



Allocating NRM funding between  
NSW Catchment Management  
Authorities

FINAL REPORT

April 2008



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APRIL 2008

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## List of acronyms

AGNRM	Australian Government Natural Resource Management
BRG	Border Rivers Gwydir Catchment Management Authority
CMA	Catchment Management Authority
CAP	Catchment Action Plan
DECC	Department of Environment and Climate Change
DPC	Department of Premier and Cabinet
HCR	Hunter Central Rivers
HN	Hawkesbury Nepean
LWMP	Land and Water Management Plan
LMD	Lower Murray Darling
MER	Monitoring, Evaluation and Reporting
NAP	National Action Plan for Salinity and Water Quality
NHT	Natural Heritage Trust
NR	Northern Rivers
NRC	Natural Resources Commission
NRM	Natural Resource Management
NSW	New South Wales
SM	Sydney Metropolitan
SR	Southern Rivers

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# 1 Introduction

The Natural Resources Commission (NRC) has been asked to provide advice to the NSW Government on how natural resource management (NRM) funding can be allocated between Catchment Management Authorities (CMAs).

The NRC recommends a process for allocating funding that aims to maximise likely return on investment. The proposed process allows governments to compare the likely return on investment across the 13 CMA regions based on:

- cross-regional priorities for CMA-delivered investment, and
- the likely effectiveness of CMAs in working with their communities to deliver natural resource outcomes.

The recommended process is structured, transparent and adaptable. It can be used to allocate funding from any source, against any set of investment objectives. The NRC recommends this process be used for all NSW Government funding to CMAs, and also encourages its use for Australian Government funding to CMAs under the recently announced *Caring for our Country* program. The NRC further believes that any NSW Government funding to any delivery agent, not only CMAs, that is directed towards achieving the 13 state-wide targets in Priority E4 of the State Plan<sup>1</sup> should be allocated using the recommended process.

The purpose of the recommended process is to ensure there is broadly the appropriate spread of funding allocated across the state, so that CMAs and investors can subsequently confirm investment in their highest priorities when developing and approving Investment Programs.

## 1.1 Recommendations

This report explains the NRC's recommendations that:

1. **The NSW Government adopts the NRC's recommended process for determining funding allocations to CMAs based on cross-regional investment priorities and CMAs' effectiveness**

The NSW Government should also encourage the Australian Government to use a similar process to allocate its *Caring for our Country* program funds to CMAs, and consider using the process to allocate all other NSW Government funding that contributes to achieving the 13 state-wide targets for NRM in Priority E4 of the State Plan.

2. **The NRC be tasked with facilitating a process to check and refine the initial assessments of priorities for investment between CMA regions**

Given the short period of time available for this review, the NRC has undertaken a 'first cut' rapid analysis using a priorities assessment framework to illustrate how priorities between CMA regions could be determined. However, the NRC recommends that these be checked and refined to ensure that best available information is used and up-to-date policy preferences are reflected. The NRC can also assist with a process to determine priorities between regions for the Australian Government's *Caring for our Country* investment priorities.

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<sup>1</sup> NSW Government (2006) *The State Plan: A New Direction for NSW*. Available at <http://www.nsw.gov.au/StatePlan>.

3. **The NSW Government evaluates the 3 options for treating Land and Water Management Plan funding and decides how it should be incorporated into the allocations**

The NRC has described 3 options for treating Land and Water Management Plan funding and the impacts of each. The NSW Government will need to negotiate the final decision with the Australian Government.

4. **The NSW Government should ask the NRC to recommend a rigorous and transparent process for reviewing and approving Investment Programs from 2009-10 onwards**

The funding allocation decision is an upstream part of a broader process. The government needs to make equally rigorous decisions based on similar principles when approving CMAs' more detailed 4 year Investment Programs to ensure they are strategic and will provide maximum return on investment. The NRC recommends that it should develop a framework for assessing Investment Programs for 2009-10 onwards, and review and recommend the approval of Investment Programs to the NSW Government. If the Investment Programs are joint NSW and Australian Government documents, the NRC should review and recommend approval to both Governments.

5. **The NSW Government reviews the indicative allocations at the mid-point of any program using updated and better data, and revise the allocations if necessary**

The NRC's initial analysis is based on readily accessible data. Better data to determine priorities and to compare CMA effectiveness will become available through the Monitoring, Evaluation and Reporting (MER) Program and the NRC's CAP implementation audit program.<sup>2</sup> The NRC recommends that allocations are reviewed at the mid-point of any new program.

The NRC has outlined steps to implement its recommended process and has undertaken an assessment using these steps to illustrate how the process works and determine some possible proportional allocations. The decision support tool used as part of this process will be made available as an Excel file to governments and CMAs.

## 1.2 Terms of reference for the review

The NRC received a Terms of Reference from the Premier seeking advice on how joint Australian and NSW Government funding could be allocated to the 13 CMAs under the new NRM program that was anticipated to commence in July 2008 (Attachment 1).

Since receiving this Terms of Reference, details of the new Australian Government NRM program, *Caring for our Country* have been announced, including the Australian Government allocations to CMAs for the 2008-09 financial year and the Australian Government's investment priorities for the program.

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<sup>2</sup> Natural Resources Commission (2007) Framework for auditing the implementation of Catchment Action Plans. Available at <http://www.nrc.nsw.gov.au>.

The NRC's recommended process remains relevant despite the changed program arrangements. It has been designed so that it can be used to allocate funding from any source and against any set of priorities. It can also be adapted to allocate funding to organisations other than CMAs.

The Terms of Reference stated that the recommended approach should maximise the likelihood of achieving improvements in natural resource condition across NSW. The Terms of Reference also directed the NRC to consult with Department of Premier and Cabinet (DPC), Department of Environment and Climate Change (DECC), NSW Treasury, the Australian Government NRM (AGNRM) Team and CMAs.

### 1.3 Review process

In developing this advice the NRC:

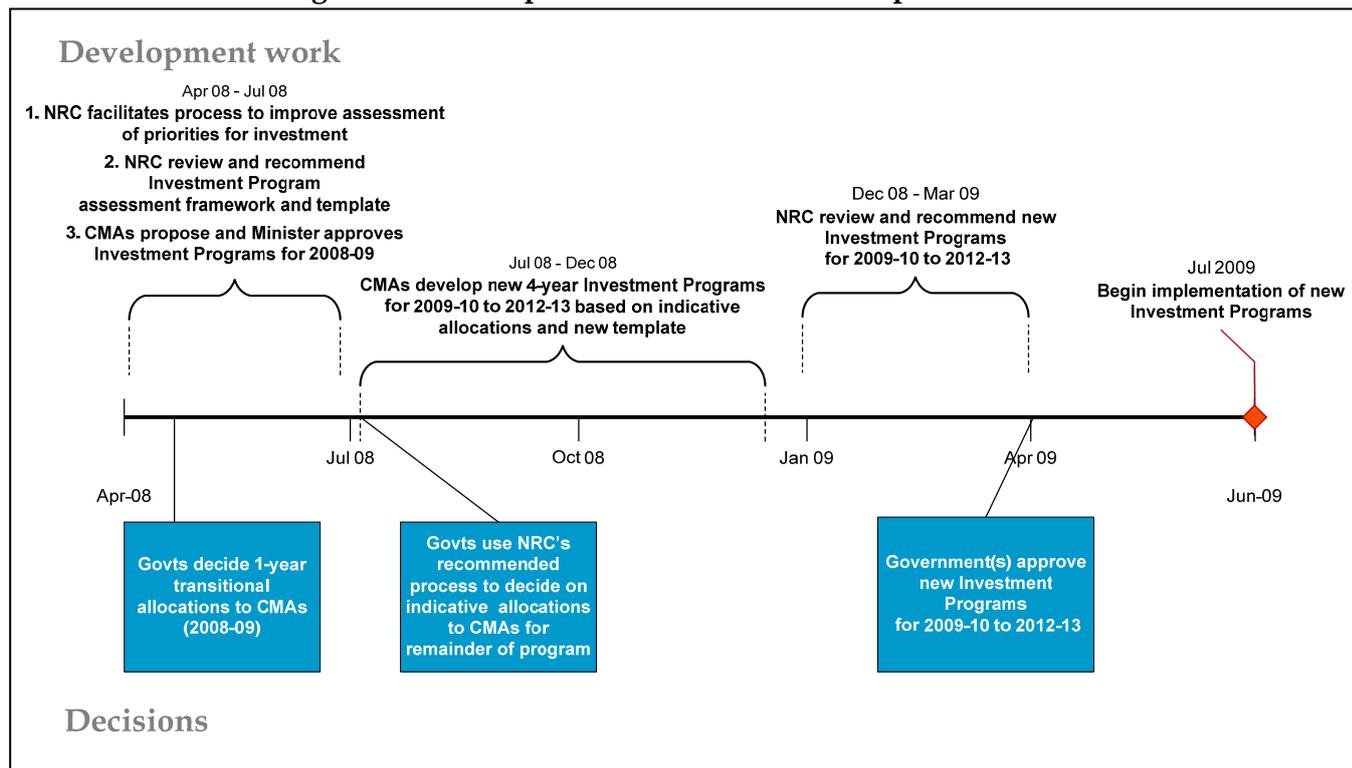
- held two preliminary stakeholder consultation meetings
- released a draft report and held a final consultation meeting with CMA General Managers, representatives from the DPC, DECC, NSW Treasury and the AGNRM team to discuss the draft recommendations
- received submissions from some agencies and CMAs and obtained peer reviews of the recommendations to ensure they are sound and credible.

### 1.4 Follow up work

As described in the recommendations, the NRC recommends the following additional tasks be undertaken according to the timeline shown in Figure 1:

- The NSW Government should advise allocations to CMAs for transitional year (2008-09) as soon as possible.
- The NRC should facilitate a process for NSW agencies to check, refine and agree on the assessments of cross-regional priorities based on the state-wide targets and best available data. This process should also involve a broader range of stakeholders, including the Department of Primary Industries, Department of Planning, Department of Water and Energy, Department of Lands and non-government groups if appropriate. This should be completed by July 2008 so that allocations for 2009-10 and beyond can be advised well in advance. The NSW Government should encourage Australian Government agencies to participate, as the process could also be used to determine spatial priorities for the Australian Government's *Caring for our Country* objectives.
- The NRC should review and recommend improvements to the Investment Program template and develop a framework for assessment and approval of Investment Programs from 2009-10 onwards. The NRC should also review and recommend approval of Investment Programs to the NSW Government. If the Investment Programs are joint NSW and Australian Government documents, the NRC should review and recommend approval to both Governments.

**Figure 1: Proposed timeline for follow up work**



## 1.5 Structure of this report

The remainder of this report outlines the NRC's recommended process for determining funding allocations in more detail:

- Chapter 2 explains the context of this decision within the broader regional model for NRM
- Chapter 3 provides an overview of the recommended process
- Chapter 4 explains the investment principles for CMA-delivered funding and assessment criteria
- Chapter 5 explains how each CMA can be assessed against the criteria and how possible allocations can be modelled
- Chapter 6 provides guidance for evaluating the results of analysis and agreeing allocations
- Chapter 7 explains the NRC's recommendations about Investment Program development and review, and reviewing the allocations during program implementation.

## 2 Context for funding allocation decisions

For the past 5 years, NSW and Australian Governments have invested jointly in NRM in NSW through Phase 2 of the Natural Heritage Trust (NHT2) and the National Action Plan for Salinity and Water Quality (NAP). Since those programs commenced there has been significant institutional reform in NSW, including:

- creation of the CMAs and the NRC
- approval of Catchment Action Plans (CAPs)
- inclusion of 13 state-wide targets for NRM in the State Plan
- adoption of the *Standard for Quality Natural Resource Management* (the Standard).

On 14 March 2008, the Australian Government announced a new 5-year program for its investment in NRM worth \$2.25 billion.<sup>3</sup> The new package, *Caring for our Country*, is due to commence on 1 July 2008 and amalgamates several existing NRM programs,<sup>4</sup> including those which have traditionally funded CMAs' activities. Full details of how this will be implemented are still emerging. However, it appears likely that funding will be available to a broader range of delivery agents beyond CMAs, on a competitive basis. Funding will be invested in 6 new national priority areas.

Despite this substantial change in the Australian Government approach, the NSW Government has a solid model for investment in the health of the state's natural resources. Priorities for NRM are articulated by the state-wide targets in the State Plan, and by catchment targets in CMAs' CAPs. Tracking progress towards these targets is underpinned by auditing and reporting arrangements - the NRC's audits of the implementation of CAPs and the NSW MER Program.

The following sections explain:

- the benefits of centrally prioritising allocations to CMAs at the beginning of any program
- where the decision on funding allocations to CMAs fits within the broader regional delivery framework.

### 2.1 Providing certainty

Under the current programs (NAP and NHT2) CMAs received indicative allocations within which they planned and prioritised their investments over a three year period, and some funding was reserved for competitive bidding.<sup>5</sup>

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<sup>3</sup> The Hon Peter Garrett MP and The Hon Tony Burke MP, *Caring for our Country - Better Land Management, Less Red Tape*, Joint Media Release, 14 March 2008.

<sup>4</sup> Existing programs include the Natural Heritage Trust (NHT), the National Action Plan for Salinity and Water Quality (NAP), the National Landcare Program (NLP), the Environmental Stewardship Program and the Working on Country Indigenous Land and Environmental Program.

<sup>5</sup> For example, the Strategic Reserve.

The NRC recommends that CMAs continue to be given as much certainty about their funding levels as possible. Certainty about funding levels is important for creating the stability and continuity needed to achieve long term change and to give organisations like CMAs the confidence to develop innovative approaches that will last. For example, it will better enable CMAs to develop market mechanisms to attract sustainable investment from other sources.

Certainty is best provided by up-front allocations, advised early, and with clear rules. The NRC recommends that all, or the vast majority, of the available funding from both Governments should be allocated to CMAs at the beginning of any program.

The NRC believes that the up-front allocations should be decided through a central prioritisation process that considers CMA effectiveness, as well as investor priorities. Considering CMA performance and effectiveness introduces a competitive element to the allocation process where the effective implementation of CAPs and outcomes achieved by CMAs become the competitive measures (rather than who can prepare the best tender applications). The allocations should then only be adjusted based on hard evidence on CMA performance in delivering outcomes, or changed investor priorities. This provides incentives for continual improvement in performance.

An alternative to central prioritisation is competitive tender where government would once, or periodically, make funding decisions based on detailed, costed program and project proposals. However, through competitive tender investors cannot ensure coverage of all priority issues across NSW and the transaction costs of managing a fully competitive funding pool would hinder efficient delivery of funding by both CMAs and governments.

The recommended process is based on allocating funding to CMAs via a centrally prioritised process rather than competitive tender. However, the NRC recommends that the up-front allocations are indicative, not fixed, so that the funding allocations can be re-assessed and redistributed if necessary based on improved data during the program implementation (see Chapter 7).

### **2.1.1 Competitive funding**

The NRC understands that under the *Caring for our Country* program CMAs, along with government agencies and non-government groups, will be able to access additional funds to undertake activities that deliver on the national priorities. These priorities and the desired outcomes from investment will be detailed in an annual business plan. The process for allocating this additional funding is still being developed, but may be a competitive process.

During the consultation process for this review CMAs expressed divergent views about competitive tender processes. Although many expressed a preference for certainty over competition, they suggested a competitive component can be beneficial provided:

- sufficient base funding is provided under the indicative allocations
- the bidding process is simple and well structured, and the rules are clear
- the transaction costs are not high.

Competitive processes to allocate funding between CMAs, or between any delivery agents, can have the advantages of:

- giving government investors confidence that any funding is allocated where it will be most efficiently and effectively spent according to investor priorities
- providing flexibility for governments to manage unexpected or emerging issues.

Governments must also ensure that the transaction costs associated with operating the competitive process do not outweigh the benefits of efficiency and flexibility.

The NRC understands that the *Caring for our Country* annual business plan will provide the framework for any competitive process. The NRC believes that the business planning process is an excellent opportunity to articulate more specific, spatial priorities that reflect the values of the 'national community', and set clear rules for any competitive process.

This process should recognise the considerable effort in NSW to establish strategic, 10 year CAPs that identify assets of regional value, and integrate national and state objectives. The CAPs provide a solid vehicle for CMAs to demonstrate how they will work with their regional communities to contribute to the national priorities. It is important that additional funding provided to CMAs, or other delivery agents in NSW, aligns with achieving the targets in CAPs and the 13 state-wide targets.

Any competitive funding under the new program should consider the likely effectiveness of different delivery agents in delivering results, as well as the priorities that will be identified in the business plan. In coming years, the NRC's audits of CAP implementation will produce comprehensive information about the effectiveness of CMAs in achieving results. No other NRM delivery agents in NSW are regularly audited by a third party. We recommend that both Governments consider the results of NRC audits when administering any competitive funding.

## **2.2 Where does this decision fit within the regional delivery model?**

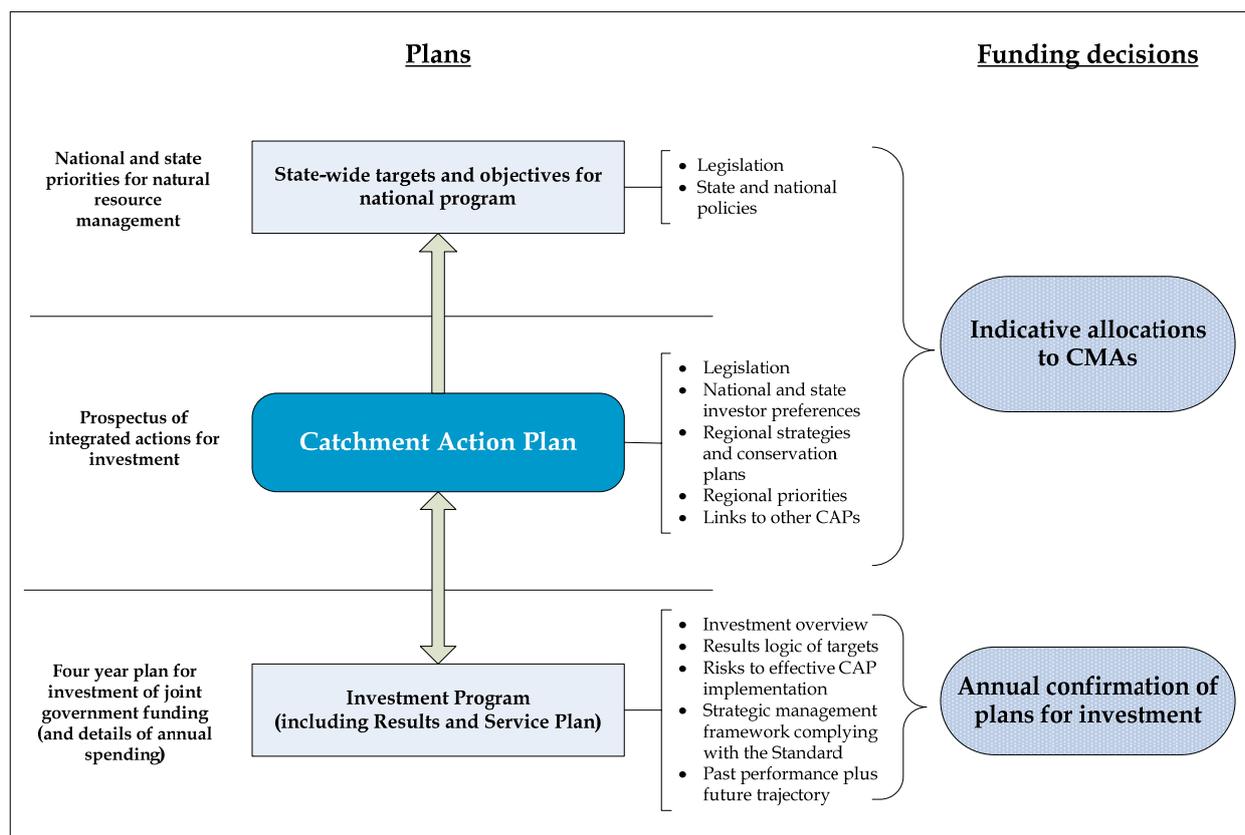
The decision on up-front, indicative funding allocations occurs upstream of other decisions that eventually lead to on-ground investment. Figure 2 illustrates a hierarchy of planning and decision-making and shows how the determination of funding allocations fits in the broader process.

Governments and CMAs have more than one 'bite of the cherry' in determining where their funding will hit the ground. As Figure 2 demonstrates, the state-wide targets, national investment objectives, and the CAPs set the strategic context for funding allocations. Once the indicative funding allocations are determined CMAs prepare Investment Programs, which will incorporate Results and Services Plans. Investment Programs will outline which parts of the CAPs are priorities for investment over the coming 3-4 years and how much it will cost to meet targets and achieve intermediate outcomes.<sup>6</sup>

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<sup>6</sup> The NRC understands that Investment Programs will incorporate NSW Government Results and Services Plans and Annual Implementation Plans. Results and Services Plans usually include expected achievements, planned expenditure and results logic. Results and Services Plans are submitted annually.

**Figure 2: Hierarchy of investment planning and funding decisions**



Therefore, the primary purpose of allocating indicative funding to each CMA at the beginning of a program is to ensure that each region will be allocated *broadly* the appropriate proportion of available funding, within which they can confidently plan activities with their communities. These indicative allocations can be thought of as ‘forward estimates’ that are confirmed annually.

This up-front allocation cannot and will not be exactly ‘right’. However, it is important that broadly the appropriate spread across the state is achieved so that governments can be confident their priorities will be targeted and so that CMAs can plan with confidence.

