaluation” as part of “results-based management.”

The Nature Conservancy monitoring programs run under four key principles:

1. Monitoring costs range from very inexpensive to a significant investment;
2. Interpreting monitoring results does not necessarily require statistics;
3. Conclusions from a thoughtful monitoring program are relevant to day-to-day conservation management; and,

4. Implementing best monitoring practices for all levels of investment and inference is food for TNC as an organization.

Indicators used in monitoring programs are tailored to the scope of the program, but can be social, biophysical or economic.

Initiative	Mekong River Commission State of the Basin Report
Organization	Mekong River Commission
Location	Mekong River Basin countries (Cambodia, Lao PDR, Vietnam, Thailand, Vietnam with China and Myanmar as dialogue partners)
Audience and use	The Mekong River Commission (MRC) was established in 1995 by an agreement between the governments of Cambodia, Lao PDR, Thailand and Viet Nam. The Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin came about as the four countries saw a common interest in jointly managing their shared water resources and developing the economic potential of the river. Signed on 5 April 1995, it set a new mandate for the organisation "to cooperate in all fields of sustainable development, utilisation, management and conservation of the water and related resources of the Mekong River Basin".
Key policy & management issues	<p>The Secretariats of the National Mekong Committees in each Member Country work with the MRC Secretariat to provide a link to each respective national government and co-ordinate The Mekong River Commission activities through the relevant line agencies.</p> <p>It is important that decision-makers have timely and accurate information on water-related sectors and an understanding of the impact that developing these sectors is having on the economy, environment and people. In support of these objectives the 'State of the Basin Report' forms part of the commitment by Cambodia, Lao PDR, Thailand and Viet Nam to collaborate for the sustainable use, management and conservation of water and related resources in the Mekong Basin.</p>
Budget	Expenditure on all Mekong River Commission projects in 2009 was US\$19,291,880. The Commission's staff salary and fee costs were US\$964,604.
Linkages with NSW MER	None established
Broad approach	<p>The Mekong State of the Basin Report includes biophysical, economic and social indicators:</p> <p>Indices of Human Development – progress towards the millennium development goals, characteristics of poverty, water resources related livelihoods and food security.</p> <p>Environment status and trends – water resources (flow regime, water quality, pollutants, sediment), wetlands (type and distribution, resources and biodiversity, functions and values, governance), fish and fisheries (capture and culture, catch trends, markets), flood and drought management (flood occurrence and severity, flood behavior, cost of floods, benefits of floods, drought occurrence and severity, drought costs, flood and drought risk), climate change (greenhouse gas emissions, climate change projections, ecosystem impacts, adaptation).</p> <p>Economic status and trends – macroeconomy, forests and forestry (forest cover, protection, logging, fuelwood consumption, non-timber forest products, forest biodiversity), agriculture and irrigation (crops, irrigation</p>

status, opportunities and challenges, agricultural inputs and farm mechanization, agrarian change and agricultural labour, food crisis, livestock production), sustainable hydropower development (hydropower status and trends, hydropower development and management), domestic water supply and sanitation (drinking water and sanitation coverage, domestic water use and sources), navigation (waterborne trade and tourism, legal agreements for freedom of navigation, waterway conditions for navigability, waterway safety and environment), mining and other industries (mineral potential, impact of mining on water resources, mining outlook, impact of other industries on water resources), tourism (status and trends).

Development in the Mekong River Basin – emerging trends and drivers (developments on a national and basin level, development of water and related resources, trans-boundary issues, Integrated Water Resources Management (IWRM) challenges), IWRM governance and stakeholder participation (IWRM at a basin scale, IWRM governance at the national level, stakeholder participation and cooperation), the Mekong River Commission cooperation (multi-lateral cooperation, cross border cooperation)

Two ‘State of the Basin Reports’ have been produced – the first in 2003, and the second in 2010.

The Mekong River Commission is currently developing a Basin Development Plan that uses an Integrated Water Resources Management (IWRM) approach, which brings national policies, plans and projects into an integrated basin-wide assessment framework. The Basin Development Plan uses scenarios to predict and assess the impact of development in the basin. The State of the Basin Report is used to report the performance of the Basin Development Plan.