CAPs are central to delivery of national and state objectives for NRM. In NSW those objectives are defined by the 13 state-wide targets, and the *Caring for our Country* program includes 6 new national investment priorities. The NSW targets and previously agreed investor preferences have been incorporated in the CAPs, and they are integrated plans that all investors, government and non-government, can invest in. They are also continually improving documents. They were approved as 10 year strategic plans with conditions to ensure they are improved over time.

While the CAPs prioritise issues and actions within each CMA region, the recommended process to allocate funding requires governments to identify and prioritise issues between regions and to choose to invest where their objectives for investment are most likely to be met. This does not undermine the regional planning process. Simply put, the governments need to undertake the same kind of prioritisation process at a state level that the CMAs undertook when developing their CAPs at a regional level.

It is also important to remember that CMAs are not the only players responsible for working towards the state targets. State and local government programs and regulation must also be aligned to achieving the targets. CMA-delivered investment is just one piece of the puzzle.

This advice focuses on how the CMA-delivered stream of funding can be allocated between CMAs. However, the NRC recommends that NRM funding delivered through other delivery agents, for example the NSW Estuary Management Program funding and the Environmental Trust, should be assessed with an equivalent level of rigour and transparency using the same principle of maximising return on investment. The recommended funding allocation process could be easily adapted to determine funding allocations under any program that contributes to achieving Priority E4 of the State Plan.

### 3 Recommended process for determining allocations

The NRC recommends a process for agreeing indicative allocations based on maximising likely return on investment, as determined by:

- the priorities of the investing government(s), and
- the likely effectiveness of CMAs in delivering outcomes.

This process has been designed primarily for allocations between CMAs. However, it can be adapted to allocate funding from any program and to any organisations, including all funding directed towards Priority E4 of the State Plan and the new *Caring for our Country* program.

The following sections describe:

- how allocations to CMAs were determined previously
- different analytical approaches for determining allocations and the NRC's preferred option
- the NRC's recommended process to implement the approach.

#### 3.1 How were the allocations to CMAs determined previously?

The new NRM program follows 5 years of regional NRM funding through NHT2 and NAP. Funding under NAP focussed primarily on salinity issues and was only available to inland regions.

The allocations under these two programs were determined by:

- allocating a base level of funding to each CMA
- allocating the remainder based on surface area and relative natural resource assets and threats
- negotiation.

Inland CMAs generally received a larger proportion of the total funding than coastal CMAs.

During consultations CMA and agencies expressed a desire for a more transparent a rigorous process for new allocations to CMAs.

## 3.2 Options for determining allocations

The NRC considered several alternative analytical approaches that could be used to determine funding allocations. Cost benefit analysis is a standard tool for assessing investment options to determine which investments are likely to generate the greatest return. However, cost benefit analysis requires robust, quantitative data that can be compared across the different investment options, in this case across CMAs. Usually this is achieved by valuing all data in dollar terms.

The standard cost benefit analysis is difficult to apply in this situation for several reasons:

- there is insufficient data about the likely outcomes from different CMA's investments
- it is difficult to place a monetary value on NRM outcomes that is comparable across regions and across natural resource themes
- it is difficult to transparently incorporate trade-offs between different principles or objectives.

Despite the difficulties associated with undertaking cost benefit analyses, there are examples of this approach being used to determine funding priorities.<sup>7</sup> However, these examples tend to focus on prioritising between *assets*, not between organisations or regions. This is a process we would expect to see undertaken by CMAs in developing their investment plans, but is not appropriate for the more high level decision of determining indicative funding allocations between CMAs.

The NRC also considered simple allocation rules such as:

- allocating funds in line with current proportional allocations
- allocating an equal share of funding to each CMA.

Consultations with agencies and CMAs indicated that several different policy objectives need to be considered in determining funding to CMAs. Therefore, the NRC believes that cost benefit analysis and the simple allocation rules are not appropriate for this task.

The NRC recommends instead that multi-criteria analysis is used. This enables funding to be allocated based on a range of quantitative and qualitative criteria. It permits a transparent combination of policy objectives and negotiated trade-offs between different values and priorities. Different decision criteria can be identified, weighted according to importance and analysed transparently. Like all analytical techniques, the practical implementation of multi-criteria analysis has its challenges. However, the NRC is confident that it is the most appropriate model in this context.

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<sup>7</sup> See, for example:

- Wilson, KA., Underwood, EC., Morrison, SA, Klausmeyer, KR., Murdoch, WW., et al. (2007) *Conserving biodiversity efficiently: What to do, where and when*. PLoS Biol 5(9): e223. doi:10.1371/journal.pbio.0050223
- Murdoch, W., Polasky, S., Wilson, K., Possingham, H., Kareiva, P., Shaw, R. (2007) *Maximising return on investment in conservation*, Biol. Conserv doi:10.1016/j.biocon.2007.07.011
- Possingham, H., Ryan, S., Baxter, J. and Morton, S. (2002) *Setting Biodiversity Priorities*.

This recommendation is consistent with the approaches adopted in Queensland, Western Australia and the United States for allocating NRM funding. For example, CSIRO and the Queensland Government applied a multi-criteria analysis model in 2005 to allocate funding between 14 QLD NRM regions, and the NRC understands it will be reapplied to distribute funding under the new program.<sup>8</sup>

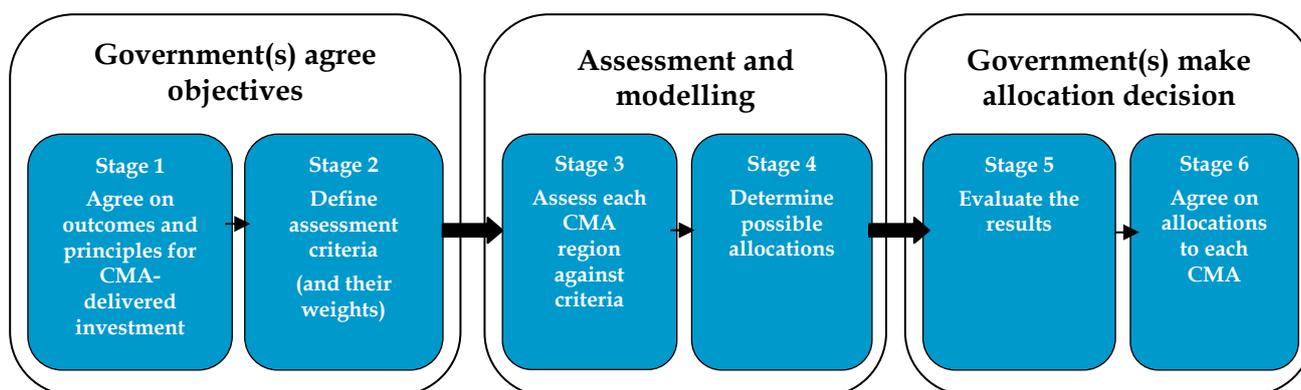
A study commissioned in 2003 by the Western Australia Government Salinity Investment Framework Steering Committee also concluded from an assessment of possible tools that multi-criteria analysis was an appropriate methodology for prioritising investment.<sup>9</sup>

The NRC has developed a decision-making process that uses multi-criteria analysis as a decision support tool. While, multi-criteria analysis is central to the NRC's recommended process it is important to note that it is just one component of an overall process. Outputs from the analysis must be carefully evaluated and any trade-offs or adjustments should be clearly justified and documented.

### 3.3 A process to implement the recommended approach

Figure 3 illustrates the recommended 6 stage process for governments to agree funding allocations in consultation with CMAs, using multi-criteria analysis as a decision support tool. Chapters 4-6 discuss each stage in more detail.

**Figure 3: A decision-making process for allocating funding to CMAs**



The NRC recommends this process on the basis that it is:

- **Transparent** - it incorporates multi-criteria analysis and clear decision rules to ensure transparent analysis that can be scrutinised by agencies and CMAs.
- **Repeatable** - it can be used to set indicative allocations at the outset of the program, and also to review and revise the allocations at any point during the program, making use of better and more up-to-date data.
- **Adaptable** - new assessment measures can be used as better data becomes available, for instance, information on CMA effectiveness in delivering landscape change will improve through the NRC audits and NSW MER Program, as will CMAs' CAPs. It can also be used to assess priorities against any set of government investment objectives.

<sup>8</sup> Hajkowicz, S. (2006) Allocating scarce financial resources across regions for environmental management in Queensland, Australia. *Ecological Economics* doi. 10.1016/j.ecolecon.2006.10.011.

<sup>9</sup> Referenced in Hajkowicz, S. (2006) Allocating scarce financial resources across regions for environmental management in Queensland, Australia. *Ecological Economics*, doi. 10.1016/j.ecolecon.2006.10.011, p.7.

Finally, the process provides incentives for CMAs to improve their effectiveness and deliver results against government and community priorities.

Given the short time frame available for this review, the NRC has run the stages of the process using readily accessible information to illustrate the process and indicate possible results. Many of the assessments are subjective judgements based on publicly available information. Ideally, more robust, scientific data would be used. However, the process for making judgements is structured and transparent, and is applied equally across all CMA regions.

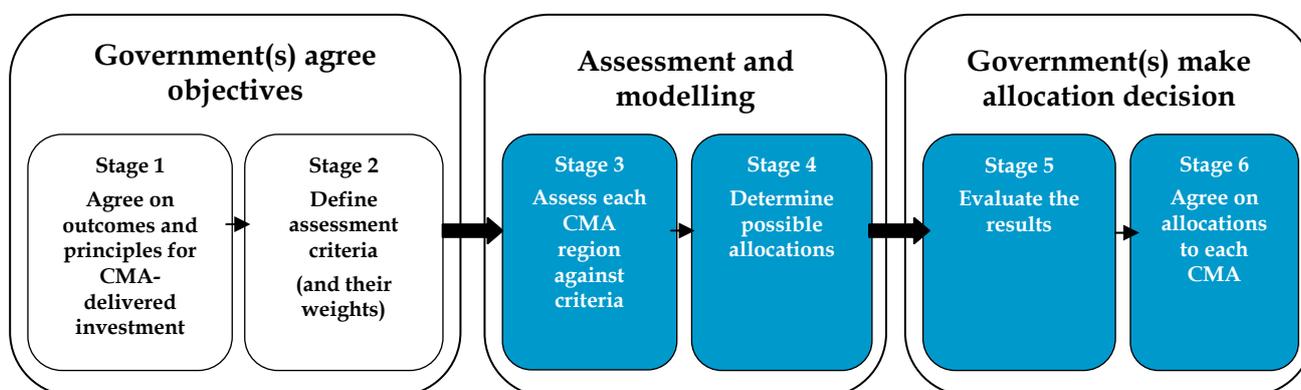
The NRC received positive feedback from both agencies and CMAs on the overall process for determining allocations. Agencies and CMAs generally support the proposed decision-making process as a robust and transparent methodology, and a step towards more objective assessments of funding allocations.

*Recommendation 1*

*The NSW Government adopts the NRC's recommended process for determining funding allocations to CMAs based on cross-regional investment priorities and CMAs' effectiveness.*

## 4 Objectives for CMA-delivered investment

Stages 1 and 2 require the government to define its objectives for CMA-delivered investment. These objectives guide the overall decision-making process and the assessment criteria used in the multi-criteria analysis.



This report presents the feedback from agencies and CMAs about their desired investment principles and assessment criteria. The following sections explain:

- the investment principles described by agencies and CMAs
- proposed assessment criteria based on the principles, and the NRC's judgements on weights that can be applied to the investment principles and criteria.

### 4.1 Stage 1 – Agree outcomes and principles for CMA-delivered investment

NSW and Australian Government agencies indicated that their primary objective is to maximise the likelihood that their CMA-delivered investment will result in improvements in the management and condition of the highest value natural resources. In other words, they are seeking to maximise the likely return on their investment.

The NSW Government has broadly defined the outcomes they want to achieve from NRM investment in the 13 state-wide targets for NRM, covering the themes of biodiversity, water, land and community. The Australian Government has also announced its objectives for the *Caring for our Country* program, and these objectives will become better defined in its proposed annual business plan for implementation of the program. The NSW targets generally seek to maintain or achieve improvements in natural resource assets, with the ultimate goal of resilient, sustainable landscapes that can support the environmental, economic, social and cultural values that communities place on their landscapes.

Agencies have indicated that two key principles should be considered when allocating investment between CMAs:

- Invest in priority natural resource issues**  
(invest where the natural resources are under the greatest threat, in the best condition, where they are most valued by local, state and national communities, and where CMA-delivered funding can have the most impact)
- Invest cost effectively and provide incentives to perform effectively**  
(to generate the greatest improvement for a given amount of funding).

Agencies indicated that targeting investment to governments' highest strategic priorities was of primary importance.

CMAs indicated a third principle that should be of equal importance, which is to:

**C. Maintain community momentum**

(to ensure continuity of community engagement and collaboration, which is a pre-requisite for achieving lasting on-ground change)

Through the current programs (NAP and NHT2), CMAs have made significant investments in community capacity building and engagement, particularly in more recent years when the rate of overall expenditure has been increasing. CMAs have indicated that they will be less able to effectively deliver the on-ground NRM improvements desired by governments if they cannot maintain this community engagement.

## 4.2 Stage 2 - Define assessment criteria

Using feedback on the investment principles, the NRC has designed an analytical framework that can be used to compare likely return on investment between CMA-regions. The two investment principles that we recommend be used in combination to determine likely return on investment are:

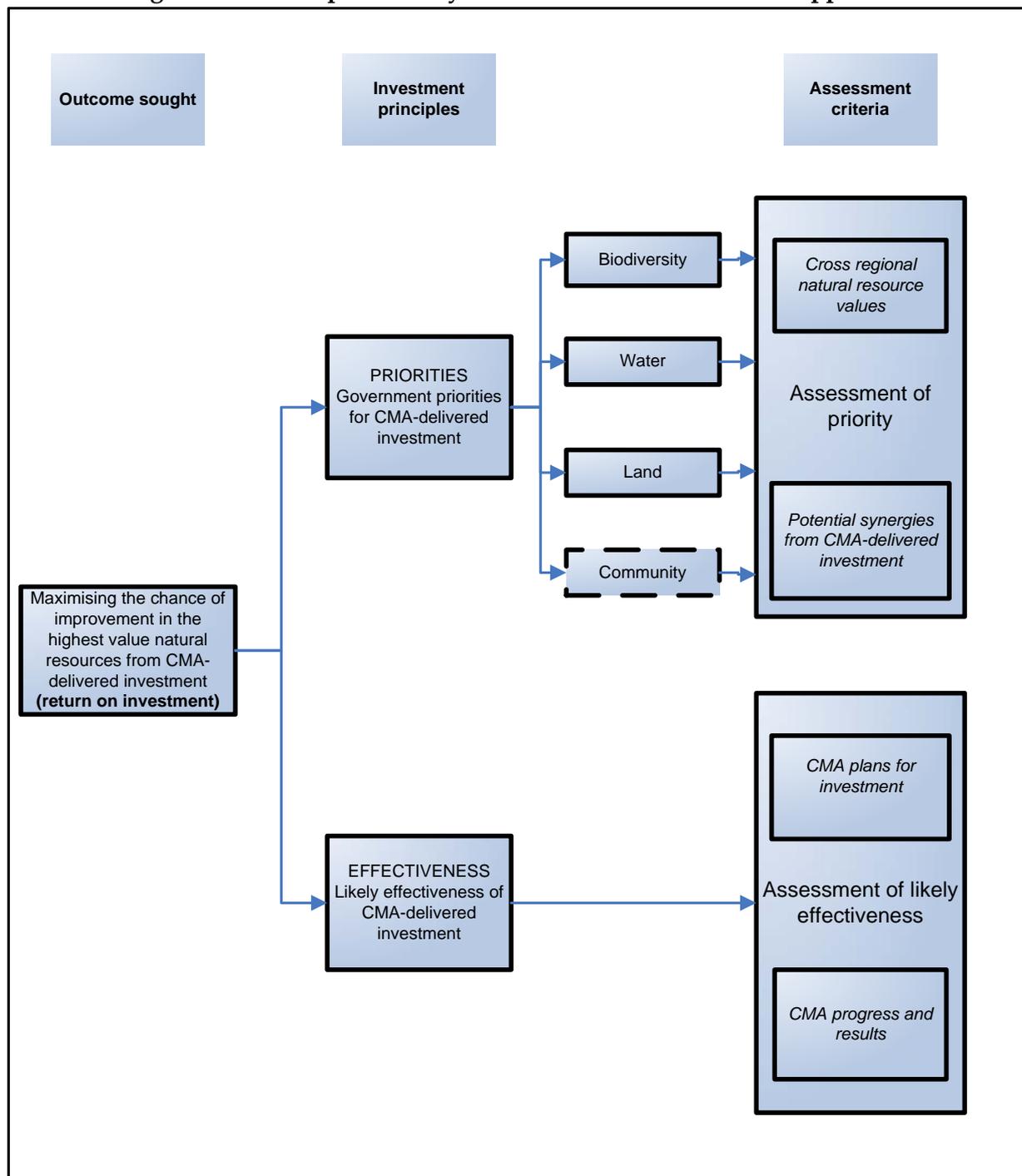
1. **Priorities for CMA-delivered investment (*priorities*)**  
(Government policy preferences for expenditure between natural resource issues across NSW, and potential synergies from CMA-delivered investment)
2. **Effectiveness of CMA-delivered investment (*effectiveness*)**  
(focussing on CMAs' likely and actual effectiveness in implementing their CAPs in partnership with local communities).

The need to maintain community momentum is implicit in both of these principles; priorities for CMA-delivered investment will be partially determined by where investment can build on existing community momentum and capacity, and a CMA's effectiveness will depend on the capacity and engagement of their community.

The proposed framework is illustrated in Figure 4 below. This figure shows the investment principles, as well as the proposed criteria against which each CMA region would be assessed.

This framework reflects a balance between government priorities and CMA performance, essentially a balance between 'top down' and 'bottom up'. At this stage in the evolution of the regional model, CAPs cannot be used as the only basis for the allocation decision. CAPs are evolving and many CMAs are already improving their targets, including their consideration of national and state government preferences. Similarly, government investment priorities cannot be the sole consideration, as this would not recognise the central role of the CAPs and the CMAs' effectiveness in delivering outcomes.

**Figure 4: Proposed analytical framework for decision support tool**



**Priorities**

The assessment criteria to determine *priorities* focus on defining where governments can generate the best outcomes from CMA-delivered funding by asking the questions:

- Where are our most valuable natural resources located? (*Cross-regional natural resource values*)
- Where can CMA-delivered investment best add to the benefits from other interventions? (*Potential synergies from CMA-delivered investment*)

The starting point for determining *priorities* in NSW should be the 13 state-wide targets. These are represented in Figure 4 by the four overarching themes; biodiversity, water, land and community.

For each target, governments can define cross-regional priorities and weight the relative importance of the issues for investment. However, governments can agree to assess *priorities* for more, or different, categories. For example, the 6 investment priorities for the *Caring for our Country* program could be used as the categories for assessing spatial priorities. As NRM policies and government priorities become better defined, or change, the analytical framework can be modified to accommodate these preferences.

During the consultations there was a divergence of views about how issues of community engagement and capacity should be included in the framework:

- some believed that community capacity and engagement is a 'means to an end' and should be considered as a component of *effectiveness*
- others believed that community capacity to undertake NRM is an outcome in itself and should be assessed as a separate theme under *priorities*.

The NRC has designed the analytical framework to accommodate both of these views.

Outcomes for the 'community asset' are described in 2 state-wide community targets. As shown in Figure 4, governments can assess cross-regional priorities for investment in the community theme using the same process as for the biophysical themes (see section 5.1.1).

Issues of community capacity and engagement are also considered where it is relevant to CMA effectiveness:

- In Stage 3 when assessing potential synergies from CMA-delivered investment in the *priorities* assessments (explained further in Section 5.1.1)
- In Stage 3 when assessing CMA *effectiveness*. Future assessments of *effectiveness* in this framework will use data from the NRC audit program which will include information about the level of community engagement in each region.
- In Stage 5 (evaluate the results), as it may be a limiting factor for some CMAs' ability to deliver their investment effectively (Section 6.1). Governments will need CMA advice about where continued CMA investment in community capacity is most needed and most valuable.

### **Effectiveness**

The criteria to assess *effectiveness* focus on determining which CMAs are likely to be most effective in delivering government investment by asking the questions:

- How confident are we that the CMAs' plans for investment (CAPs) will lead to achieving the 13 state-wide targets? (*CMA plans for investment*)
- What progress are CMAs making to improve their effectiveness and achieve targets? (*CMA progress and results*)

Linking funding to performance sets up positive incentives for CMAs to improve their effectiveness and deliver results.

The assessments of *effectiveness* should project forward to look at which CMAs are *likely* to be most effective in delivering on Governments' objectives. A forward estimate of likely effectiveness can be determined by considering factors which indicate ability and capacity to deliver – such as existence of strong business systems and good strategic plans - and by assessing implementation performance. Actual delivery of the results desired by Governments – both long-term and intermediate outcomes - can then be used as an indicator of likely future performance.

In the future, the NRC audits of how effectively CMAs are implementing their CAPs will generate good data about CMA effectiveness. The NRC will audit CMAs' effectiveness using a broad program logic that good NRM practice complying with the Standard will lead to more effective delivery of medium term management targets and use of best available science to select the right management targets. This will subsequently lead to greater improvements in resource condition on the ground. The NRC will be assessing CMA effectiveness in three ways:

1. Has the CMA complied with the Standard in implementing its CAP?
  - Some of the criteria will be:
    - the extent to which plans, systems and decision making comply with the Standard
    - the extent of progress against the NRC's recommended actions from CAP reviews
2. Has the CMA successfully delivered management targets that are likely to promote achievement of their catchment targets?
  - Some of the criteria will be:
    - the extent of progress against CAP management targets
    - the extent to which management targets are likely to promote catchment targets and catchment targets are likely to promote state-wide targets.
3. Has the CMA's investment contributed to observed improvements in the condition of natural resources in the catchment?
  - Some of the criteria will be:
    - the extent of observed changes in natural resource condition
    - the extent to which on ground activities lead to improvements in natural resource condition.

The NRC believes this provides a comprehensive definition of *effectiveness* for CMAs implementing their CAPs. Our ability to assess CMAs against all criteria will improve over time.

#### **4.2.1 Weighting the criteria**

Investors can weight the investment principles and assessment criteria in Figure 4 to reflect their relative importance. There are many consensus based processes that can be used to agree weightings. Consensus between the stakeholders involved in the review has not been reached, but the NRC is recommending some weights for the investment principles and assessment criteria based on our judgement of the feedback we have heard from stakeholders.

If the process is used in the *short term* the NRC recommends a weighting of 60% to *priority* and 40% to *effectiveness* because:

- agencies indicated that the investor priorities should be of primary importance
- in the short term there is more data available to assess priorities than to compare CMA effectiveness.

The NRC also proposes that within the *effectiveness* analysis a 60% weighting is given to *CMA plans for investment*, and a 40% weighting applied to *CMA progress*. This is because we have good data about the quality of each CMA's CAP from the NRC's assessments, but data on likely CMA progress and effectiveness is not as robust at this stage (explained further in 5.1.5).

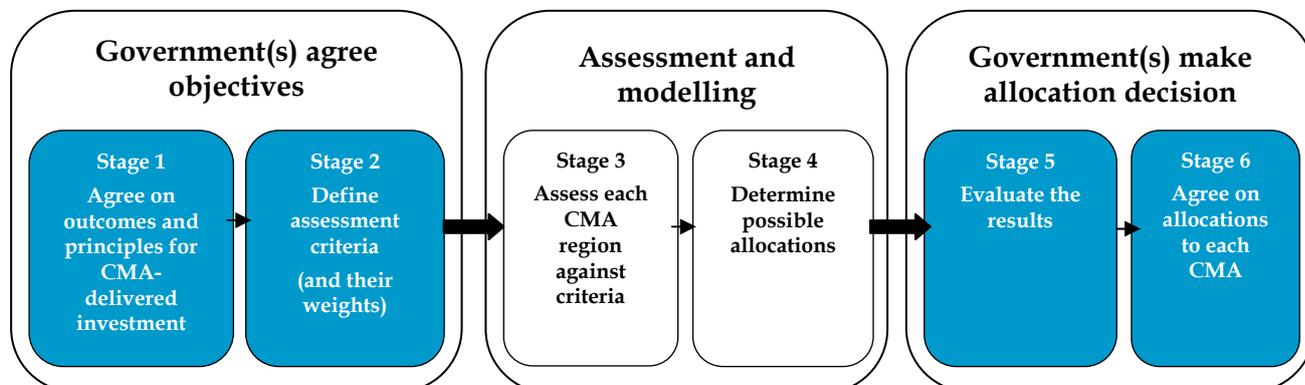
Governments also have the option to weight between the investment themes to indicate their broad preferences for investment in different issues, for example, weighting investment in biodiversity more highly than water. If governments choose not to weight between themes, the default will be for equal importance to be applied to the different themes. The themes have been assigned equal weights for the modelling in this report.

When deciding whether to weight between themes, governments should consider the biases of the previous programs (lots of funding for salinity, not much funding for coasts) and the potential consequences for regional communities of dramatically shifting priorities in the short term.

The weights modelled in this report are based on NRC judgements. Ideally, more stakeholders should be involved in a transparent process to determine appropriate weightings to apply to the investment principles and assessment criteria. When the process is run for a specific funding program such a process should be undertaken.

## 5 Assessment and modelling

Stages 3 and 4 require each CMA region to be assessed against the assessment criteria shown in Figure 4. Multi-criteria analysis is then used to determine possible allocations.



The NRC has undertaken the assessments described for Stage 3. We have completed a rapid assessment of each CMA region against the criteria using readily accessible information.

When undertaking the *priorities* assessments, we found that there are few existing national or state policies which indicate investment priorities spatially across NSW which would enable an assessment of priorities for investment in each CMA region. The NSW Government has broadly expressed its priorities in the 13 state-wide targets. However, underneath the broadly expressed priorities there are few definitions of spatial priority and value across the state and between regions.

To overcome this data gap, the NRC has developed a framework that the NSW Government can use to identify their investment priorities between regions. The NRC has undertaken a 'first cut' rapid analysis using this framework to illustrate how it works. However, the NRC recommends that it be tasked to refine these assessments to ensure that up-to-date policy preferences and data sources are appropriately reflected.

To facilitate Stage 4 we have developed a multi-criteria analysis tool to determine possible funding allocations. The simulations we have run are to illustrate possible proportional allocations. However, the model will need to be re-run when the total funding pool is agreed.

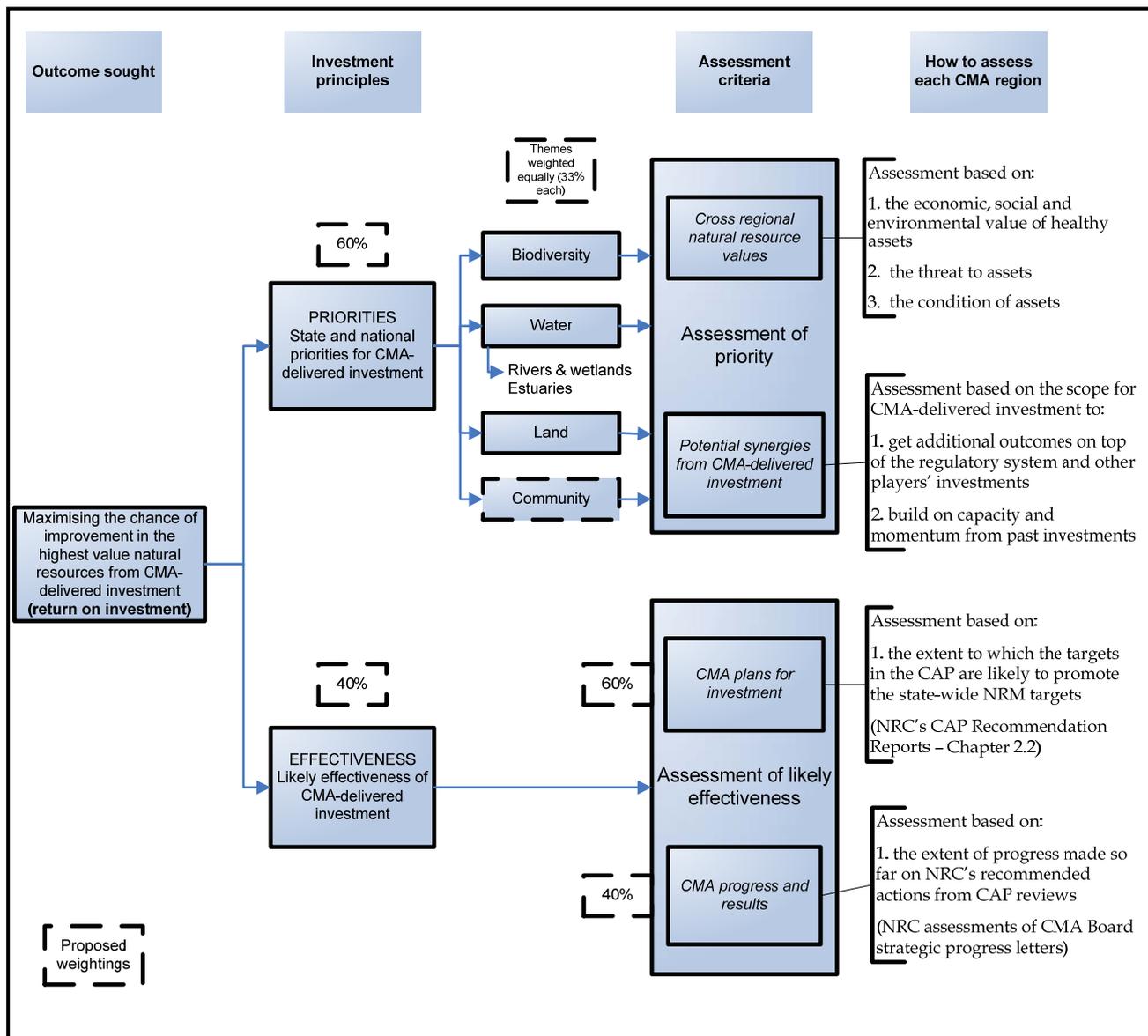
The following sections describe:

- how the NRC has assessed each CMA region against the criteria for priorities and effectiveness
- how multi-criteria analysis is used to determine possible allocations.

### 5.1 Stage 3 - Assess each CMA region against criteria

Figure 5 shows the recommended analytical framework, including a brief description of how each CMA region can be assessed against the criteria and proposed weightings for the investment principles and assessment criteria.

**Figure 5: Proposed analytical framework including proposed weights and method of assessing each CMA region against the criteria\***



\*Note: Community theme not assessed in this initial application of the model due to shortness of time and limited available data.

Figure 5 identifies the best performance measures we can use right now. These proposed measures are based on data that is readily accessible across all CMA regions and can be used in the *short term* (prior to June 2008). If the model is used in the future, the same assessment criteria should be considered, but the method of evaluating each CMA against the criteria can become more sophisticated and incorporate a richer variety of data. Over time, State of Catchment Reports and the NRC audit program will provide much more up-to-date and rigorous data to assess both *priority* and *effectiveness*.

Initially, the NRC recommends assessing *priorities* at an aggregated level, not for each of the 13 targets. We recommend aggregated assessments for each of the three biophysical natural resource themes (biodiversity, land and water). However, within the water theme we have undertaken a separate assessment of estuaries as this issue is only relevant to 5 CMAs. The NRC has not undertaken an assessment for the community theme at this stage due to shortness of time and limited available data.

Figure 5 also shows weightings the NRC recommends are applied to each criterion as a starting point (described in Section 4.2.1). The NRC has also made a judgement about how the separate priorities assessment for estuaries should be weighted compared with the other assessments of riverine ecosystems and wetlands in the water theme. For the modelling in this report we have applied a weighting of 22% to rivers and wetlands, and 11% to estuaries (33% overall to the water theme).

The NRC has assessed each CMA region against the assessment criteria using the measures shown in Figure 5. Sections 5.1.1 and 5.1.2 describe how these assessments were undertaken. The NRC's qualitative assessments are then converted into a score for each CMA against each criterion.

### 5.1.1 Assessing investment priorities between CMA regions

Agencies have indicated that CMA-delivered funding should be targeted to governments' NRM priorities across the state. In the State Plan Priority E4, the NSW Government has endorsed the 13 state-wide natural resource targets as the priority areas for NRM investment and the *Caring for our Country* program has identified 6 investment priorities.

However, there is little guidance available on **where** across the state NRM investment should be directed. At both state and national levels there are few clear, spatially defined priorities for CMA-delivered investment. In addition, CAPs express priorities *within* regions, but CAPs cannot be used to compare priorities *between* regions. It is therefore difficult to determine which regions should be allocated greater proportions of funding under different NRM themes.

In September 2005, the NRC recommended that:

*'state agencies should develop a high level policy that defines any additional state priorities for natural resource management... (which might) involve identifying particular assets in a geographic location that have state value, or developing strategies and policies for particular themes'.<sup>10</sup>*

The NSW Government is currently developing a Biodiversity Strategy, and there are other government strategies and policies that can be used to derive national priorities for CMA-delivered investment, such as the NRM Ministerial Council's *Directions for the National Reserve System*<sup>11</sup>, and Australian Ramsar Wetlands and Wetlands of International Importance.<sup>12</sup>

Building from these strategies, the NRC is recommending a framework that governments can use to determine their priorities for CMA-delivered investment. During the NRC's consultation for this review, CMAs also strongly supported the need to define state-scale spatial NRM investment priorities.

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<sup>10</sup> Natural Resources Commission (2005) *Recommendations: Standards and Targets*, May 2005.

<sup>11</sup> Natural Resources Management Ministerial Council (2004) *Directions for the National Reserve System - a partnership approach*, Australian Government, Department of Environment and Heritage, Canberra, ACT.

<sup>12</sup> Australian Wetlands Database, accessed at <http://www.environment.gov.au/water/publications/environmental/wetlands/database/index.html>.

### **Prioritisation principles**

The NRC recommends a set of principles for determining priority that are based on supporting landscape function. The framework is based on the principles that healthy assets are important to support landscape function, which in turn supports the values that communities derive from their landscapes. The NRC recommends the following principles be used to determine which regions are the highest priority for CMA-delivered investment in each theme:

1. The highest value regions for CMA-delivered investment are where:
  - a) the nation's environmental, economic and social values are highly dependent on the landscape functions<sup>13</sup> supported by the natural assets in that region (including where priorities have already been defined in state or national policies eg. Ramsar listed wetlands)
  - b) natural assets, and hence the landscape functions and values dependent on those assets, are under the greatest threat
  - c) natural assets that support landscape function are in the best condition compared with the condition needed to support landscape function and values.
  
2. The greatest potential synergies from CMA-delivered investment can be found where:
  - d) there is the greatest scope for CMA-delivered investment to add to the regulatory system (for regulating the condition of, or threats to, assets in that theme) and to other players' investments in that theme
  - e) there is the greatest scope for further CMA-delivered investment to build on the capacity and momentum from past investments in that theme.

More work is needed to understand the target levels of condition we should be aiming at for different assets in different parts of the state. However, even with imperfect information, each CMA region can be assessed using these principles to determine the relative priority for investment in each region for each theme.

It should be noted that these principles do not prioritise between different management responses or interventions such as rehabilitation or conservation of high value assets. Prioritisation between management responses is best done by CMAs, when they are developing their Investment Programs.

#### **5.1.2 Step-by-step priorities assessment process**

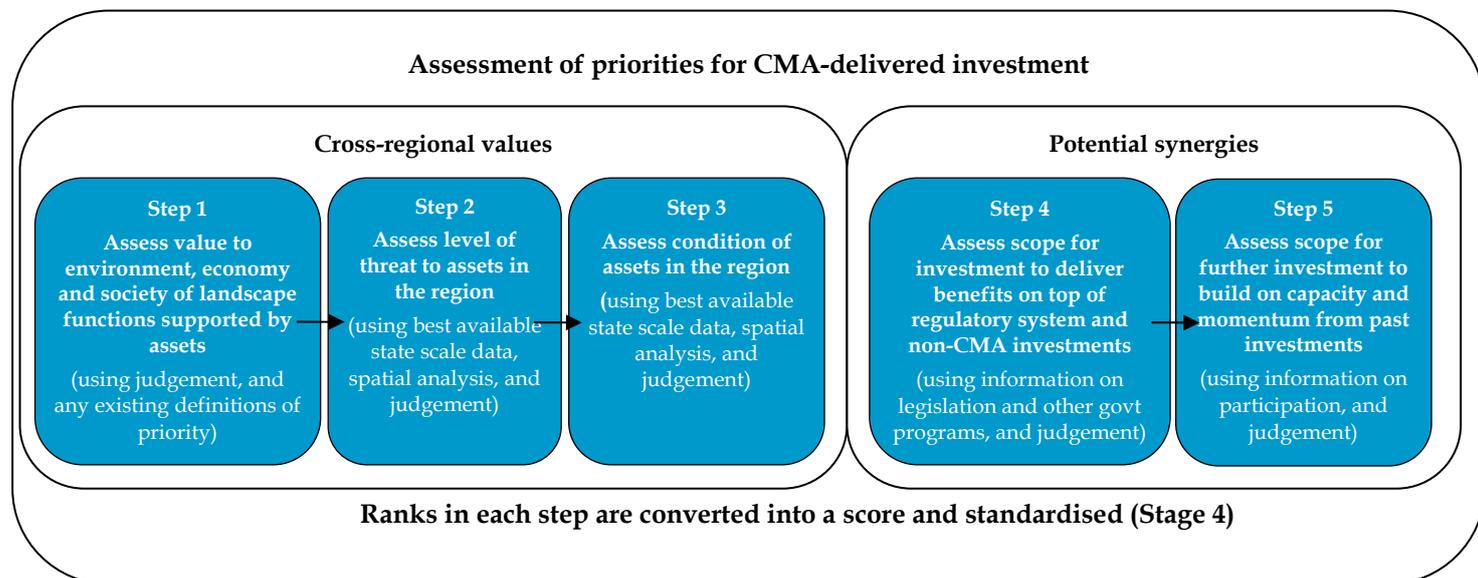
The NRC has designed a simple framework that leads analysts through a question-and-answer process. The principles outlined above have been incorporated in a series of questions. The analyst assesses each CMA region against these questions and assigns a ranking.

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<sup>13</sup> By landscape function, the NRC means water balance, nutrient balance, landscape heterogeneity, ecosystem health and biodiversity, economic and market dynamics, community dynamics, see Stefan Hajkowicz, Tom Hatton, Jim McColl, Wayne Meyer and Mike Young, *Exploring future landscapes: a conceptual framework for planned change*, Land and Water Australia, July 2003.

Figure 6 outlines the step-by-step process that is undertaken for each theme.

**Figure 6: Priorities assessment process**



The NRC referred to the *Required Outcomes* of each component of the Standard for Quality NRM to guide development of the assessment questions. For example:

- in all steps analysts should use best available knowledge (scientific, biophysical, social, economic, expert) in a structured and transparent manner
- Step A ensures that the multiple values (environmental, economic and social) supported by the natural resource assets are assessed (*Scale*)
- Step D ensures that the responsibilities and activities of other parties in delivering benefits in each theme are assessed to identify where CMA investment might add to these (*Collaboration*).

Section 5.1.4 describes how the NRC used the Standard to identify the next steps for agencies, with support of the NRC, to check and confirm the priorities assessments.

### 5.1.3 Results - priority assessments for each CMA-region

The NRC has followed the process outlined above and has undertaken a rapid assessment to determine relative *priorities* for CMA-delivered investment in each theme. We have used desktop research to access available data and checked our results and approach with some independent experts. The NRC's primary purpose in undertaking this rapid assessment was to demonstrate that it can be done, and to use it as a basis for further checking and refinement with agencies and CMAs.

The results for each theme, and the information sources used, are summarised in Attachment 2. Attachment 3 summarises the rationale for each CMA region's ranking and Attachment 4 explains the approach and method to rank each CMA region against the assessment questions. These rankings have been input to the multi-criteria analysis model that is described in Section 5.2.

#### 5.1.4 Next steps to check and refine priorities assessments

The NRC used the Standard for Quality NRM to evaluate the quality of its rapid assessment process (Attachment 5). This has identified the following major areas for improvement when this priorities assessment is revisited:

- update and expand existing data sources to include a wider range of information
- consult more extensively with experts including those within NSW and Australian Government agencies and CMAs
- involve a broader range of parties and increase community involvement, provided the costs of doing so do not outweigh the benefits
- improve understanding of the asset condition required to support landscape function, and hence values, for all themes.

The NRC recommends that it should facilitate a process for NSW Government agencies to check and refine the assessments of *priorities* based on the state-wide targets and the best available data. This process should also involve a broader range of stakeholders, including the Department of Primary Industries, Department of Planning, Department of Water and Energy and Department of Lands. The NRC also recommends that the NSW Government seeks Australian Government involvement in this process, as it could also be used to determine spatial priorities for the *Caring for our Country* objectives.

The process to check and refine the assessments will ensure that data and preferences that were not publicly available and accessed in the NRC's rapid assessment are incorporated, such as:

- upcoming policies or strategies (for example, the NSW Biodiversity Strategy being developed by DECC)
- new sources of evaluated data (for example, Sustainable Rivers Audit, CSIRO work on groundwater sustainable yield, community benchmarking and socio-economic profiles being undertaken by Land and Water Australia)
- any data held within CMAs that can allow cross-regional comparisons.<sup>14</sup>

In particular, the information being generated through the NSW MER Program should be used to check rankings for *Threat* and *Condition*. Further analysis may be required for *Value to Environment, Economy and Society*, and CMAs will have greater knowledge on the *Synergies* questions.

Attachments 4 and 5 contain additional information on how to improve this process.

#### ***Recommendation 2***

***The NRC be tasked with facilitating a process to check and refine the initial assessments of priorities for investment between CMA regions.***

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<sup>14</sup> For example, some CMAs have commissioned native vegetation mapping that is consistent with state-wide mapping products, but at a finer scale.

### 5.1.5 Assessing likely effectiveness in each CMA-region

The NRC has based its assessment of the likely *effectiveness* of CMA investment on two data sources that are readily available:

1. **CMA plans for investment** – measured by the NRC’s assessment of confidence that CMAs’ CAP targets will promote achievement of the state-wide targets<sup>15</sup>
2. **CMA progress and results** – measured by assessment of progress against the NRC’s recommended actions from CAP reviews (using strategic progress letters)

These are the data sources we are recommending for an allocation decision that needs to be made *in the short term*. We believe they provide the best indication of likely CMA effectiveness in delivering their CAPs and contributing to achievement of the state-wide targets at this point in time.

The NRC’s CAP recommendations were determined by the extent to which each CMA’s CAP targets:

- were developed using a rigorous and transparent process that was compliant with the Standard
- provide a basis for assessing performance, which means they need to be measurable (including having timeframes, units of measure, clear target levels, and performance indicators)
- are supported by information that demonstrates that they are relevant and achievable
- demonstrate linkages between the different sets of targets, which means that management targets should clearly contribute to catchment targets and catchment targets should clearly contribute to the state-wide targets.

This assessment considered several different parameters, reflecting both the underlying systems and processes of the CMA, as well as how well aligned their targets were with the state and national priorities.