Initiative	Danube Basin River Management Plan
Organization	International Commission for the Protection of the Danube River
Location	Danube River Basin countries (Austria, Bosnia-Herzegovnia, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Moldova, Montenegro, Romania, Serbia, Slovakia, Slovenia, Ukraine)
Audience and use	The International Commission for the Protection of the Danube River (ICPDR) is a transnational body, which has been established to implement the <i>Danube River Protection Convention</i> . The ICPDR is formally comprised of Delegations of all contracting parties to the Danube River Protection Convention, but has also established a framework for other organisations to join.
Key policy & management issues	<p>In 2000, the ICPDR contracting parties nominated the ICPDR as the platform for the implementation of all transboundary aspects of the EU Water Framework Directive (WFD). The work for the successful implementation of the EU WFD is therefore high on the political agenda of the countries of the Danube river basin district.</p> <p>To achieve good water status in the water bodies of the Danube region by 2015 (and beyond) and to ensure a sufficient supply of clean water for future generations, the Contracting Parties to the <i>Danube River Protection Convention</i> nominated the ICPDR as the co-ordination body for the development of a comprehensive management plan for the entire Danube River Basin using the principles of the EU Water Framework Directive. This process involves experts from industry and agriculture, and representatives from environmental and consumer organisations as well as the local and national authorities.</p>
Budget	Staff costs in 2009 within the International Commission for the Protection of the Danube River were EU 541,700.
Linkages with NSW MER	None established
Broad approach	<p>The Danube River Basin Management Plan focuses on the main transboundary pressures, so called Significant Water Management Issues (SWMI), that can directly or indirectly affect the quality of rivers and lakes as well as transboundary groundwater bodies:</p> <ul style="list-style-type: none"> •Pollution by organic substances; •Pollution by nutrients; •Pollution by hazardous substances; and, •Hydromorphological alterations. <p>According to the EU WFD, good ecological and chemical status has to be ensured and achieved for all surface water bodies. For those identified as heavily modified or artificial, good ecological potential and chemical status has to be achieved and ensured. Confidence levels for ecological and chemical status are reported as high, medium or low, according to several criteria related to data collection and reporting.</p> <p>Monitoring results serve to validate the pressure analysis and to provide an overview of the impacts on water status in order to initiate measures. Monitoring data are collected within the Transnational Monitoring Network,</p>

which enables a reliable and consistent trend analysis for concentrations and loads of priority pollutants, supports the assessment of water quality for water use, and to assist in the identification of major pollution sources.

A Joint Programme of Measures (JPM) is then derived to describe expected improvements in water status. The JPM is firmly based on the national programmes of measures and describes the expected improvements in water status by 2015. Priorities for the effective implementation of national measures on the basin-wide scale are highlighted and are the basis of further international coordination. Some additional joint initiatives and measures on the basin-wide level that show transboundary character are presented as well. Targets for achievement are expressed as management objectives.

The 2009 Danube River Basin Plan has been elaborated within the framework of the first River Basin Management (RBM) Cycle according to the EU Water Framework Directive, which lasts until 2015. The first cycle will be followed-up by two more RBM Cycles that will be finalised by 2021 and 2027, respectively.

4. Information sources

Strategic Adaptive Management

A framework for developing and implementing management plans for South African national parks. April 2008. http://www.sanparks.org/conservation/park_man/

Kruger National Park management plan. December 2008. http://www.sanparks.org/conservation/park_man/

Coordinated policy framework governing park management plans. July 2006. http://www.sanparks.org/conservation/park_man/

Koedoe journal special issue – Strategic Adaptive Management in SANParks. 2011. <http://www.koedoe.co.za/index.php/koedoe/issue/view/82>

Budget figures

The total audited budget of SANParks in 2009/10 was R912 million (approximately AU\$130 million), of which 47% was used in the conservation program.

Source: South African Estimates of National Expenditure 2011, Table 30.11, page 663.

The projected budget for conservation management within Kruger National Park for 2009/10 was R21.3 million (approximately AU\$3 million).

Source: KNP Management Plan 2010, Table 37.

Note: It is unclear what the spend is directly on scientific services staff in Kruger National Park that develop and implement SAM, or on initiatives have taken SAM to all South African park management plans.

European State of the Environment Reporting

EEA State of the Environment Report Website. 2010. <http://www.eea.europa.eu/soer>

State of the Environment Report Synthesis. 2010. <http://www.eea.europa.eu/soer/synthesis>

Environmental Indicators Topology and Overview, 1999. <http://www.eea.europa.eu/publications/TEC25>

Budget figures

In the 2009 financial year, the budget for integrated environmental assessments was EUR 327,387. The total operating budget for the European Environmental Agency in the same year was EUR 15,870,218. Staff costs were EUR 18,195,510.

Source: Final accounts for the European Environment Agency, 2009. Page 11.

<http://www.eea.europa.eu/about-us/documents/administrativedocuments/eea-accounts-for-the-year-2009/>

Note: It is not clear which section within the EEA conducts the SoE function, but from the names in the acknowledgements of the 2010 report it appears to be the Integrated Environmental Assessments section.

The National Plan for Environmental Information

The National Plan for Environmental Information. Factsheet.

<http://www.environment.gov.au/npei/index.html>

Framework for Determining Commonwealth Environmental Watering Actions

Department of the Environment, Water, Heritage and the Arts (2009) A Framework for Determining Commonwealth Environmental Watering Actions.

<http://www.environment.gov.au/ewater/publications/pubs/cehw-framework.pdf>

Budget figures

The Commonwealth Water Holder anticipates \$14.6 million for the environmental water holdings special account between 2009 and 2011.

Source: Sustainability, Environment, Water, Population and Communities Portfolio Budget Statements 2011-12. <http://www.environment.gov.au/about/publications/budget/2011/pbs.html>

Note: The budget estimate from this framework are based on the current budget for the purchase of environmental water

Victorian River Health Strategy

Victorian River Health Strategy, 2002. Department of Sustainability and the Environment.

http://www.water.vic.gov.au/__data/assets/pdf_file/0007/9862/VRHSComplete.pdf

Victorian River Health Report Card, 2002-2009. Department of Sustainability and the Environment.

http://www.water.vic.gov.au/__data/assets/pdf_file/0006/77694/1_Section1_pp1-33_r.pdf

Budget figures

The Victorian River Health Program is delivered in partnership with catchment management authorities. The Program is responsible for the delivery of the Victorian River Health Strategy and meeting Government's commitment to significantly improve the health of Victoria's rivers, floodplains and estuaries. With an annual budget of over \$30 million, this is the one of the largest river health programs in Australia.

Source: <http://www.dse.vic.gov.au/about-dse/publications/state-of-the-environment-report-victoria-2008-the-government-response/inland-waters>

South East Queensland Healthy Waterways Strategy

<http://www.healthywaterways.org/TheStrategy.aspx>

South East Queensland Healthy Waterways Partnership (2007). South East Queensland Healthy Waterways Strategy 2007-2012 – Strategy Overview.

<http://www.healthywaterways.org/TheStrategy/ActionPlanLinks.aspx>

South East Queensland Healthy Waterways Partnership (2007). South East Queensland Healthy Waterways Strategy 2007-2012 – Protections and Conservation Action Plan.

<http://www.healthywaterways.org/TheStrategy/ActionPlanLinks.aspx>

South East Queensland Healthy Waterways Partnership (2007). South East Queensland Healthy Waterways Strategy 2007-2012 – Ecosystem Health Monitoring Program Action Plan.