The CAPs were approved with conditions, and the CMAs write to the NRC periodically to describe progress made against these recommendations (strategic progress letters).<sup>16</sup> The NRC believes that the strategic progress letters provide the best, readily accessible indication of how CMAs’ business systems and strategic planning have improved since those CAP reviews were completed.

Comprehensive and comparable data on landscape change as a result of CMA interventions are not currently available. Some agencies and some CMAs suggested that CMAs’ regular financial and milestone reporting to the JSC could be used both as a measure of CMA effectiveness and to assess where there are gaps in investment. The NRC believes this data cannot be used for this purpose in the short term. Much more analysis would be required to get a meaningful assessment of effectiveness and progress, particularly as the milestones and targets reported against may not be well aligned with the CAPs, and focus on outputs rather than landscape change.

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<sup>15</sup> NRC’s Catchment Action Plan Recommendation Reports – Section 2.2. Available at [www.nrc.nsw.gov.au](http://www.nrc.nsw.gov.au).

<sup>16</sup> NRC’s Catchment Action Plan Recommendation Reports – Section 1.2. Available at [www.nrc.nsw.gov.au](http://www.nrc.nsw.gov.au).

However, as more comprehensive data becomes available and if this decision making process is used again during program implementation, measures of CMA performance in delivering outcomes against both Governments' priorities can be easily incorporated into the framework. Over time, State of Catchment reports and NRC audits of CAP implementation will provide more comprehensive and robust data for this assessment.

The results of the NRC's assessment of likely *effectiveness* are presented in Attachment 5.

## 5.2 Stage 4 - Determine possible allocations

In this stage the assessments against the criteria (detailed in the previous section) are analysed together to determine possible allocations for each CMA:

- the qualitative assessments are converted into standardised scores
- the weights are then applied to each of these scores
- the weighted scores are added together to come up with an overall weighted score for each CMA.

There are many approaches to implementing multi-criteria analysis. The following sections explain how the NRC has designed the multi-criteria analysis and the assumptions that have been made.

### Assigning scores to the qualitative rankings

The NRC has adopted a methodology where each CMA region is assigned a qualitative ranking for each criterion. Following the qualitative assessment (performed in Stage 3), each possible qualitative ranking for a given criterion must be assigned a number.

To do this, the NRC has assumed a linear relationship between the possible CMA rankings for each criterion and the likely return on investment. This means that the rankings are assigned scores on a linear scale of equal intervals. For example, a rating scale of very high, high, medium, low and very low is translated into scores between 4 and 0, where a very high rating is given a score of 4 and a very low rating is given a score of 0.

This means that, for example, if a CMA is rated high and scores a 3 for a particular criterion, its likely contribution to return on investment against that criterion is assumed to be 75% of that for a CMA which is rated as a very high and receives a 4.

Applying a linear relationship is a simplifying assumption. This approach is commonly used when an agreed scale of measurement for the criterion in question does not exist, or where there is insufficient time or resources to undertake the measurement. A linear relationship has been adopted for transparency and clarity, and because of sometimes high levels of uncertainty associated with each ranking.

Once each CMA has been assigned a score for each of the performance criteria, each of those scores is standardised into a score between 0 and 10. The agreed weightings are then applied to the standardised scores.

### Determining the overall weighted score

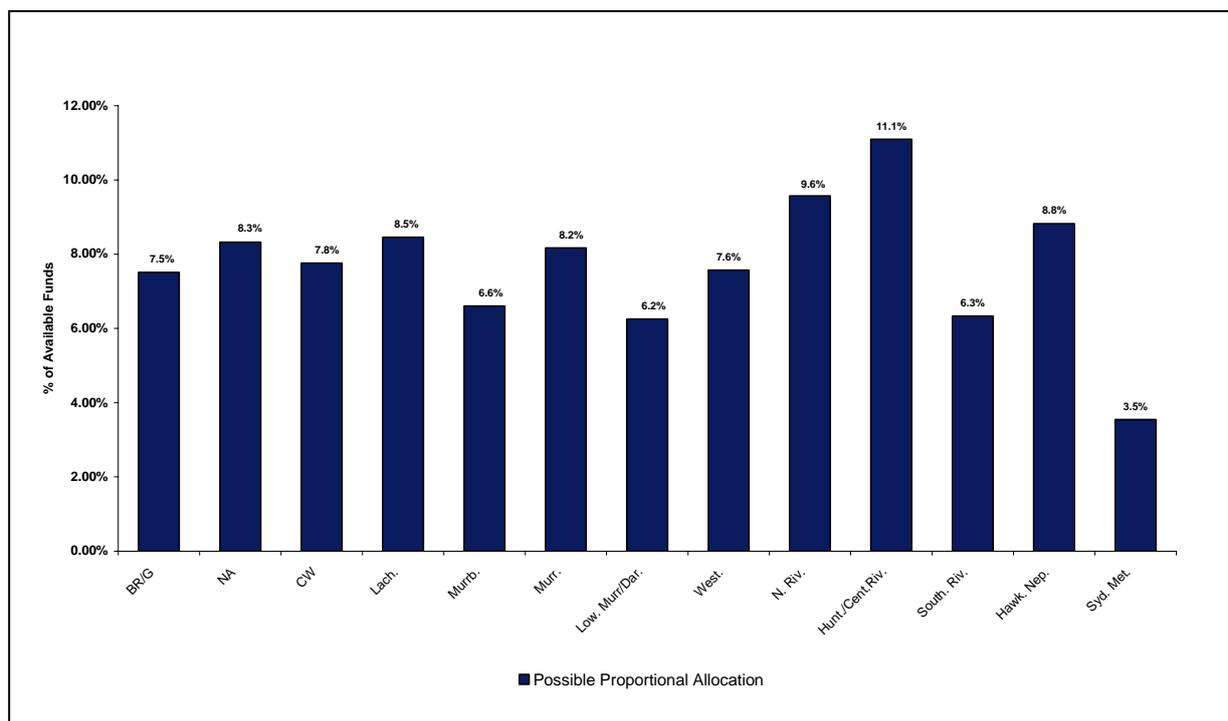
The NRC has used a simple additive method to aggregate the weighted, standardised scores. The model adds all the weighted scores across all criteria to yield a single weighted score for each CMA.

### Using the scores to determine allocations

The final step in the model is to use the aggregated score for each CMA to determine their proportional funding allocation. CMAs are allocated funds in direct proportion to the ratio of their individual scores over the total of all weighted scores. For example, if a CMA's weighted score is equal to 10% of the sum of all the weighted scores, then that CMA would receive 10% of the total funds available.

The NRC has run the multi-criteria analysis using the assessments presented in this chapter. The proportional allocations resulting from this analysis are shown in Figure 7. Note that this assessment excludes Land and Water Management Plan funding.

**Figure 7: Proportional allocation per CMA based on *priorities and effectiveness***



This figure showing relative percentage shares of an unknown funding pool illustrates the possible spread of funding across the state when the funding decision is made based entirely on *priorities and effectiveness*.

The multi-criteria analysis has been run using a tool developed in Excel. It will be made available to NSW and Australian Governments and CMAs on request. The NRC can provide technical support for using the tool when required.

### **5.2.1 Land and Water Management Plan funding**

The Terms of Reference asked the NRC to consider Land and Water Management Plan (LWMP) funding. This funding is relevant because it is a fixed quantum of funding delivered through some CMAs. The funding must be continued as it is already contracted and committed by the NSW Government, but it is important to consider if or how it should be incorporated into the broader funding allocation.

The NRC is not recommending an approach at this stage because there are still considerable uncertainties regarding:

- the total amount of funding still to be delivered per annum under the plans
- whether the LWMP in the Murray will expire during the period of the new program
- how the NSW LWMP funding will be matched by the Australian Government.

However, the NRC can suggest the different options and describe the consequences of each.

LWMP funding is already committed to the four relevant CMAs (Lower Murray Darling, Murrumbidgee, Murray and Lachlan). The NRC understands that:

- the activities funded under LWMPs contribute to achieving targets in each of the CAPs, but that CMAs do not have complete control over the activities funded as the plans were developed prior to the creation of CMAs and the NAP/NHT2 funding programs
- LWMP funding can only be spent in certain parts of each CMA region.

We also understand that the NSW Government will be seeking Australian Government matching funding for its committed funding. Following the *Caring for our Country* announcement, it is not clear how the Australian Government will match the NSW Government funds. The NRC believes there are three options for Government to consider. The options and the consequences of each are described in Table 1. The described consequences focus on the Murray and Murrumbidgee CMAs, as they receive the highest amount of LWMP funding.

**Table 1: Options for including LWMP in the analysis and the consequences of each option**

	Option for treating LWMP funding (NSW funds and AG matching)	Consequences <sup>17</sup>
1.	Treat LWMP funding completely independently of the main funding decision, and add 'on-top' of the relevant CMAs' allocations that are determined by the multi-criteria analysis.	Murray and Murrumbidgee would receive a full allocation of the other program funds in addition to their LWMP funds.
2.	Offset the allocations determined by the multi-criteria analysis by the full amount of LWMP funding (ie. relevant CMAs first paid their LWMP allocations, with any extra required funding provided from the new program).	This option could potentially result in Murray (and Murrumbidgee to a lesser extent) only being allocated their LWMP funding, or only a small amount of additional other program funds. All other CMAs would receive more of the other program funds, in line with their overall percentage shares.
3.	Offset the allocations determined by the multi-criteria analysis based on the percentage of the catchment that is covered by the LWMP (ie. the CMAs' share of the other program funds is reduced in proportion to the percentage of their catchment that is covered by the LWMP).	This is an option between the two extremes described above. Murray and Murrumbidgee would receive a smaller amount of other program funds than under Option 1, but would receive more other program funds than under Option 2. All other CMAs would receive more of the other program funds, in line with their overall percentage shares (but less than under Option 2).

<sup>17</sup> The magnitude of the consequence will depend on the total funding pool. These are general statements about potential consequences. The described consequences focus on Murray and Murrumbidgee CMAs as they receive the vast majority of the LWMP funding. The consequences of the different options for Lachlan and Lower Murray Darling CMAs will be less significant.

Analysis of the allocations under the current programs suggests that the LWMP funding was added on top of the overall allocations (Option 1).

The NRC believes that if the Australian Government is to match NSW LWMP funding from the general pool of new program funds, then Option 3 is a compromise between two extremes that is most equitable.

The NRC understands that approximately 29% of the Murray catchment and approximately 9% of the Murrumbidgee catchment is under the LWMP, but recommends these figures are verified. It is less than 1% for both Lachlan and Lower Murray Darling.

In general terms, the impact of applying Option 3 rather than Option 1 will be negligible for the Lachlan and Lower Murray Darling CMAs as the LWMP only applies to small proportions of their catchments. Their overall allocations would not vary significantly compared with Option 1.

Under Option 3, the Murray CMA's allocation of the other program funds (based on the multi-criteria analysis) would be reduced by 29% (the area covered by the LWMP) and the Murrumbidgee CMA's by 9%. This surplus would then be redistributed between all other CMAs according to their percentage share that was determined by the multi-criteria analysis. This would result in Murray and Murrumbidgee CMAs receiving less total funding than under Option 1. However, the magnitude of the difference will depend on the total funding pool being considered.

Depending on how the Australian Government matches the NSW LWMP funding, the NRC believes that this compromise is appropriate. However, modelling will need to be undertaken when agreements are reached to understand the actual consequences. However, if the Australian Government matches the NSW Government contribution from another source, then the LWMP funding should be excluded entirely from the analysis, as all other funding sources to CMAs currently are.

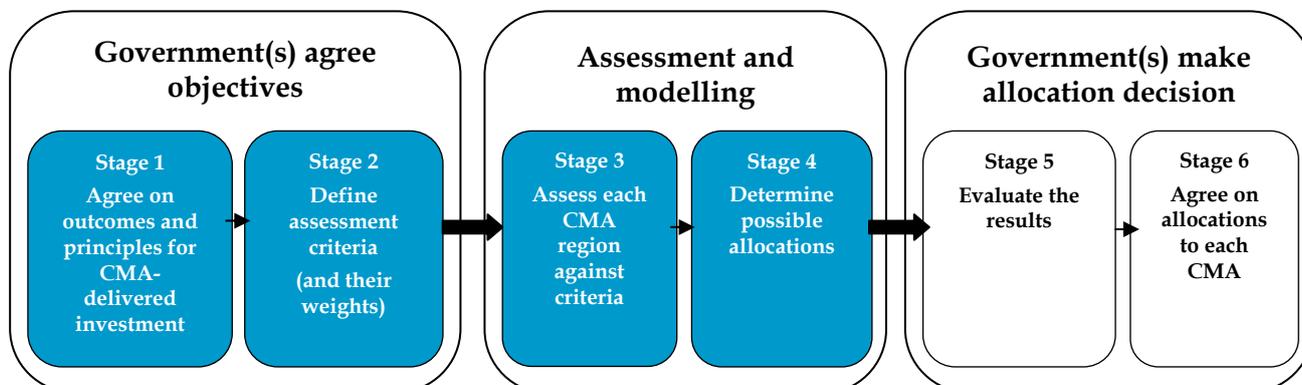
The Murray and Murrumbidgee CMAs believe that Option 1 is appropriate because they don't have total control over the activities funded under the plans. For the Murray CMA, it would also provide a smoother transition if the plan is not continued post 2010 when the plan may be due to expire. However, they believe that if Option 3 is adopted, the magnitude of the offset should be reduced by half to minimise the impacts on the CMA.

### ***Recommendation 3***

***The NSW Government evaluates the 3 options for treating Land and Water Management Plan funding and decides how it should be incorporated into the allocations.***

## 6 Making the final allocation decision

Stages 5 and 6 require the governments to evaluate the outputs of the decision support tool and decide on the allocations.



The following section explains how to evaluate the results of the multi-criteria analysis and agree allocations.

### 6.1 Stages 5 and 6 – Evaluate results and agree allocations

The multi-criteria analysis will generate possible allocations for each CMA. However, the outputs of the modelling must be evaluated in a logical and structured way. If any tradeoffs or adjustments are needed, they must be clearly justified and documented.

For the new NRM program, the NRC recommends that governments evaluate the results of the multi-criteria analysis against the average allocations under the current programs, and against the recent levels of expenditure, to assess whether the outcomes are reasonable.

The NRC recommends a risk based approach to evaluating the results of the analysis, using the Standard as a frame of reference. This risk assessment of the results should consider:

- the likely consequences of any shifts in funding away from the status quo
- the significance of these consequences for CMAs and for the overall regional model
- what can be done to manage that risk.

The purpose of Stage 5 is to minimise risk to CMAs and investing governments by highlighting any significant changes in funding levels compared with current levels. It is not intended to ‘fine tune’ the model or compensate for poor data. The better the information that goes into the model, the more robust the outcomes will be. However, it is important to undertake a ‘sanity check’ to ensure the outcomes are reasonable and will not lead to unintended consequences or unacceptable environmental, economic and social risks for CMAs or investing governments.

This stage can be thought of as a risk assessment of the state-wide investment portfolio. Where the results of the analysis suggest a significant change in funding for particular CMAs compared with the status quo, the first step is to investigate why there is a change and whether it is consistent with anticipated outcomes given the investment principles and data. For example, since broadening government priorities are effectively reducing the priority placed in salinity under the current programs, we would expect a reduction in funding for those CMAs that traditionally have received high levels of funding for salinity. Having established the cause of the variation, the governments must then assess whether the level of the variation is appropriate by assessing the risks.

Where a cause for the variation cannot be established, the data should be checked for accuracy and revised where necessary.

The NRC has developed a set of risk-based questions outlined in Table 2 to guide decision-makers in evaluating the results. These questions were guided by the Standard and the need to:

- maximise efficiency and effectiveness
- ensure success
- minimise impacts.

**Table 2: Framework for risk assessment of results\***

Decision makers assess	Types of consequences
If there is a significant increase in a CMA's investment budget compared to the status quo, do they have the capacity to implement that budget? (consider ratio of investment to recurrent budget)	Funding may be left over which could have been more efficiently spent elsewhere
If there is a significant decrease in a CMA's investment budget compared to the status quo, will their programs be severely impacted? (consider ratio of investment to recurrent budget)	Inability to maintain momentum in existing projects Inability to invest in new projects Staff layoffs
Are there any notable geographic distortions, such as an aggregation of bordering CMAs with significantly reduced funding?	Large areas of NSW not receiving funding
Are there any CMAs with similar characteristics but significantly different investment budgets?	Local inequities
If there is a significant decrease in a CMA's investment budget compared to the status quo, is the CMA's ability to effectively engage with the community reduced?	Community not effectively consulted Community support withdrawn CMA's effectiveness reduced Potential loss of collaboration with landowners and other community groups
If there is a significant decrease in a CMA's investment budget compared to the status quo, is the CMA's ability to collaborate with other CMAs (both in NSW and other states) reduced?	Inability to leverage off other projects Impact on bordering regions where there's a reluctance for one CMA to provide all funds
Do all CMAs have sufficient funding to allow them to undertake a critical level of investment?	Funding may be spread too thinly, reducing overall effectiveness
Do low performing CMAs have sufficient funding and support to improve their performance?	Funding based on effectiveness may result in low performing CMAs receiving continually lower funding levels

\*These questions have been written in the context of determining major program funding to CMAs. A similar risk based framework could be designed to evaluate the results for any kind of funding decision.

The next steps are to assess the likelihood and severity of the consequences identified in the process outlined above, and decide what level of risk is acceptable, both to the CMAs and the government investors. Decision makers should consult with CMAs at this point for advice on the potential severity of the risks.

Decision makers may be able to manage, or reduce, the risks or consequences. One option is make adjustments to the levels of funding determined by the model. Redistributing the funds should be a last resort, and should not occur without sound reasoning and clear documentation to ensure the continued transparency of the process. Furthermore, if any significant changes are proposed it is important to ensure the outcomes from the changes remain consistent with the investment principles. Generally, changes should only be made if the reduction in funding will present an unacceptable risk to CMA's or where CMAs do not have sufficient capacity to spend their allocated budget.

## 7 Ongoing decision-making

Determining indicative funding allocations is an up-stream decision in a broader process. Governments must also approve the Investment Programs that CMAs will develop based on the indicative allocations they receive. Governments may also want the flexibility to revisit the allocations at a fixed point in time, or in response to external factors.

The following sections explain:

- the need for a similarly rigorous and strategic process for evaluating Investment Programs
- how the recommended process can be used to revisit the allocations at a point during programs.

### 7.1 Confirming allocations - Approval of Investment Programs

The recommended process for determining allocations is based on *priorities* and *effectiveness*. These principles should also be used to evaluate and approve Investment Programs. Cost efficiency is another important principle that must be carefully considered when approving Investment Programs.

CMAs develop Investment Programs that specify priorities for investment over a shorter time period than the 10 year CAP. They should detail prioritised programs, including a breakdown of their costs. They should also indicate expected results from the investment, including intermediate and longer term outcomes. It is essential that Investment Programs are strategic and are aligned with CAPs.

Investment Programs for the 2008-09 transitional year need to be completed by April 2008. Going forward, the process for the review and approval of Investment Programs provides an opportunity for investor governments to ensure that CMAs have incentives for effective and efficient spending. CMAs should be required to demonstrate that their anticipated costs are reasonable and in line with other CMAs implementing similar projects.

The NRC recommends that the Investment Program template be reviewed and improved for 2009-10 onwards and that a rigorous and transparent assessment framework is developed that builds on the principles used in the process for funding allocations. The framework should also incorporate incentives to ensure CMAs are adopting least cost processes.

#### ***Recommendation 4***

***The NSW Government should ask the NRC to recommend a rigorous and transparent process for reviewing and approving Investment Programs from 2009-10 onwards.***

## 7.2 Mid-program review - Checking allocations

The NRC recommends that the NSW Government revisits the allocation process mid-way through any program, and revise allocations to CMAs if necessary. Several major initiatives are underway that will generate better information that can be incorporated in the allocation framework that may have a bearing on the spread of funding across CMAs. These initiatives include:

- NRC's program of CAP implementation audits – this will provide best available information on CMA effectiveness and progress
- the NSW MER Program – this will provide best available information on the state (condition and threat) of natural resources
- CMAs' revisions of their CAPs and their own MER Programs.

In addition, NSW Government may wish to revise their priority issues or themes for CMA-delivered investment after several years of investment. New policy preferences can be fed in as they become available.

Revisiting allocations sets up positive incentives for all stakeholders involved in the funding allocation process. With clarity on criteria for the next major funding decision, CMAs are likely to work towards improving against those criteria. For example, in the recommended process, a CMA's proportion of the total funding pool is partially dependent on the quality of its CAP (whether it is likely to promote achievement of the state targets). This effectively sets up a positive incentive to CMAs to continue to improve their CAP targets.

In addition, with clarity on the information needs for the next major funding decision, those parties responsible for collecting and evaluating information can be very clear on the ultimate use of that information, and are likely to work towards improving its quality. For example, information on condition and threat to natural resource assets has been used to determine which CMA regions are high priorities for investment. This effectively sets up a positive incentive to MER Program leaders to generate relevant and quality data.

Most importantly, any changes to the assessment criteria would need to be agreed and communicated early enough so that CMAs and agencies can adapt their approaches if necessary and provide information in a form that is useful for the decision-making process.

### ***Recommendation 5***

***The NSW Government reviews the indicative allocations after three years of program implementation using updated and better data, and revise the allocations if necessary.***

## Attachment 1 Terms of Reference

# Terms of Reference: NHT3 Regional Funding Allocations

The NSW and Australian Governments are negotiating joint funding for Catchment Management Authorities (CMAs) from 2008-09 to 2012-13 as part of the regional component of the Natural Heritage Trust 3 (NHT3) program.

The NSW Government seeks advice on how the joint funding can be allocated to the 13 CMAs. The Natural Resources Commission (the Commission) is to propose a mechanism for allocating the joint funding between the 13 CMAs that maximises the likelihood of improvements in natural resource condition across NSW. The Commission is to assess different options and recommend a preferred mechanism.

The Commission should consider at least the following:

- each CMA's Catchment Action Plan
- both governments' investment objectives as described in the NSW state-wide targets for NRM and currently agreed national investment themes
- natural resource assets and threats in each CMA region
- each CMA's capacity to implement their CAP effectively and efficiently
- Land and Water Management Plan funding.

The recommendation on an allocation mechanism should also address implementation issues, including:

- transition from existing programs and allocations
- adapting the mechanism over time
- data requirements.

In undertaking this task the Commission is to consult with the Department of Environment and Climate Change, the NSW Treasury, the Department of Premier and Cabinet, CMAs and the Australian Government NRM Team.

The Commission is to provide a draft report by 29 February 2008 and a final report as soon as possible thereafter but not later than 14 March 2008.

## Attachment 2 Summarised results of priorities assessment process

### Biodiversity theme

**Table A2.1: Results of Biodiversity Priorities Assessment**

CMA region	Cross-regional values			Potential synergies from CMA-delivered investment	
	How dependent are the nation's environmental, social and economic values on the health of biodiversity in the region? (A)	What is the level of threat to biodiversity in the region? (B)	What is the condition of biodiversity assets in the region? (C)	What is the scope to get additional benefits on top of the regulatory system and other players' investments? (D)	What is the scope for further investment to build on the capacity and momentum from past investments? (E)
	Rank dependence (VH, H, M, L, VL)	Rank threat (VH, H, M, L, VL)	Rank condition (VH, H, M, L, VL)	Rank scope (VH, H, M, L, VL)	Rank scope (VH, H, M, L, VL)
BRG	Medium	Very high	Medium	Medium	Medium
Namoi	Medium	High	Medium	Medium	High
Central West	Medium	High	Low	Medium	Medium
Lachlan	Medium	High	Low	Medium	High
Murrum.	Low	Very high	Low	Medium	Medium
Murray	Low	High	Low	Medium	Medium
LMD	High	High	High	Medium	High
Western	High	High	Very high	Medium	Medium
NR	Very high	High	High	High	High
HCR	High	Very high	Medium	High	Medium
SR	Very high	High	High	High	Medium
HN	High	High	High	Medium	Very high
SM	Medium	Very high	Very low	Low	Low

**Notes:**

These rankings are input to the model, converted into standardised scores, weighted and aggregated. A summary of the rationale for these rankings is explained in Attachment 3. The approach and methods to rank each region against the assessment questions are explained in Attachment 4.

**A Data sources:**

- Natural Resources Management Ministerial Council (2004) *Directions for the National Reserve System - a partnership approach*, Australian Government, Department of Environment and Heritage, Canberra, ACT.
- Judgement by NRC Staff.

**B Data sources:**

- DECC 2008, Threatened species listings, Priority Action Statements.
- Land use pressure - DEC (2006), *NSW State of the Environment*, Department of Environment and Conservation NSW, Sydney. Map 6.3 of Report (data referenced within as DEC 2005 data).

**C Data sources:**

- Native vegetation extent - Keith, D.A. (2004) *Ocean Shores to Desert Dunes: The native vegetation of New South Wales and the ACT*, Department of Environment and Conservation (NSW).
- Map: Sattler, P. and Creighton, C. (2002) Sattler, P. and Creighton, C. (2002) *Australian Terrestrial Biodiversity Assessment 2002*, National Land and Water Resources Audit, Canberra 2002).

**D Data sources:**

- Assessment and judgement by NRC Staff

**E Data sources:**

- Nelson, R., Alexander, F., Elliston, L. and Blais, A. (2004) *Natural Resource Management on Australian Farms*, ABARE eReport 04.7. Prepared for the Australian Government Department of Agriculture, Fisheries and Forestry, Canberra, May.

## Water theme

**Table A2.2: Results of Water Priorities Assessment (riverine ecosystems and wetlands)**

CMA region	Cross-regional values			Potential synergies from CMA-delivered investment	
	How dependent are the nation's environmental, social and economic values on the health of riverine ecosystems in the region? (A)	What is the level of threat to riverine ecosystem assets in the region? (B)	What is the condition of riverine ecosystem assets in the region? (C)	What is the scope to get additional benefits on top of the regulatory system and other players' investments? (D)	What is the scope for further investment to build on the capacity and momentum from past investments? (E)
	Rank dependence (VH, H, M, L, VL)	Rank threat (VH, H, M, L, VL)	Rank condition (VH, H, M, L, VL)	Rank scope (VH, H, M, L, VL)	Rank scope (VH, H, M, L, VL)
BRG	High	High	Low	Medium	Medium
Namoi	Low	High	Low	High	High
Central West	High	High	Medium	Very high	Medium
Lachlan	Medium	High	Medium	High	High
Murrum.	High	High	Low	High	Medium
Murray	High	High	Medium	High	High
LMD	Low	Medium	Medium	High	High
Western	High	Medium	Medium	Medium	High
NR	Very high	Medium	Medium	Low	Medium
HCR	Very high	High	Medium	Medium	Medium
SR	High	Medium	Medium	Low	Medium
HN	High	High	Medium	Low	Very high
SM	High	High	Low	Low	Low

### Notes:

These rankings are input to the model, converted into standardised scores, weighted and aggregated. A summary of the rationale for these rankings is explained in Attachment 3. The approach and methods to rank each region against the assessment questions are explained in Attachment 4.

#### A Data sources:

- Australian Wetlands Database.
- Judgement by NRC Staff.

#### B Data sources:

- Habitat condition in reaches assessed using Habitat Index map data (CSIRO Land and Water, *The Assessment of River Condition*, 2001)
- Nutrient and sediment load condition in reaches assessed (CSIRO Land and Water, *The Assessment of River Condition*, 2001)
- Levels of consumptive use compared to inflows 2004-05 (Australian Water Resources 2005)
- Grazing pressure on wetlands (NLWRA 2002)

#### C Data sources:

- Biological condition of reaches based on Biota Index (ARC B) – River Reaches (CSIRO Land and Water, *The Assessment of River Condition*, 2001)
- Assessment of river reaches based on environmental features based on Environment Index (ARC E) – River Reaches (CSIRO Land and Water, *The Assessment of River Condition*, 2001)
- Condition of nationally important wetlands (NLWRA, Assessment of Terrestrial Biodiversity 2002)

#### D Data sources:

- Assessment and judgement by NRC Staff

#### E Data sources:

- Nelson, R., Alexander, F., Elliston, L. and Blias, A. (2004) *Natural Resource Management on Australian Farms*, ABARE eReport 04.7. Prepared for the Australian Government Department of Agriculture, Fisheries and Forestry, Canberra, May.

**Table A2.3: Results of Water Priorities Assessment (estuaries/coastal lakes)**

CMA region	Cross-regional values			Potential synergies from CMA-delivered investment	
	How dependent are the nation's environmental, social and economic values on the health of estuaries in the region? (A)	What is the level of threat to estuary assets in the region? (B)	What is the condition of estuary assets in the region? (C)	What is the scope to get additional benefits on top of the regulatory system and other players' investments? (D)	What is the scope for further investment to build on the capacity and momentum from past investments? (E)
	Rank dependence (VH, H, M, L, VL)	Rank threat (VH, H, M, L, VL)	Rank condition (VH, H, M, L, VL)	Rank scope (VH, H, M, L, VL)	Rank scope (VH, H, M, L, VL)
NR	High	High	Medium	High	Medium
HCR	High	High	Medium	Medium	Medium
SR	High	Medium	High	Medium	Medium
HN	Medium	High	Low	Low	Very high
SM	High	Medium	Low	High	Medium

**Notes:**

These rankings are input to the model, converted into standardised scores, weighted and aggregated. A summary of the rationale for these rankings is explained in Attachment 3. The approach and methods to rank each region against the assessment questions are explained in Attachment 4.

**A Sources**

- Healthy Rivers Commission, (2002), *Coastal Lakes Independent Inquiry into Coastal Lakes, Final Report*
- CMAs CAPs and Regional strategies
- Judgement by NRC Staff
- Personal communication, Bruce Thom

**B Threats assessed limited to estimated predictions of population growth. The limitations of the threat data are further explained in Attachment 4.**

Data sources:

- DoP (2005) *New South Wales State and Regional Population Projections 2001-2051*, page 2 map.
- DoP (2006) *Far North Coast Regional Strategy 2006-31*.
- DoP (2006) *Draft Mid North Coast Regional Strategy 2006-31*.
- DoP (2006) *Lower Hunter Regional Strategy 2006-31*.
- DoP (2006) *Draft Central Coast Regional Strategy 2006-31*.
- DoP (2006) *Illawarra Regional Strategy 2006-31*
- DoP (2006) *South Coast regional Strategy 2006-31*

**C Condition Data sources:**

- List of major estuaries provided on NSW Government website: [http://www.iqqm.com/estuaries/inventory/index\\_ns.shtml](http://www.iqqm.com/estuaries/inventory/index_ns.shtml)
- Condition of estuaries and coastal lakes sourced from OzCoasts website; based on National Land and Water Resources Audit (NLWRA) 2001 (*condition rankings of near pristine, largely unmodified, modified, extremely modified*).

**D Data sources:**

- Assessment and judgement by NRC Staff
- Personal communication, DECC officer, Status of Estuary Management Plans, March 2008
- Personal communication, Bruce Thom
- NSW Government Website – major programs at <http://www.iqqm.com/estuaries/estmgt.shtml>

**E Data sources:**

- Nelson, R., Alexander, F., Elliston, L. and Blias, A. (2004) *Natural Resource Management on Australian Farms*, ABARE eReport 04.7. Prepared for the Australian Government Department of Agriculture, Fisheries and Forestry, Canberra, May.

## Land theme

**Table A2.4: Land (soil) – Results of Priorities Assessment**

CMA region	Cross-regional values			Potential synergies from CMA-delivered investment	
	How dependent are the nation's environmental, social and economic values on the health of soil assets in the region? (A)	What is the level of threat to soil assets in the region? (B)	What is the condition of soil assets in the region? (C)	What is the scope to get additional benefits on top of the regulatory system and other players' investments? (D)	What is the scope for further investment to build on the capacity and momentum from past investments? (E)
	Rank dependence (VH, H, M, L, VL)	Rank threat (VH, H, M, L, VL)	Rank condition (VH, H, M, L, VL)	Rank scope (VH, H, M, L, VL)	Rank scope (VH, H, M, L, VL)
BRG	High	Medium	High	High	Medium
Namoi	Very high	Very high	Very high	High	High
Central West	Very high	Very high	Medium	High	Medium
Lachlan	High	Very high	Medium	High	High
Murrumbidgee	Very high	High	Low	High	Medium
Murray	Very high	High	High	High	High
LMD	High	Low	High	Very high	High
Western	High	Medium	Low	Very high	High
NR	Medium	High	Medium	High	Medium
HCR	Medium	Very high	High	High	Medium
SR	Medium	Low	Low	High	Medium
HN	Medium	Low	Medium	High	Very high
SM	Low	Low	Medium	High	Low

### Notes:

These rankings are input to the model, converted into standardised scores, weighted and aggregated. A summary of the rationale for these rankings is explained in Attachment 2. The approach and methods to rank each region against the criteria are explained in Attachment 3.

#### A Data sources:

- Judgement by NRC staff

#### B Threats assessed include:

- sheet and rill erosion, salinity, sodic soils, acidification, acid sulphate, wind erodibility.

#### Data sources:

- DEC (2006) *State of the Environment Report 2006*. Environment and Conservation, Sydney, NSW (data referenced within as DNR adapted from NLWRA 2002, DNR data 2005, DLWC 2003, adapted from Naylor *et.al.* 1998; Davies and Mumby 1999, Tulau 1999 (numerous papers)).
- DEC (2003) *State of the Environment Report 2003*. Environment and Conservation, Sydney, NSW (data referenced within as DLWC 2002).

#### C Data sources:

- Soil type maps in Isbell, R.F., McDonald, W.S. and Ashton, L.J. (1997) *Concepts and Rationale of the Australian Soil Classification*. ACLEP, CSIRO Land and Water, Canberra.
- Williams, J., Hook, A. and Gascoigne (1998) *Farming Action/Catchment Reaction – the effect of dryland farming on the natural environment*. CSIRO Publishing, Victoria.
- Judgement by NRC Staff.

#### D Data sources:

- Assessment and judgement by NRC Staff

#### E Data sources:

- Nelson, R., Alexander, F., Elliston, L. and Blias, A. (2004) *Natural Resource Management on Australian Farms*, ABARE eReport 04.7. Prepared for the Australian Government Department of Agriculture, Fisheries and Forestry, Canberra, May.

## **Attachment 3 Results and rationale for priorities assessments**

# Results and rationale for priorities assessments

The NRC has designed a simple framework to help governments determine their spatial priorities for CMA-delivered investment. Agencies indicated that they would like to invest where the highest value natural resources are under the greatest threat, where they are most valued by local, state and national communities, and where CMA-delivered funding can have the most impact.

The framework lead analysts through a question-and-answer ranking process that analyses:

- cross-regional natural resource values and
- the potential synergies from CMA-delivered investment.

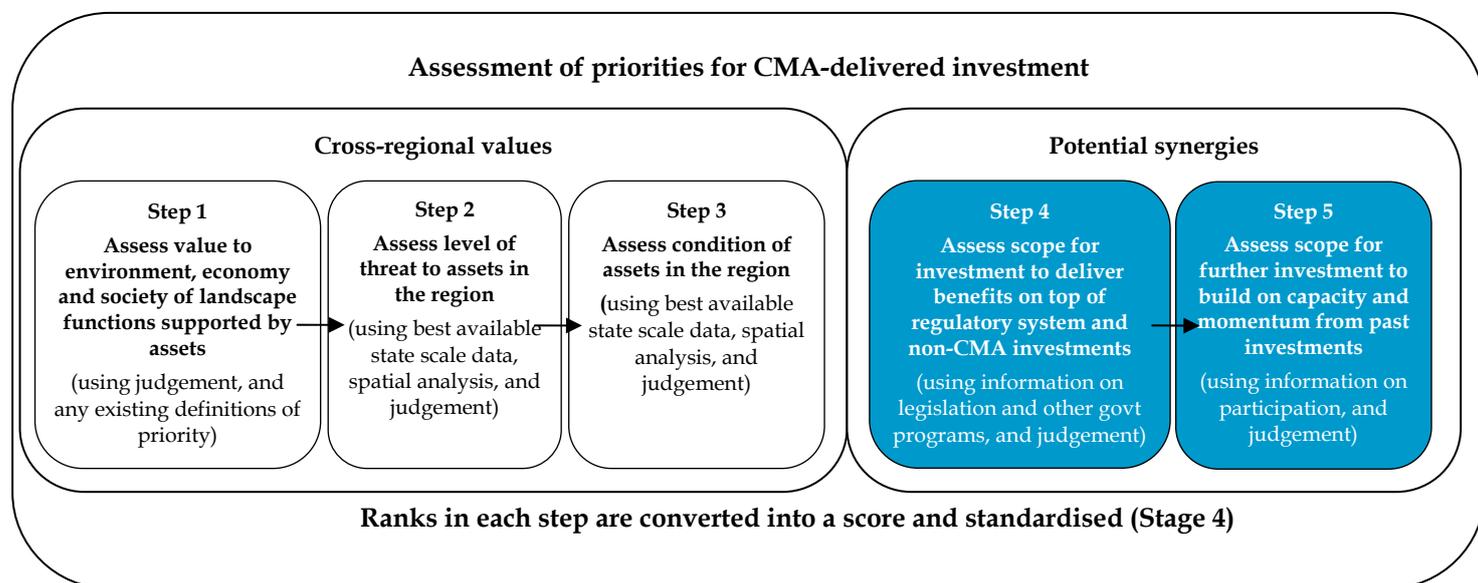
This framework has been developed using the Standard for Quality NRM.

## 1 Cross regional natural resource values per theme

For each theme (biodiversity, water (riverine ecosystems, wetlands and estuaries) and land (soil)), this part of the framework asks:

3. How dependent are the nation's environmental, social and economic values on the landscape functions supported by the natural assets in the region? – analysts are guided to consider benefits to regional, state and national communities and industries, and any existing policies that state the governments' values.
4. What is the level of threat to those assets, and hence the landscape functions and values dependent on those assets, in the region? – analysts are guided to use available scientific information and expert opinion.
5. What is the condition of those assets in the region compared with the condition needed to support landscape function and values? – analysts are guided to use available scientific information and expert opinion.

This is shown in the figure below.



Responses are recorded as rankings, which can then be input to the multi-criteria analysis model.

The NRC undertook a rapid assessment. The following tables summarise rankings and the rationale for each CMA region. <sup>18</sup> Attachment 4 contains further details on the principles and methods used to assign rankings.

**Table A3.1: Results and rationale - cross regional values - biodiversity**

CMA	Criteria	Rank	Why it was assigned this ranking
Border Rivers/ Gwydir	Eco, social, enviro values of healthy biodiversity (Note1)	Medium	<ul style="list-style-type: none"> <li>Most biodiverse, southern part of the Brigalow Belt national biodiversity hotspot region</li> <li>Agricultural landscapes, some economic and social benefits can be derived from biodiversity</li> <li>Very high priority to include under-represented IBRA regions into the National Reserve System</li> </ul>
	Threat to biodiversity assets (Note2)	Very high	<ul style="list-style-type: none"> <li>Relative very high pressure on native vegetation due to land management related activities</li> <li>High ranking in threatened species list</li> </ul>
	Condition of biodiversity assets (Note3)	Medium	<ul style="list-style-type: none"> <li>30 – 50% native vegetation extent</li> <li>Significant increase in trend of native bird breeding</li> </ul>
Namoi	Eco, social, enviro values of healthy biodiversity (Note1)	Medium	<ul style="list-style-type: none"> <li>Agricultural landscapes, some economic and social benefits can be derived from biodiversity</li> <li>Very high priority to include under-represented IBRA regions into the National Reserve System</li> </ul>
	Threat to biodiversity assets (Note2)	High	<ul style="list-style-type: none"> <li>Relative high pressure on native vegetation due to land management related activities</li> <li>Medium ranking in threatened species list</li> </ul>
	Condition of biodiversity assets (Note3)	Medium	<ul style="list-style-type: none"> <li>30 – 50% native vegetation remaining</li> <li>Significant increase in trend of native bird breeding</li> </ul>
Central West	Eco, social, enviro values of healthy biodiversity (Note1)	Medium	<ul style="list-style-type: none"> <li>Agricultural landscapes, some economic and social benefits can be derived from biodiversity</li> <li>Very high priority to include under-represented IBRA regions into the National Reserve System</li> </ul>
	Threat to biodiversity assets (Note2)	High	<ul style="list-style-type: none"> <li>Relative high pressure on native vegetation due to land management related activities</li> <li>Medium ranking in threatened species list</li> </ul>
	Condition of biodiversity assets (Note3)	Low	<ul style="list-style-type: none"> <li>&lt; 30% native vegetation extent</li> <li>No significant change in trend of native bird species breeding</li> </ul>
Lachlan	Eco, social, enviro values of healthy biodiversity (Note1)	Medium	<ul style="list-style-type: none"> <li>Agricultural landscapes, some economic and social benefits can be derived from biodiversity</li> <li>Very high priority to include under-represented IBRA regions into the National Reserve System</li> </ul>
	Threat to biodiversity assets (Note2)	High	<ul style="list-style-type: none"> <li>Relative high pressure on native vegetation due to land management related activities</li> <li>Medium ranking in threatened species list</li> </ul>
	Condition of biodiversity assets (Note3)	Low	<ul style="list-style-type: none"> <li>&lt; 30% native vegetation extent</li> <li>No significant change in trend of native bird species breeding</li> </ul>
Murrumbidgee	Eco, social, enviro values of healthy biodiversity (Note1)	Low	<ul style="list-style-type: none"> <li>Highly degraded, limited 'lifestyle' value</li> <li>High priority to include under-represented IBRA regions into the National Reserve System</li> </ul>
	Threat to biodiversity assets (Note2)	Very high	<ul style="list-style-type: none"> <li>Relative very high pressure on native vegetation due to land management related activities</li> <li>High ranking in threatened species list</li> </ul>
	Condition of biodiversity assets (Note3)	Low	<ul style="list-style-type: none"> <li>&lt; 30% native vegetation extent</li> <li>No significant change in trend of native bird species breeding</li> </ul>

<sup>18</sup> These assessments are supported by further analytical tables (too detailed to include here but can be supplied upon request).