<http://www.healthywaterways.org/TheStrategy/ActionPlanLinks.aspx>

Budget figures

Approx \$36.6 million over the period 2009 – 2013

Source: Healthy waterways Ltd. Business Plan 2010-2012.

http://web01.redland.qld.gov.au/robo/Minutes_Agendas/July_Sept10/Minutes%5CJuly%5C07_July_PP%5CITEM3.8_Healthy_Waterways_Limited_Business_Plan.pdf

Northern Rivers CMA Ecohealth Report Card

Bellingen Report Card. 2011. Northern Rivers CMA.

http://www.northern.cma.nsw.gov.au/programmes_ecohealth_bellingen.php

Northern Rivers CMA Ecohealth Programme website.

http://www.northern.cma.nsw.gov.au/programmes_ecohealth.php

Bellinger-Kalang Rivers Ecohealth Project. Technical Report for Report Card Preparation, Indicators and Calculation of Grades. 2011.

http://www.ourlivingcoast.com.au/wp-content/uploads/BSC_Ecohealth_Score_Calculation.pdf

NSW Integrated Planning and Reporting

Planning and reporting guidelines for local government in NSW. 2010.

<http://www.dlg.nsw.gov.au/dlg/dlghome/Documents/Information/IPRGuidelinesJanuary2010.pdf>

Planning and reporting manual for local government in NSW. 2010.
<http://www.dlg.nsw.gov.au/dlg/dlghome/Documents/Information/IPRManualJanuary2010.pdf>

Environmental Monitoring and Assessment Program (EMAP)

EMAP Research Strategy. 2002. <http://www.epa.gov/emap/html/pubs/docs/resdocs/resstrat02.html>

EMAP Homepage. <http://www.epa.gov/emap/index.html>

Sustainable Rivers Audit & Monitoring, Evaluation and Reporting Strategy

<http://www.mdba.gov.au/programs/sustainable-rivers-audit>.

Davies PE, JH Harris, TJ Hillman and KF Walker (2008). SRA Report 1: A Report on the Ecological Health of Rivers in the Murray–Darling Basin, 2004–2007. Prepared by the Independent Sustainable Rivers Audit Group for the Murray–Darling Basin Ministerial Council.

Conservation by design

<http://www.conservationgateway.org/>

<http://www.nature.org/ourscience/conservationbydesign/index.htm>

Montambault and Groves. 2009. Improving conservation practice by investing in monitoring strategy effectiveness. <http://www.conservationgateway.org/file/improving-conservation-practice-investing-monitoring-strategy-effectiveness>

Budget figures

In 2009/10, the Nature Conservancy spent US\$34.9 million on conservation activities and actions and US\$20.4 million on purchases of conservation land and easements. The organization spent US\$9.9 million on administration.

Source: The Nature Conservancy Annual Report, 2010. <http://www.nature.org/aboutus/index.htm>

Note: It is not clear whether the scientists within TNC are within in the conservation or administration budgets.

Mekong River Commission State of the Basin Reporting

Mekong River Commission. State of the Basin Report 2010.

http://www.mrcmekong.org/free_download/report.htm

Mekong River Commission website. <http://www.mrcmekong.org/>

Budget figures

Expenditure on all Mekong River Commission projects in 2009 was US\$19,291,880. Staff salary and fee costs were US\$964,604.

Source: Mekong River Commission Annual Report 2009.

http://www.mrcmekong.org/download/Annual_report/Annual_Report_2009.pdf Page 48

Note: The exact expenditure of the State of the Basin Report is unknown.

Danube River Basin Management Plan

International Commission for the Protection of the Danube River website.

<http://www.icpdr.org/icpdr-pages/home.htm>

Danube River Basin Management Plan. 2009.

http://www.icpdr.org/icpdr-pages/danube_rbm_plan_ready.htm

Budget figures

Staff costs in 2009 within the International Commission for the Protection of the Danube River were EU 541,700.

Source: International Commission for the Protection of the Danube River Annual Report, 2009, page 13.

http://www.icpdr.org/icpdr-pages/annual_reports.htm

Note: No information was given on expenditure to develop the Danube River Basin Management Plan. Staff costs and time are also contributed by member country agencies.

Agency discussions or information

Joe Flotemersch	US Environmental Protection Agency
Michael Reuter	The Nature Conservancy
David Winfield	Murray Darling Basin Authority
Scientific Services Staff	Kruger National Park
Integrated Assessments Section	European Environmental Agency
Bruce Campbell	Department of Sustainability, Environment, Water, Population and Communities
Sebastian Lang	Department of Sustainability, Environment, Water, Population and Communities

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