CMA	Criteria	Rank	Why it was assigned this ranking
Murray	Eco, social, enviro values of healthy biodiversity (Note1)	Low	<ul style="list-style-type: none"> <li>Highly degraded, limited 'lifestyle' value</li> <li>High priority to include under-represented IBRA regions into the National Reserve System</li> </ul>
	Threat to biodiversity assets (Note2)	High	<ul style="list-style-type: none"> <li>Relative high pressure on native vegetation due to land management related activities</li> <li>Medium ranking in threatened species list</li> </ul>
	Condition of biodiversity assets (Note3)	Low	<ul style="list-style-type: none"> <li>&lt; 30% native vegetation extent</li> <li>No significant change in trend of native bird species breeding</li> </ul>
Lower Murray Darling	Eco, social, enviro values of healthy biodiversity (Note1)	High	<ul style="list-style-type: none"> <li>Relatively undisturbed biodiverse ecosystems, preservation and future option values</li> <li>Eco and social values from tourism</li> <li>Moderate priority to include under-represented IBRA regions into the National Reserve System</li> </ul>
	Threat to biodiversity assets (Note2)	Medium	<ul style="list-style-type: none"> <li>Relative high pressure on native vegetation due to land management related activities</li> <li>Low ranking in threatened species list</li> </ul>
	Condition of biodiversity assets (Note3)	High	<ul style="list-style-type: none"> <li>&gt; 70% native vegetation extent</li> <li>No significant change in trend of native bird species breeding</li> </ul>
Western	Eco, social, enviro values of healthy biodiversity (Note1)	High	<ul style="list-style-type: none"> <li>Relatively undisturbed biodiverse ecosystems, preservation and future option values</li> <li>High priority to include under-represented IBRA regions into the National Reserve System</li> </ul>
	Threat to biodiversity assets (Note2)	High	<ul style="list-style-type: none"> <li>Relative high pressure on native vegetation due to land management related activities</li> <li>High ranking in threatened species list</li> </ul>
	Condition of biodiversity assets (Note3)	High	<ul style="list-style-type: none"> <li>&gt; 70% native vegetation extent</li> <li>Significant increase in trend of native bird breeding</li> </ul>
Northern Rivers	Eco, social, enviro values of healthy biodiversity (Note1)	Very high	<ul style="list-style-type: none"> <li>Southern part of the Border Ranges national biodiversity hotspot</li> <li>High value for tourism, and sea/tree change 'lifestyle' values</li> <li>Low priority to include under-represented IBRA regions into the National Reserve System</li> </ul>
	Threat to biodiversity assets (Note2)	High	<ul style="list-style-type: none"> <li>Relative high pressure on native vegetation due to land management related activities</li> <li>Very high ranking in threatened species list</li> </ul>
	Condition of biodiversity assets (Note3)	High	<ul style="list-style-type: none"> <li>&gt; 70% native vegetation extent</li> <li>Significant decrease in trend of native bird breeding</li> </ul>
Hunter/Central Rivers	Eco, social, enviro values of healthy biodiversity (Note1)	High	<ul style="list-style-type: none"> <li>High value for tourism, and sea/tree change 'lifestyle' values</li> <li>Low priority to include under-represented IBRA regions into the National Reserve System</li> </ul>
	Threat to biodiversity assets (Note2)	Very high	<ul style="list-style-type: none"> <li>Relative very high pressure on native vegetation due to land management related activities</li> <li>Very high ranking in threatened species list</li> </ul>
	Condition of biodiversity assets (Note3)	Medium	<ul style="list-style-type: none"> <li>30 – 50% native vegetation remaining</li> <li>Significant decrease in trend of native bird breeding</li> </ul>
Southern Rivers	Eco, social, enviro values of healthy biodiversity (Note1)	Very high	<ul style="list-style-type: none"> <li>High value for tourism, and sea/tree change 'lifestyle' values</li> <li>Moderate priority to include under-represented IBRA regions into the National Reserve System</li> </ul>
	Threat to biodiversity assets (Note2)	High	<ul style="list-style-type: none"> <li>Relative high pressure on native vegetation due to land management related activities</li> <li>Very high ranking in threatened species list</li> </ul>
	Condition of biodiversity assets (Note3)	High	<ul style="list-style-type: none"> <li>&gt; 70% native vegetation extent</li> <li>Significant decrease in trend of native bird breeding</li> </ul>

CMA	Criteria	Rank	Why it was assigned this ranking
Hawkesbury Nepean	Eco, social, enviro values of healthy biodiversity (Note1)	High	<ul style="list-style-type: none"> <li>Large areas in national parks</li> <li>Elsewhere degraded, but high value to the large Sydney population from amenity, recreational and tourism value</li> <li>Low priority to include under-represented IBRA regions into the National Reserve System</li> </ul>
	Threat to biodiversity assets (Note2)	High	<ul style="list-style-type: none"> <li>Relative high pressure on native vegetation due to land management related activities</li> <li>Very high ranking in threatened species list</li> </ul>
	Condition of biodiversity assets (Note3)	High	<ul style="list-style-type: none"> <li>50–70% native vegetation remaining</li> <li>Significant decrease in trend of native bird breeding</li> </ul>
Sydney Metro	Eco, social, enviro values of healthy biodiversity (Note1)	Medium	<ul style="list-style-type: none"> <li>Degraded, but high value to the large Sydney population from amenity, recreational and tourism values</li> <li>Low priority to include under-represented IBRA regions into the National Reserve System</li> </ul>
	Threat to biodiversity assets (Note2)	Very high	<ul style="list-style-type: none"> <li>Relative very high pressure on native vegetation due to land management related activities</li> <li>High ranking in threatened species list</li> </ul>
	Condition of biodiversity assets (Note3)	Low	<ul style="list-style-type: none"> <li>30–50% native vegetation remaining</li> <li>Significant decrease in trend of native bird breeding</li> </ul>

- Data sources:
  - Natural Resources Management Ministerial Council (2004) Directions for the National Reserve System - a partnership approach, Australian Government, Department of Environment and Heritage, Canberra, ACT.
  - Judgement by NRC Staff.
- Data sources:
  - DECC 2008, Threatened species listings, Priority Action Statements.
  - Land use pressure - DEC (2006), *NSW State of the Environment*, Department of Environment and Conservation NSW, Sydney. Map 6.3 of Report (referenced within as DEC 2005 data).
- Data sources:
  - Native vegetation extent – Keith, D.A. (2004) *Ocean Shores to Desert Dunes: The native vegetation of New South Wales and the ACT*, Department of Environment and Conservation (NSW).
  - Map: Sattler, P. and Creighton, C. (2002) *Australian Terrestrial Biodiversity Assessment 2002*, National Land and Water Resources Audit, Canberra 2002).

**Table A3.2: Results and rationale - cross regional values - riverine ecosystems/wetlands**

CMA	Criteria	Rank	Why it was assigned this ranking
Border Rivers/ Gwydir	Eco-Social-Enviro Values of healthy water assets (Note 1)	High	<ul style="list-style-type: none"> <li>One Ramsar wetland and three nationally important wetlands</li> <li>Relatively less agriculture and urban settlements</li> </ul>
	Threat to water assets (Note 2)	High	<ul style="list-style-type: none"> <li>Habitat condition: significant areas with substantially modified habitat</li> <li>Nutrient and suspended sediment loads: substantially and severely modified river reaches</li> <li>Consumptive use compared to inflows: high</li> <li>Grazing pressures on wetlands identified</li> </ul>
	Condition of water assets (Note 3)	Low	<ul style="list-style-type: none"> <li>Biological condition: some river reaches severely to extremely impaired</li> <li>Environmental features (e.g. catchment disturbance, hydrology, habitat, nutrients and suspended sediment load): a large proportion of river reaches have been substantially modified</li> <li>Wetland condition: significant areas of degraded wetland condition with recovery unlikely in medium term</li> </ul>
Namoi	Eco-Social-Enviro Values of healthy water assets (Note 1)	Low	<ul style="list-style-type: none"> <li>One nationally important wetland</li> <li>Value to primary industries</li> </ul>
	Threat to water assets (Note 2)	High	<ul style="list-style-type: none"> <li>Habitat condition and nutrient and suspended sediment loads: substantially and severely modified river reaches</li> <li>Consumptive use compared to inflows: high</li> <li>Grazing pressures on wetlands identified</li> </ul>
	Condition of water assets (Note 3)	Low	<ul style="list-style-type: none"> <li>Biological condition: some river reaches severely impaired based on biota index</li> <li>Environmental features: approximately half of river reaches are substantially modified (</li> <li>Wetland condition: degraded condition of nationally important wetlands with recovery unlikely in the medium term</li> </ul>

CMA	Criteria	Rank	Why it was assigned this ranking
Central West	Eco-Social-Enviro Values of healthy water assets (Note 1)	High	<ul style="list-style-type: none"> <li>Two Ramsar wetlands and one nationally important wetland</li> <li>Value to primary industries (irrigated agriculture) and tourism value</li> </ul>
	Threat to water assets (Note 2)	High	<ul style="list-style-type: none"> <li>Habitat condition and nutrient and sediment loads: includes river reaches with moderately, substantially and severely modified habitat condition and nutrient and suspended sediment loads</li> <li>Consumptive use compared to inflows: high</li> <li>Grazing pressures on wetlands identified</li> </ul>
	Condition of water assets (Note 3)	Medium	<ul style="list-style-type: none"> <li>Biological condition: some river reaches significantly and severely impaired</li> <li>Environmental features: most river reaches are moderately modified, with a small area substantially modified</li> <li>Wetland condition: includes                             <ul style="list-style-type: none"> <li>some degraded condition with recovery unlikely in the medium term</li> <li>some fair condition with recovery requiring significant intervention</li> </ul> </li> </ul>
Lachlan	Eco-Social-Enviro Values of healthy water assets (Note 1)	Medium	<ul style="list-style-type: none"> <li>Nine nationally important wetlands</li> <li>Value to primary industries (irrigated agriculture)</li> </ul>
	Threat to water assets (Note 2)	High	<ul style="list-style-type: none"> <li>Habitat condition and nutrient and suspended sediment loads: river reaches range from moderately, substantially and some specific areas of severely modified habitat condition and nutrient and suspended sediment loads.</li> <li>Consumptive use compared to inflows: high</li> <li>Grazing pressures on wetlands identified</li> </ul>
	Condition of water assets (Note 3)	Medium	<ul style="list-style-type: none"> <li>Biological condition: some river reaches are in reference condition and some are significantly impaired</li> <li>Environmental features: most river reaches are moderately modified, with some river reaches substantially modified</li> <li>Wetland condition: fair with recovery requiring significant intervention</li> </ul>
Murrumbidgee	Eco-Social-Enviro Values of healthy water assets (Note 1)	High	<ul style="list-style-type: none"> <li>16 nationally important wetlands</li> <li>Relatively high value to primary industries (irrigated agriculture)</li> </ul>
	Threat to water assets (Note 2)	High	<ul style="list-style-type: none"> <li>Habitat condition: predominantly moderately and substantially modified with some severely modified river reaches</li> <li>Nutrient and suspended sediment loads: predominantly substantially modified nutrient and suspended sediment loads</li> <li>Consumptive use compared to inflows: high</li> <li>Grazing pressures on wetlands identified</li> </ul>
	Condition of water assets (Note 3)	Low	<ul style="list-style-type: none"> <li>Biological condition: has river reaches that are in reference condition, significantly impaired, severely impaired and extremely impaired</li> <li>Environmental features: river reaches range from moderately to substantially modified</li> <li>Wetland condition: fair with recovery requiring significant intervention</li> </ul>
Murray	Eco-Social-Enviro Values of healthy water assets (Note 1)	High	<ul style="list-style-type: none"> <li>One Ramsar wetland and seven nationally important wetlands</li> <li>Relatively high value to primary industries (irrigated agriculture)</li> </ul>
	Threat to water assets (Note 2)	High	<ul style="list-style-type: none"> <li>Habitat condition: most river reaches either moderately and substantially modified with some specific areas severely modified</li> <li>Nutrient and suspended sediment loads: large proportion of substantially modified nutrient and suspended sediment loads</li> <li>Consumptive use compared to inflows: high</li> <li>Grazing pressures on wetlands identified</li> </ul>
	Condition of water assets (Note 3)	Medium	<ul style="list-style-type: none"> <li>Biological condition: some river reaches in reference condition and small areas of severely and extremely impaired river reaches</li> <li>Environmental features: river reaches range from moderately modified to substantially modified</li> <li>Wetland condition: fair with recovery requiring significant intervention</li> </ul>

CMA	Criteria	Rank	Why it was assigned this ranking
Lower Murray Darling	Eco-Social-Enviro Values of healthy water assets (Note 1)	Low	<ul style="list-style-type: none"> <li>Three nationally important wetlands</li> <li>Value to primary industries (irrigated agriculture)</li> </ul>
	Threat to water assets (Note 2)	Medium	<ul style="list-style-type: none"> <li>Habitat condition: mixture ranging from largely unmodified to substantially modified.</li> <li>Nutrient and suspended sediment loads: areas of moderately, substantially and severely modified nutrient and suspended sediment loads</li> <li>Consumptive use compared to inflows: high</li> <li>Grazing pressures on wetlands identified</li> </ul>
	Condition of water assets (Note 3)	Medium	<ul style="list-style-type: none"> <li>Biological condition: contains small areas of significantly impaired river reaches with large areas not assessed</li> <li>Environmental features: river reaches range from moderately to substantially modified</li> <li>Wetland condition: includes                             <ul style="list-style-type: none"> <li>some degraded with recovery unlikely in the medium term</li> <li>some fair with recovery requiring significant intervention</li> </ul> </li> </ul>
Western	Eco-Social-Enviro Values of healthy water assets (Note 1)	High	<ul style="list-style-type: none"> <li>Two Ramsar wetlands and 49 nationally important wetlands</li> <li>Relatively less agriculture and urban settlements</li> </ul>
	Threat to water assets (Note 2)	Medium	<ul style="list-style-type: none"> <li>Habitat condition: mainly a mixture of largely unmodified and substantially modified. Some specific areas of severely modified</li> <li>Nutrient and suspended sediment loads: predominately moderately modified with some areas substantially modified</li> <li>Consumptive use compared to inflows: high</li> <li>Grazing pressures on wetlands identified</li> </ul>
	Condition of water assets (Note 3)	Medium	<ul style="list-style-type: none"> <li>Biological condition: largely not assessed, with small specific areas of reference condition and significantly and severely impaired condition</li> <li>Environmental features: predominately moderately modified with a few small areas of substantially modified</li> <li>Wetland condition: includes some degraded with recovery unlikely in the medium term; a large area in good condition with recovery in the short term with minimum intervention</li> </ul>
Northern Rivers	Eco-Social-Enviro Values of healthy water assets (Note 1)	Very high	<ul style="list-style-type: none"> <li>One Ramsar wetland and 23 nationally important wetlands</li> <li>High value for tourism, recreation and primary industries</li> </ul>
	Threat to water assets (Note 2)	Medium	<ul style="list-style-type: none"> <li>Habitat condition: largely unmodified with small areas of moderately to severely modified reaches</li> <li>Nutrient and suspended sediment loads: most reaches are substantially modified. There are a few reaches that are severely modified and a few are moderately modified.</li> <li>Consumptive use compared to inflows: a large part of the catchment region has not been assessed. The far north west part of the catchment has low consumptive use compared to inflows</li> <li>Grazing pressures on wetlands identified</li> </ul>
	Condition of water assets (Note 3)	Medium	<ul style="list-style-type: none"> <li>Biological condition: large areas of reference condition. There are instances of significantly and severely impaired condition along the coast as well as two instances of extremely impaired condition.</li> <li>Environmental features: predominately moderately modified with a few small areas of substantially modified</li> <li>Wetland condition: includes                             <ul style="list-style-type: none"> <li>some degraded (north west of catchment) with recovery unlikely in the medium term and</li> <li>some fair (southern part of catchment) with recovery requiring significant intervention</li> </ul> </li> </ul>
Hunter/Central Rivers	Eco-Social-Enviro Values of healthy water assets (Note 1)	Very High	<ul style="list-style-type: none"> <li>Two Ramsar wetlands and 20 nationally important wetlands</li> <li>High value for amenity, tourism and recreation</li> </ul>
	Threat to water assets (Note 2)	High	<ul style="list-style-type: none"> <li>Habitat Condition: mixture of largely unmodified modified and substantially modified. Includes some specific areas of severely modified habitat condition.</li> <li>Nutrient and suspended sediment loads: moderately to severely modified</li> <li>Consumptive use compared to inflows: a large part of the catchment region has not been assessed. Some areas of high consumptive use compared to inflows</li> <li>Grazing pressures on wetlands identified</li> </ul>

CMA	Criteria	Rank	Why it was assigned this ranking
	Condition of water assets (Note 3)	Medium	<ul style="list-style-type: none"> <li>Biological condition: varies across catchment including reaches in reference condition, significantly impaired and severely impaired. A small number of reaches are extremely impaired.</li> <li>Environmental features: reaches range from largely unmodified to moderately and substantially modified</li> <li>Wetland condition: fair with recovery requiring significant intervention</li> </ul>
Southern Rivers	Eco-Social-Enviro Values of healthy water assets (Note 1)	High	<ul style="list-style-type: none"> <li>One Ramsar wetland and 42 nationally important wetlands</li> <li>High value for amenity and recreation</li> </ul>
	Threat to water assets (Note 2)	Medium	<ul style="list-style-type: none"> <li>Habitat condition: largely unmodified. Includes specific areas of moderately to substantially modified habitat condition.</li> <li>Nutrient and suspended sediment loads: range from moderately to substantially modified.</li> <li>Consumptive use compared to inflows: most of catchment area was not assessed, and where it was assessed consumptive use was low</li> <li>Grazing pressures on wetlands identified</li> </ul>
	Condition of water assets (Note 3)	Medium	<ul style="list-style-type: none"> <li>Biological condition: large areas of reference condition</li> <li>Environmental features: reaches largely unmodified to moderately modified</li> <li>Wetland condition: fair with recovery requiring significant intervention</li> </ul>
Hawkesbury Nepean	Eco-Social-Enviro Values of healthy water assets (Note 1)	High	<ul style="list-style-type: none"> <li>Eight nationally important wetlands</li> <li>High value to the greater Sydney population for amenity, recreational and tourism values</li> <li>Large area in drinking water catchment for greater Sydney</li> </ul>
	Threat to water assets (Note 2)	High	<ul style="list-style-type: none"> <li>Habitat condition: mixture of largely unmodified modified and substantially modified habitat condition. There areas specific small areas of severely modified habitat condition.</li> <li>Nutrient and suspended sediment loads: reaches range from largely unmodified to severely modified.</li> <li>Consumptive use compared to inflows: high</li> <li>Grazing pressures on wetlands identified</li> </ul>
	Condition of water assets (Note 3)	Medium	<ul style="list-style-type: none"> <li>Biological condition: varies across catchment area. Includes reaches in reference condition, significantly impaired and severely impaired. A small area is extremely impaired</li> <li>Environmental features: reaches range from largely unmodified, moderately to substantially modified</li> <li>Wetland condition: fair with recovery requiring significant intervention</li> </ul>
Sydney Metro	Eco-Social-Enviro Values of healthy water assets (Note 1)	High	<ul style="list-style-type: none"> <li>One Ramsar wetland and eight nationally important wetlands</li> <li>Degraded, but high value to the greater Sydney population from amenity, recreational and tourism values</li> </ul>
	Threat to water assets (Note 2)	High	<ul style="list-style-type: none"> <li>Habitat condition and nutrient and suspended sediment loads: not easily determinable from map data but expected to be substantially modified or more</li> </ul>
	Condition of water assets (Note 3)	Low	<ul style="list-style-type: none"> <li>Biological condition: not easily determinable but appears to be severely to extremely impaired.</li> <li>Environmental features: not determinable from scale of map but expected to be substantially modified or more</li> <li>Wetland condition: fair with recovery requiring significant intervention</li> </ul>

1 Data sources:  

- Australian Wetlands Database and Judgement by NRC Staff.

2 Data sources:  

- Habitat condition in reaches assessed using Habitat Index map data (CSIRO Land and Water, *The Assessment of River Condition*, 2001)
- Nutrient and sediment load condition in reaches assessed (CSIRO Land and Water, *The Assessment of River Condition*, 2001)
- Levels of consumptive use compared to inflows 2004-05 (Australian Water Resources 2005)
- Grazing pressure on wetlands (NLWRA 2002)

3 Data sources:  

- Biological condition of reaches based on Biota Index (ARC B) – River Reaches (CSIRO Land and Water, *The Assessment of River Condition*, 2001)
- Assessment of river reaches based on environmental features based on Environment Index (ARC E) – River Reaches (CSIRO Land and Water, *The Assessment of River Condition*, 2001)
- Condition of nationally important wetlands (NLWRA, Assessment of Terrestrial Biodiversity 2002)

**Table A3.3: Results and rationale - cross regional values - water (estuaries and coastal lakes)**

CMA	Criteria	Rank	Why it was assigned this ranking
Northern Rivers	Eco, social, enviro values of healthy estuaries and coastal lakes (Note1)	High	<ul style="list-style-type: none"> <li>▪ 41% of coastal lakes in region have a high recognised conservation value and 41% a medium value</li> <li>▪ CAP and regional strategy identify the following eco, social, enviro values: <ul style="list-style-type: none"> <li>- Oyster growing, commercial and recreational fisheries are important and profitable resource based industries</li> <li>- North coast is a highly valued place to live (more recently with sea changers and alternative life stylers) and the environment is a major influence on the community and the economy of the region</li> <li>- Tourism is major driver for the region</li> <li>- Mid North Coast regional strategy notes regions natural icons include long stretches of beach including estuarine habitats</li> <li>- Far North Coast regional strategy notes the region is recombined for its significant environmental values and their importance to the economy</li> <li>- High value of Clarence to fisheries</li> </ul> </li> </ul>
	Threat to estuarine and coastal lake assets (Note2)	High	<ul style="list-style-type: none"> <li>▪ Population statistics indicate population growth in NSW over next 25 years will be greatest on the coast – potential to put pressure on coastal environment</li> <li>▪ Population in region expected to increase by @ 26-27% over next 25 years</li> </ul>
	Condition of estuarine and coastal lake assets (Note3)	Medium	<ul style="list-style-type: none"> <li>▪ 54% of evaluated major estuaries and coastal lakes in the Northern Rivers region are in modified or extensively modified condition</li> <li>▪ Approximately 28% are in largely unmodified condition</li> <li>▪ Approximately 8% are in near pristine condition</li> <li>▪ Approximately 10% have an unknown condition</li> </ul>
Hunter/Central Rivers	Eco, social, enviro values of healthy estuaries and coastal lakes (Note1)	High	<ul style="list-style-type: none"> <li>▪ While 44% of coastal lakes in region have a high recognised conservation value and equal 44% have a low recognised conservation value</li> <li>▪ CAP and regional strategies identify that: <ul style="list-style-type: none"> <li>- Lower Hunter has nationally significant economic infrastructure including the world's largest coal exporting port</li> <li>- Tourism is a major component of the economy – visitors are attracted to pristine ocean beaches (and natural and rural hinterland)</li> <li>- Estuaries of Central Coast and Wallis lakes each have 20% of the remaining seagrass beds in NSW – a key habitat for valued species of commercial and recreational fish, molluscs and crabs and nursery area for juvenile fish</li> <li>- Estuaries are used extensively for recreational activities including fishing, boating and swimming</li> <li>- Some estuaries support a commercial fishing industry</li> </ul> </li> </ul>
	Threat to estuarine and coastal lake assets (Note2)	High	<ul style="list-style-type: none"> <li>▪ Population statistics indicate population growth in NSW over next 25 years will be greatest on the coast - potential to put pressure on coastal environment</li> <li>▪ Population in region expected to increase by @ 27-31% over next 25 years</li> </ul>
	Condition of estuarine and coastal lake assets (Note3)	Medium	<ul style="list-style-type: none"> <li>▪ Approximately 63% of evaluated major estuaries and costal lakes in the Hunter/Central Rivers region are in modified or extensively modified condition (NB: has been large investment in improving condition of extensively modified Lake Macquarie and Lake Tuggerah)</li> <li>▪ Approximately 31% are largely unmodified condition</li> <li>▪ Approximately 6% are in near pristine condition</li> </ul>
Southern Rivers	Eco, social, enviro values of healthy estuaries and coastal lakes (Note1)	High	<ul style="list-style-type: none"> <li>▪ 45% of coastal lakes in region have a medium recognised conservation value and 26% a low recognised conservation value. 28% have a high recognised conservation</li> <li>▪ CAP and regional strategies identify that: <ul style="list-style-type: none"> <li>- Contains over 50% of NSW coastal lakes and lagoons and significant areas of the region's estuaries and marine environments are protected in marine parks including Jervis Bay Marine Park and Bateman's Bay Marine Park</li> <li>- Fishing is an important primary industry (so are dairying and forestry)</li> <li>- Tourism is playing an increasing important role, especially in coastal towns such as Merimbula, Ulladulla, Bateman's Bay, Narooma and Bermagui (the region is the 4th most visited region by Australian holiday makers after Sydney, Melbourne, Brisbane/Gold Coast)</li> <li>- Port of Eden supports export activities, commercial fishing, cruise ships</li> <li>- Wollongong area manufacturing a major economic driver, importance of Port Kembla</li> </ul> </li> </ul>

CMA	Criteria	Rank	Why it was assigned this ranking
	Threat to estuarine and coastal lake assets (Note2)	<b>Medium</b> *	<ul style="list-style-type: none"> <li>Population statistics indicate population growth in NSW over next 25 years will be greatest on the coast - potential to put pressure on coastal environment</li> <li>Population in region expected to increase by 17% in Illawarra region and 36% in South Coast region over next 25 years</li> <li>*Judgement based on: threats high to Lake Illawarra where planned population growth at West Dapto. In southern region population growth is off a lower total population base and large number of estuaries are protected in National Parks</li> </ul>
	Condition of estuarine and coastal lake assets (Note3)	<b>High</b>	<ul style="list-style-type: none"> <li>Approximately 30% of evaluated major estuaries and coastal lakes in the Southern Rivers region are in modified or extensively modified condition</li> <li>Approximately 50% are in largely unmodified condition</li> <li>Approximately 15% are in near pristine condition</li> <li>Approximately 5% have an unknown condition</li> </ul>
<b>Hawkesbury Nepean</b>	Eco, social, enviro values of healthy estuaries (Note1)	<b>Medium</b>	<ul style="list-style-type: none"> <li>No data obtained on recognised value of coastal lakes</li> <li>CAP and regional strategies identify that                             <ul style="list-style-type: none"> <li>Hawkesbury River estuary has high social and economic values including high recreational use and fishing. Supports largest commercial coastal fishery of prawns, oysters (prior to outbreak of QX disease) and fish in NSW</li> <li>A regional priority is the need to balance long-term water supply for region without compromising health of the region's rivers, estuaries and lakes.</li> <li>The region has outstanding environmental qualities including Hawkesbury River, Brisbane waters, Tuggerah lakes, coastal lagoons</li> <li>The central coast is a recognised tourism area</li> </ul> </li> </ul>
	Threat to estuarine and coastal lake assets (Note2)	<b>High</b>	<ul style="list-style-type: none"> <li>Population statistics indicate population growth in NSW over next 25 years will be greatest on the coast - potential to put pressure on coastal environment</li> <li>Population in region expected to increase by @ 20% in region over next 25 years</li> </ul>
	Condition of estuarine and coastal lake assets (Note3)	<b>Low</b>	<ul style="list-style-type: none"> <li>100% of evaluated major estuaries and coastal lakes in the Hawkesbury Nepean region are in modified or extensively modified condition</li> </ul>
<b>Sydney Metro</b>	Eco, social, enviro values of healthy estuaries and coastal lakes (Note1)	<b>High</b>	<ul style="list-style-type: none"> <li>No coastal lake has a high recognised conservation value. 75% have a low recognised conservation value</li> <li>High amenity and tourism values of the estuaries and coastal lakes of Sydney</li> </ul>
	Threat to estuarine and coastal lake assets (Note2)	<b>Medium</b>	<ul style="list-style-type: none"> <li>Population statistics indicate population growth in NSW over next 25 years will be greatest on the coast - potential to put pressure on coastal environment</li> <li>Population in region expected to increase by @ 26% over the next 25 years. Population already highly urbanised with 4.1M people with further 1.1M over next 25 years.</li> <li>Threats have resulted from past increases in population and historical build up of contamination/pollution..</li> </ul>
	Condition of estuarine and coastal lake assets (Note3)	<b>Low</b>	<ul style="list-style-type: none"> <li>Approximately 80% of evaluated major estuaries and coastal lakes in the Sydney metropolitan region are in modified or extensively modified condition</li> <li>Approximately 20% have an unknown condition</li> </ul>

1 Data sources:

- Healthy Rivers Commission, (2002), *Coastal Lakes Independent Inquiry into Coastal Lakes, Final Report*
- CMAs CAPs and Regional strategies (listed under Note 2 below)
- Judgement by NRC Staff
- Personal communication, Professor Bruce Thom

2 Threats assessed limited to estimated predictions of population growth. The limitations of the threat data are further explained in Attachment 4.

Data sources:

- DoP (2005) *New South Wales State and Regional Population Projections 2001-2051*, page 2 map.
- DoP (2006) *Far North Coast Regional Strategy 2006-31*.
- DoP (2006) *Draft Mid North Coast Regional Strategy 2006-31*.
- DoP (2006) *Lower Hunter Regional Strategy 2006-31*.
- DoP (2006) *Draft Central Coast Regional Strategy 2006-31*.
- DoP (2006) *Illawarra Regional Strategy 2006-31*
- DoP (2006) *South Coast regional Strategy 2006-31*

3 Condition Data sources:

- List of major estuaries provided on NSW Government website: [http://www.igqm.com/estuaries/inventory/index\\_ns.shtml](http://www.igqm.com/estuaries/inventory/index_ns.shtml)
- Condition of estuaries and coastal lakes sourced from OzCoasts website; based on National Land and Water Resources Audit (NLWRA) 2001 (condition rankings of near pristine, largely unmodified, modified, extremely modified\_.

**Table A3.4: Results and rationale - cross regional values - land (soil)**

CMA	Criteria	Rank	Why it was assigned this ranking
Border Rivers/ Gwydir	Eco-Social-Enviro Values of healthy soil assets <small>(Note 1)</small>	High	<ul style="list-style-type: none"> <li>Agricultural landscapes, economic and social wellbeing of the region closely related to health of land</li> </ul>
	Threat to soil assets <small>(Note 2)</small>	Medium	<ul style="list-style-type: none"> <li>Significant areas with predicted potential medium to high levels of sheet and rill erosion</li> <li>Areas of dryland salinity outbreaks</li> <li>Areas of local significant sodicity</li> </ul>
	Condition of soil assets <small>(Note 3)</small>	High	<ul style="list-style-type: none"> <li>High resilient soil types</li> <li>Low impact from land uses</li> </ul>
Namoi	Eco-Social-Enviro Values of healthy soil assets <small>(Note 1)</small>	Very high	<ul style="list-style-type: none"> <li>Agricultural landscapes, economic and social wellbeing of the region closely related to health of land, but assets threatened</li> </ul>
	Threat to soil assets <small>(Note 2)</small>	Very high	<ul style="list-style-type: none"> <li>Significant areas of the catchment with predicted medium to high levels of sheet and rill erosion</li> <li>Areas of dryland salinity outbreaks and rising trends</li> <li>Areas of moderate to very high risk of acidification hazard with small area of at or below critical level of acidification hazard</li> </ul>
	Condition of soil assets <small>(Note 3)</small>	Very high	<ul style="list-style-type: none"> <li>Very high resilient soil types</li> <li>Very low impact from land uses</li> </ul>
Central West	Eco-Social-Enviro Values of healthy soil assets <small>(Note 1)</small>	Very high	<ul style="list-style-type: none"> <li>Agricultural landscapes, economic and social wellbeing of the region closely related to health of land, but assets threatened</li> </ul>
	Threat to soil assets <small>(Note 2)</small>	Very high	<ul style="list-style-type: none"> <li>Significant areas of the catchment with predicted medium to high levels of sheet and rill erosion</li> <li>Areas of dryland salinity outbreaks and rising trends</li> <li>Significant areas of high to very high risk of acidification hazard with significant area of at or below critical level of acidification hazard</li> </ul>
	Condition of soil assets <small>(Note 3)</small>	Medium	<ul style="list-style-type: none"> <li>Low to moderate resilient soil types</li> <li>High impact from land uses</li> </ul>
Lachlan	Eco-Social-Enviro Values of healthy soil assets <small>(Note 1)</small>	High	<ul style="list-style-type: none"> <li>Agricultural landscapes, economic and social wellbeing of the region closely related to health of land, but assets threatened</li> </ul>
	Threat to soil assets <small>(Note 2)</small>	Very high	<ul style="list-style-type: none"> <li>Significant areas of the catchment with predicted medium to high levels of sheet and rill erosion</li> <li>Areas of dryland salinity outbreaks and rising trends</li> <li>Significant areas of high to very high risk of acidification hazard with significant area of at or below critical level of acidification hazard</li> </ul>
	Condition of soil assets <small>(Note 3)</small>	Medium	<ul style="list-style-type: none"> <li>Low to moderate resilient soil types</li> <li>High impact from land uses</li> </ul>
Murrumbidgee	Eco-Social-Enviro Values of healthy soil assets <small>(Note 1)</small>	Very high	<ul style="list-style-type: none"> <li>Agricultural landscapes, economic and social wellbeing of the region closely related to health of land</li> <li>Urban infrastructure threatened</li> </ul>
	Threat to soil assets <small>(Note 2)</small>	High	<ul style="list-style-type: none"> <li>Areas of dryland salinity outbreaks and rising trends</li> <li>Areas of moderate to very high risk of acidification hazard with small area of at or below critical level of acidification hazard</li> </ul>
	Condition of soil assets <small>(Note 3)</small>	Low	<ul style="list-style-type: none"> <li>Low resilient soil types</li> <li>Very high impact from land uses</li> </ul>
Murray	Eco-Social-Enviro Values of healthy soil assets <small>(Note 1)</small>	Very high	<ul style="list-style-type: none"> <li>Agricultural landscapes, economic and social wellbeing of the region closely related to health of land</li> <li>Urban infrastructure threatened</li> </ul>

CMA	Criteria	Rank	Why it was assigned this ranking
	Threat to soil assets (Note 2)	High	<ul style="list-style-type: none"> <li>Small areas of dryland salinity outbreaks</li> <li>Areas of local significant sodicity</li> <li>Areas of moderate to very high risk of acidification hazard with areas of at or below critical level of acidification hazard</li> </ul>
	Condition of soil assets (Note 3)	High	<ul style="list-style-type: none"> <li>Moderate resilient soil types</li> <li>High impact from land uses</li> </ul>
Lower Murray Darling	Eco-Social-Enviro Values of healthy soil assets (Note 1)	High	<ul style="list-style-type: none"> <li>Economic and social wellbeing of the region linked to health of land, but less agricultural and urban landscapes</li> </ul>
	Threat to soil assets (Note 2)	Low	<ul style="list-style-type: none"> <li>Large areas of widespread sodicity</li> <li>Significant areas of moderate to high wind erodibility</li> <li>Low real or potential impact from other threats</li> </ul>
	Condition of soil assets (Note 3)	High	<ul style="list-style-type: none"> <li>Moderate resilient soil types</li> <li>High impact from land uses</li> </ul>
Western	Eco-Social-Enviro Values of healthy soil assets (Note 1)	High	<ul style="list-style-type: none"> <li>Economic and social wellbeing of the region linked to health of land, but less agricultural and urban landscapes</li> </ul>
	Threat to soil assets (Note 2)	Medium	<ul style="list-style-type: none"> <li>Large areas of widespread sodicity (however equally large areas with minor or no sodicity)</li> <li>Areas of moderate to high wind erodibility</li> </ul>
	Condition of soil assets (Note 3)	Low	<ul style="list-style-type: none"> <li>Low resilient soil types</li> <li>Moderate impact from land uses</li> </ul>
Northern Rivers	Eco-Social-Enviro Values of healthy soil assets (Note 1)	Medium	<ul style="list-style-type: none"> <li>Economic and social wellbeing of the region not as directly linked to health of land assets, but health of ecosystems related to health of land assets</li> </ul>
	Threat to soil assets (Note 2)	High	<ul style="list-style-type: none"> <li>Areas with predicted potential medium to high levels of sheet and rill erosion</li> <li>Significant areas at or below critical level of acidification hazard</li> <li>Significant area of coastline with low to high probability of Acid Sulfate Soils including NSW identified priority management areas</li> </ul>
	Condition of soil assets (Note 3)	Medium	<ul style="list-style-type: none"> <li>Low to moderate resilient soil types</li> <li>Moderate impact from land uses</li> </ul>
Hunter/Central Rivers	Eco-Social-Enviro Values of healthy soil assets (Note 1)	Medium	<ul style="list-style-type: none"> <li>Some agricultural landscapes but overall economic wellbeing of the region not as directly linked to health of land assets</li> <li>Condition of water and biodiversity assets related to health of land assets</li> </ul>
	Threat to soil assets (Note 2)	Very high	<ul style="list-style-type: none"> <li>Significant areas with predicted potential medium to high levels of sheet and rill erosion</li> <li>Areas of dryland salinity outbreaks including marine related salinity</li> <li>Areas at or below critical level of acidification hazard</li> <li>Significant area of coastline with low to high probability of Acid Sulfate Soils</li> </ul>
	Condition of soil assets (Note 3)	High	<ul style="list-style-type: none"> <li>Moderate resilient soil types</li> <li>High impact from land uses</li> </ul>
Southern Rivers	Eco-Social-Enviro Values of healthy soil assets (Note 1)	Medium	<ul style="list-style-type: none"> <li>Economic wellbeing of the region not as directly linked to health of land assets, but health of ecosystems related to health of land assets</li> </ul>
	Threat to soil assets (Note 2)	Low	<ul style="list-style-type: none"> <li>Area of coastline with low to high probability of Acid Sulfate Soils</li> <li>Some areas of moderate to high wind erodibility</li> </ul>
	Condition of soil assets (Note 3)	Low	<ul style="list-style-type: none"> <li>Low resilient soil types</li> <li>Moderate impact from land uses</li> </ul>
Hawkesbury Nepean	Eco-Social-Enviro Values of healthy soil assets (Note 1)	Medium	<ul style="list-style-type: none"> <li>Some agricultural landscapes but overall economic wellbeing of the region not as directly linked to health of land assets</li> <li>Condition of water and biodiversity assets related to health of land assets</li> </ul>

CMA	Criteria	Rank	Why it was assigned this ranking
Sydney Metro	Threat to soil assets <small>(Note 2)</small>	Low	<ul style="list-style-type: none"> <li>Significant areas at or below critical level of acidification hazard</li> <li>Area of coastline with low to high probability of Acid Sulfate Soils (Hawkesbury-Nepean estuary only and relative small area compared to other coastal CMAs)</li> </ul>
	Condition of soil assets <small>(Note 3)</small>	Medium	<ul style="list-style-type: none"> <li>Low to moderate resilient soil types</li> <li>Moderate impact from land uses</li> </ul>
	Eco-Social-Enviro Values of healthy soil assets <small>(Note 1)</small>	Low	<ul style="list-style-type: none"> <li>Largely developed and limited value to economic and social values, though health of land assets very linked to health of water assets</li> </ul>
Sydney Metro	Threat to soil assets <small>(Note 2)</small>	Very low	<ul style="list-style-type: none"> <li>Significant area of coastline with low to high probability of Acid Sulfate Soils</li> <li>Low real or potential impact from other threats</li> </ul>
	Condition of soil assets <small>(Note 3)</small>	Medium	<ul style="list-style-type: none"> <li>Low resilient soil types</li> <li>Low impact from land uses</li> </ul>

1 Data sources:

- Judgement by NRC staff

2 Threats assessed include:

- sheet and rill erosion, salinity, sodic soils, acidification, acid sulphate, wind erodibility.

Data sources:

- DEC (2006) *State of the Environment Report 2006*. Environment and Conservation, Sydney, NSW (data referenced within as DNR adapted from NLWRA 2002, DNR data 2005, DLWC 2003, adapted from Naylor *et.al.* 1998; Davies and Mumby 1999, Tulau 1999 (numerous papers)).
- DEC (2003) *State of the Environment Report 2003*. Environment and Conservation, Sydney, NSW (data referenced within as DLWC 2002).

3 Data sources:

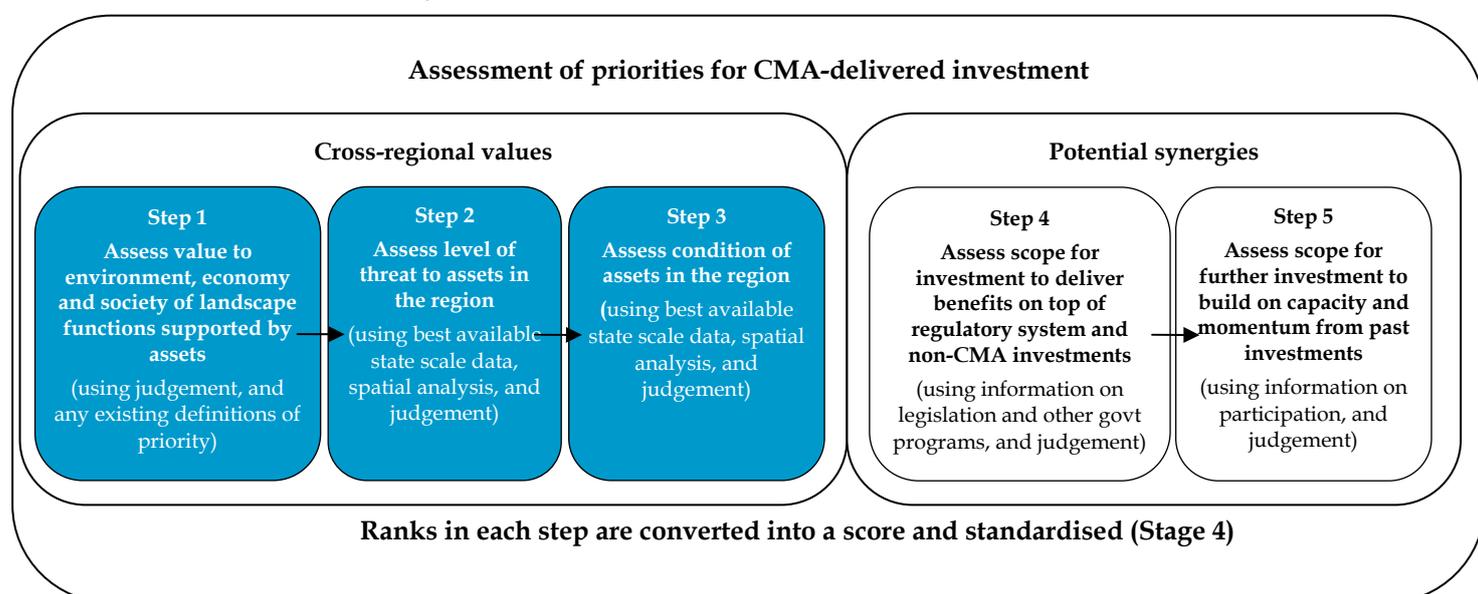
- Soil type maps in Isbell, R.F., McDonald, W.S. and Ashton, L.J. (1997) *Concepts and Rationale of the Australian Soil Classification*. ACLEP, CSIRO Land and Water, Canberra.
- Williams, J., Hook, A. and Gascoigne (1998) *Farming Action/Catchment Reaction - the effect of dryland farming on the natural environment*. CSIRO Publishing, Victoria.
- Judgement by NRC Staff.

## 2 Synergies per theme

For each theme (biodiversity, water (riverine ecosystems, wetlands and estuaries) and land (soil)), this part of the framework asks:

1. What is the scope for CMA-delivered investment to get additional benefits on top of the regulatory system and other players' investments? – analysts are guided to consider whether regulation is already managing threats and improving condition, whether investment or action by other players (eg. LG, state or federal govt) is already managing threats and improving condition.
2. What is the scope for further CMA-delivered investment to build on the capacity and momentum from past investments? – analysts are guided to consider the level of community involvement and participation in CMA programs, past levels of CMA investment in this theme.

This is shown in the figure below.



The NRC undertook a rapid assessment. The following tables summarise rankings and the rationale for each CMA region. <sup>19</sup> Attachment 4 contains further details on the principles and methods behind assigning rankings.

<sup>19</sup> These assessments are supported by further analytical tables (too detailed to include here but can be supplied upon request).

**Table A3.5: Results and rationale – synergies from CMA-delivered investment – biodiversity**

CMA	Criteria	Rank	Why it was assigned this ranking
Border Rivers/ Gwydir	Scope for CMA\$ to get additional benefits (note1)	Medium	<ul style="list-style-type: none"> <li>▪ Assume effective outcomes from native vegetation regulation (i.e. stabilising and decrease trend in vegetation clearing) from: Native Vegetation Act 2003 (in regions where it applies), Threatened Species Conservation Act 1997, Environmental Planning and Assessment Act 1979</li> <li>▪ Assume improving policy setting for biodiversity: Biodiversity Certification; BioBanking; Priority Action Statements</li> <li>▪ Assume Native Vegetation Regulation 2005 and Environmental Outcomes Assessment Methodology are continually improved over time</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	Medium	<ul style="list-style-type: none"> <li>▪ ABARE data<sup>20</sup> shows that: <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs<sup>21</sup></li> <li>○ a relative small area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Namoi	Scope for CMA\$ to get additional benefits (note1)	Medium	<ul style="list-style-type: none"> <li>▪ Same rationale as BR/G CMA</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	High	<ul style="list-style-type: none"> <li>▪ ABARE data shows that: <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>○ a relative large area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Central West	Scope for CMA\$ to get additional benefits (note1)	Medium	<ul style="list-style-type: none"> <li>▪ Same rationale as BR/G CMA</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	High	<ul style="list-style-type: none"> <li>▪ ABARE data shows that: <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>○ a relative small area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> <li>▪ Build on previous strong community engagement in respect to Invasive Native Species</li> </ul>
Lachlan	Scope for CMA\$ to get additional benefits (note1)	Medium	<ul style="list-style-type: none"> <li>▪ Same rationale as BR/G CMA</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	High	<ul style="list-style-type: none"> <li>▪ ABARE data shows that: <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>○ a relative large area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Murrumbidgee	Scope for CMA\$ to get additional benefits (note1)	High	<ul style="list-style-type: none"> <li>▪ Same rationale as BR/G CMA</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	Medium	<ul style="list-style-type: none"> <li>▪ ABARE data shows that: <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>○ a relative small area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Murray	Scope for CMA\$ to get additional benefits (note1)	Medium	<ul style="list-style-type: none"> <li>▪ Same rationale as BR/G CMA</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	High	<ul style="list-style-type: none"> <li>▪ ABARE data shows that: <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>○ a relative large area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>

<sup>20</sup> Nelson, R., Alexander, F., Elliston, L. and Bias, A. (2004), *Natural Resource Management on Australian Farms*, ABARE eReport 04.7 Prepared for the Australian Government Department of Agriculture, Fisheries and Forestry, Canberra, May.

<sup>21</sup> Includes farms with a property representative who was involved in the Rivercare, Bushcare or Coastcare programs, the Murray Darling Initiative, other NHT programs or the NAP during the two year to 30 June 2002

CMA	Criteria	Rank	Why it was assigned this ranking
Lower Murray Darling	Scope for CMA\$ to get additional benefits (note1)	Medium	<ul style="list-style-type: none"> <li>Same rationale as BR/G CMA</li> <li>Further regulation through Western Lands Act 1901 and Crown Lands Act 1989</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	High	<ul style="list-style-type: none"> <li>ABARE data shows that: <ul style="list-style-type: none"> <li>most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>a relative large area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Western	Scope for CMA\$ to get additional benefits (note1)	Medium	<ul style="list-style-type: none"> <li>Same rationale as BR/G CMA</li> <li>Further regulation through Western Lands Act 1901 and Crown Lands Act 1989</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	High	<ul style="list-style-type: none"> <li>ABARE data shows that: <ul style="list-style-type: none"> <li>most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>a relative large area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> <li>Build on previous strong community engagement in respect to Invasive Native Species review (and subsequent research projects)</li> </ul>
Northern Rivers	Scope for CMA\$ to get additional benefits (note1)	High	<ul style="list-style-type: none"> <li>Same rationale as BR/G CMA</li> <li>Regional Plans (and Regional Conservation Plans when/if adopted) should provide sound foundation to build upon</li> <li>Strong opportunities for collaboration with local government (e.g. appropriate zoning through LEPs and on-ground works)</li> <li>Opportunities to build around existing extensive National Parks system, and other initiatives such as Alps to Atherton</li> <li>Existing priorities based on BioForcaster model (Application of best available knowledge)<sup>22</sup></li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	Medium	<ul style="list-style-type: none"> <li>ABARE data shows that: <ul style="list-style-type: none"> <li>most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>a relative small area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Hunter/Central Rivers	Scope for CMA\$ to get additional benefits (note1)	High	<ul style="list-style-type: none"> <li>Same rationale as BR/G CMA</li> <li>Regional Plans and Regional Conservation Plans should provide sound foundation to build upon</li> <li>Strong opportunities for collaboration with local government (e.g. appropriate zoning through LEPs and on-ground works)</li> <li>Opportunities to build around existing extensive National Parks system, and other initiatives such as Alps to Atherton</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	Medium	<ul style="list-style-type: none"> <li>ABARE data shows that: <ul style="list-style-type: none"> <li>most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>a relative small area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Southern Rivers	Scope for CMA\$ to get additional benefits (note1)	High	<ul style="list-style-type: none"> <li>Same rationale as BR/G CMA</li> <li>Regional Plans (and Regional Conservation Plans when/if adopted) should provide sound foundation to build upon</li> <li>Strong opportunities for collaboration with local government (e.g. appropriate zoning through LEPs and on-ground works)</li> <li>Opportunities to build around existing extensive National Parks system, and other initiatives such as Alps to Atherton</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	Medium	<ul style="list-style-type: none"> <li>Assume same coastal characteristics as Northern Rivers</li> </ul>
Hawkesbury Nepean	Scope for CMA\$ to get additional benefits (note1)	Medium	<ul style="list-style-type: none"> <li>Same rationale as BR/G CMA</li> <li>Regional Plans and Regional Conservation Plans should provide sound foundation to build upon</li> <li>Strong opportunities for collaboration with local government (e.g. appropriate</li> </ul>

<sup>22</sup> May have been applied in other catchments

CMA	Criteria	Rank	Why it was assigned this ranking
Sydney Metro			<ul style="list-style-type: none"> <li>zoning through LEPs and on-ground works)</li> <li>▪ Opportunities to build around existing extensive National Parks system, and other initiatives such as Alps to Atherton</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	<b>Very high</b>	<ul style="list-style-type: none"> <li>▪ ABARE data shows that: <ul style="list-style-type: none"> <li>○ a significant area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
	Scope for CMA\$ to get additional benefits (note1)	<b>Medium</b>	<ul style="list-style-type: none"> <li>▪ Assume effective outcomes from native vegetation regulation (i.e. stabilising and decrease trend in vegetation clearing) from: Threatened Species Conservation Act 1997, Environmental Planning and Assessment Act 1979</li> <li>▪ Assume improving policy setting for biodiversity: Biodiversity Certification; BioBanking; Priority Action Statements</li> <li>▪ Regional Plans should provide sound foundation to build upon</li> <li>▪ Strong opportunities for collaboration with local government (e.g. appropriate zoning through LEPs and on-ground works)</li> <li>▪ Opportunities to build around existing extensive National Parks system, and other initiatives such as Alps to Atherton</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	<b>Low</b>	<ul style="list-style-type: none"> <li>▪ Assume low knowledge and participation rate from urban population</li> </ul>

1 Data sources:

- Assessment and judgement by NRC Staff

2 Data sources:

- Nelson, R., Alexander, F., Elliston, L. and Bias, A. (2004) *Natural Resource Management on Australian Farms*, ABARE eReport 04.7. Prepared for the Australian Government Department of Agriculture, Fisheries and Forestry, Canberra, May.

**Table A3.6: Results and rationale - synergies from CMA-delivered investment - riverine ecosystems/wetlands**

CMA	Criteria	Rank	Why it was assigned this ranking
Border Rivers/ Gwydir	Scope for CMA\$ to get additional benefits (note1)	<b>Medium</b>	<ul style="list-style-type: none"> <li>▪ Assume effective outcomes from current water regulation (i.e. getting the balance right between consumptive and environmental use) from Water Management Act 2000 including water sharing plans</li> <li>▪ Assume specific government programs are effective at improving available water for the environment: Riverbank, NSW Wetland Recovery program</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	<b>Medium</b>	<ul style="list-style-type: none"> <li>▪ ABARE data<sup>23</sup> shows that: <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs<sup>24</sup></li> <li>○ a relative small area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Namoi	Scope for CMA\$ to get additional benefits (note1)	<b>Medium</b>	<ul style="list-style-type: none"> <li>▪ Assume effective outcomes from current water regulation (i.e. getting the balance right between consumptive and environmental use) from - Water Management Act 2000 including water sharing plans</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	<b>High</b>	<ul style="list-style-type: none"> <li>▪ ABARE data shows that: <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>○ a relative large area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Central West	Scope for CMA\$ to get additional benefits (note1)	<b>Medium</b>	<ul style="list-style-type: none"> <li>▪ Same rationale as BR/G CMA</li> </ul>

<sup>23</sup> Nelson, R., Alexander, F., Elliston, L. and Bias, A. (2004), *Natural Resource Management on Australian Farms*, ABARE eReport 04.7 Prepared for the Australian Government Department of Agriculture, Fisheries and Forestry, Canberra, May.

<sup>24</sup> Includes farms with a property representative who was involved in the Rivercare, Bushcare or Coastcare programs, the Murray Darling Initiative, other NHT programs or the NAP during the two year to 30 June 2002

CMA	Criteria	Rank	Why it was assigned this ranking
	Scope for CMA\$ to build on momentum & capacity (note2)	High	<ul style="list-style-type: none"> <li>▪ ABARE data shows that:               <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>○ a relative small area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> <li>▪ Build on previous strong community engagement in respect to Invasive Native Species</li> </ul>
Lachlan	Scope for CMA\$ to get additional benefits (note1)	Medium	<ul style="list-style-type: none"> <li>▪ Assume effective outcomes from current water regulation (i.e. getting the balance right between consumptive and environmental use) from Water Management Act 2000 including water sharing plans</li> <li>▪ Assume specific government programs are effective at improving available water for the environment: Riverbank</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	High	<ul style="list-style-type: none"> <li>▪ ABARE data shows that:               <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>○ a relative large area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Murrumbidgee	Scope for CMA\$ to get additional benefits (note1)	High	<ul style="list-style-type: none"> <li>▪ Assume effective outcomes from current water regulation (i.e. getting the balance right between consumptive and environmental use) from Water Management Act 2000 including water sharing plans</li> <li>▪ Assume specific government programs are effective at improving available water for the environment: Living Murray, Riverbank</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	Medium	<ul style="list-style-type: none"> <li>▪ ABARE data shows that:               <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>○ a relative small area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Murray	Scope for CMA\$ to get additional benefits (note1)	Medium	<ul style="list-style-type: none"> <li>▪ Assume effective outcomes from current water regulation (i.e. getting the balance right between consumptive and environmental use) from Water Management Act 2000 including water sharing plans</li> <li>▪ Assume specific government programs are effective at improving available water for the environment Living Murray</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	High	<ul style="list-style-type: none"> <li>▪ ABARE data shows that:               <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>○ a relative large area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Lower Murray Darling	Scope for CMA\$ to get additional benefits (note1)	Medium	<ul style="list-style-type: none"> <li>▪ Same rationale as Murray</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	High	<ul style="list-style-type: none"> <li>▪ ABARE data shows that:               <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>○ a relative large area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Western	Scope for CMA\$ to get additional benefits (note1)	Medium	<ul style="list-style-type: none"> <li>▪ Assume effective outcomes from current water regulation (i.e. getting the balance right between consumptive and environmental use) from Water Management Act 2000 including water sharing plans</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	High	<ul style="list-style-type: none"> <li>▪ ABARE data shows that:               <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>○ a relative large area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> <li>▪ Build on previous strong community engagement in respect to Invasive Native Species</li> </ul>
Northern Rivers	Scope for CMA\$ to get additional benefits (note1)	High	<ul style="list-style-type: none"> <li>▪ Assume lower outcomes from current water regulation (i.e. getting the balance right between consumptive and environmental use) as consumptive use from regulated rivers is lower than in other CMA areas</li> </ul>

CMA	Criteria	Rank	Why it was assigned this ranking
	Scope for CMA\$ to build on momentum & capacity (note2)	Medium	<ul style="list-style-type: none"> <li>▪ ABARE data shows that:               <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>○ a relative small area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Hunter/ Central Rivers	Scope for CMA\$ to get additional benefits (note1)	High	<ul style="list-style-type: none"> <li>▪ Assume effective outcomes from current water regulation (i.e. getting the balance right between consumptive and environmental use) from Water Management Act 2000 including water sharing plans</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	Medium	<ul style="list-style-type: none"> <li>▪ ABARE data shows that:               <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>○ a relative small area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Southern Rivers	Scope for CMA\$ to get additional benefits (note1)	High	<ul style="list-style-type: none"> <li>▪ Assume lower outcomes from current water regulation (i.e. getting the balance right between consumptive and environmental use) as consumptive use from regulated rivers is lower than in other CMA areas</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	Medium	<ul style="list-style-type: none"> <li>▪ Assume same coastal characteristics as Northern Rivers</li> </ul>
Hawkes- bury Nepean	Scope for CMA\$ to get additional benefits (note1)	Medium	<ul style="list-style-type: none"> <li>▪ Assume effective outcomes from current water regulation (i.e. getting the balance right between consumptive and environmental use) from Water Management Act 2000 including water sharing plans</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	Very high	<ul style="list-style-type: none"> <li>▪ ABARE data shows that:               <ul style="list-style-type: none"> <li>○ a significant area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Sydney Metro	Scope for CMA\$ to get additional benefits (note1)	Medium	<ul style="list-style-type: none"> <li>▪ Large number of other players that manage and regulate riverine ecosystems in the region. Though potential for CMA investment to coordinate and lead players.</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	Low	<ul style="list-style-type: none"> <li>▪ Assume low knowledge and participation rate from urban population</li> </ul>

**Notes:**

1 Data sources:

- Assessment and judgement by NRC Staff

2 Data sources:

- Nelson, R., Alexander, F., Elliston, L. and Bias, A. (2004) *Natural Resource Management on Australian Farms*, ABARE eReport 04.7. Prepared for the Australian Government Department of Agriculture, Fisheries and Forestry, Canberra, May.

**Table A3.7: Results and rationale – synergies from CMA-delivered investment – estuaries and coastal lakes**

CMA	Criteria	Rank	Why it was assigned this ranking
Northern Rivers	Scope for CMA\$ to get additional benefits (note1)	High	<ul style="list-style-type: none"> <li>▪ Opportunities for collaboration with local government (e.g. appropriate zoning through LEPs and on-ground works) and to build on Regional Strategies</li> <li>▪ Opportunities to build on existing policy and regulation e.g. Coastal Protection Act 1979, SEPP 71 – Coastal protection, NSW Rivers and Estuaries Policy, Fisheries Management Act 1994, NSW Coastal Policy 1997, National parks system and Lands (Crown Land Act)</li> <li>▪ Already 72% of major estuaries/coastal lakes have commenced estuary management planning with 44% implementation commenced. Scope for CMA to get additional benefits high</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	Medium	<ul style="list-style-type: none"> <li>▪ ABARE data shows that:               <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>○ a relative small area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>

CMA	Criteria	Rank	Why it was assigned this ranking
Hunter/ Central Rivers	Scope for CMA\$ to get additional benefits (note1)	Medium	<ul style="list-style-type: none"> <li>▪ Opportunities for collaboration with local government (e.g. appropriate zoning through LEPs and on-ground works) and to build on Regional Strategies</li> <li>▪ Opportunities to build on existing policy and regulation e.g. Coastal protection Act 1979, SEPP 71 – Coastal protection, NSW Rivers and Estuaries Policy, Fisheries Management Act 1994, NSW Coastal Policy 1997, National parks system and Lands (Crown Land Act)</li> <li>▪ Large amount of state funding @ \$27M already provided to restoration of Lake Macquarie, Kooragang Islands wetland and Tuggerah lakes as part of estuaries management program. Commonwealth has promised further \$20M for Tuggerah lakes. Local government also contributing.</li> <li>▪ Already 56% of major estuaries/coastal lakes have commenced estuary management planning with 38% implementation commenced. Opportunities for CMA involvement medium.</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	Medium	<ul style="list-style-type: none"> <li>▪ ABARE data shows that: <ul style="list-style-type: none"> <li>- most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>- a relative small area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Southern Rivers	Scope for CMA\$ to get additional benefits (note1)	Medium	<ul style="list-style-type: none"> <li>▪ Opportunities for collaboration with local government (e.g. appropriate zoning through LEPs and on-ground works) and to build on Regional Strategies</li> <li>▪ Opportunities to build on existing policy and regulation e.g. Coastal protection Act 1979, SEPP 71 – Coastal protection, NSW Rivers and Estuaries Policy, Fisheries Management Act 1994, NSW Coastal Policy 1997, National parks system and Lands (Crown Land Act)</li> <li>▪ 14.8M state funding provided towards management and restoration of Lake Illawarra as part of estuaries management program</li> <li>▪ Lake Illawarra has its own statutory authority (Lake Illawarra authority - Lake Illawarra Authority Act 1987) therefore less opportunities for CMA</li> <li>▪ 52% of major estuaries/coastal lakes have commenced estuary management planning with 47% implementation commenced. Scope for CMA to get additional benefits medium</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	Medium	<ul style="list-style-type: none"> <li>▪ Assume same coastal characteristics as Northern Rivers</li> </ul>
Hawkes- bury Nepean	Scope for CMA\$ to get additional benefits (note1)	Low	<ul style="list-style-type: none"> <li>▪ Opportunities for collaboration with local government (e.g. appropriate zoning through LEPs and on-ground works) and to build on Regional Strategies.</li> <li>▪ Opportunities to work with Sydney Catchment Authority and Sydney Water</li> <li>▪ Opportunities to build on existing policy and regulation e.g. Coastal protection Act 1979, SEPP 71 – Coastal protection, NSW Rivers and Estuaries Policy, Fisheries Management Act 1994, NSW Coastal Policy 1997, National parks system and Lands (Crown Land Act)</li> <li>▪ No estuary management planning has commenced</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	Very high	<ul style="list-style-type: none"> <li>▪ ABARE data shows that: <ul style="list-style-type: none"> <li>- a significant area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Sydney Metro	Scope for CMA\$ to get additional benefits (note1)	High	<ul style="list-style-type: none"> <li>▪ Opportunities for collaboration with local government (e.g. appropriate zoning through LEPs and on-ground works) and to build on Regional Strategies</li> <li>▪ Opportunities to coordinate with agencies, Sydney Water Corporation and local government to improve stormwater management and impacts</li> <li>▪ Opportunities to build on existing policy and regulation e.g. Coastal protection Act 1979, SEPP 71 – Coastal protection, NSW Rivers and Estuaries Policy, Fisheries Management Act 1994, NSW Coastal Policy 1997, National parks system (Crown Land Act).</li> <li>▪ 5.5M funding provided towards management and restoration of Chipping Lakes</li> <li>▪ Scope for additional benefits in projects such as Cooks River and Port Hacking projects/working groups</li> <li>▪ 50% of major estuaries/coastal lakes have commenced estuary management planning with 50% implementation commenced. Scope for CMA to get additional benefits medium</li> </ul>

CMA	Criteria	Rank	Why it was assigned this ranking
	Scope for CMA\$ to build on momentum & capacity (note2)	Medium	<ul style="list-style-type: none"> <li>Assume low knowledge and participation rate from urban population</li> <li>Assume participation from other stakeholders</li> </ul>
1	Data sources:		<ul style="list-style-type: none"> <li>Assessment and judgement by NRC Staff</li> <li>Personal communication, DECC officer, Status of Estuary Management Plans, March 2008</li> <li>Personal communication, Bruce Thom</li> <li>NSW Government Website - major programs at <a href="http://www.iqgm.com/estuaries/estmgt.shtml">http://www.iqgm.com/estuaries/estmgt.shtml</a></li> </ul>
2	Data sources:		<ul style="list-style-type: none"> <li>Nelson, R., Alexander, F., Elliston, L. and Blias, A. (2004) <i>Natural Resource Management on Australian Farms</i>, ABARE eReport 04.7. Prepared for the Australian Government Department of Agriculture, Fisheries and Forestry, Canberra, May.</li> </ul>

**Table A3.8: Results and rationale - synergies from CMA-delivered investment - land (soil)**

CMA	Criteria	Rank	Why it was assigned this ranking
Border Rivers/ Gwydir	Scope for CMA\$ to get additional benefits (note1)	High	<ul style="list-style-type: none"> <li>Assume stabilising and increasing trend in groundcover (all vegetation types) due to impacts from Native Vegetation Act 2003 and CMA investments</li> <li>Assume moderate to strong soil knowledge in CMAs (for example, ex-DLWC/DNT staff)</li> <li>Established knowledge in soil and land constraints from land and soil capability mapping (and LSC tool in PVP)</li> <li>Assume effective regulation from: Soil Conservation Act 1938; Environmental Planning and Assessment Act</li> <li>However, need to consider CMA's capacity fill gaps left by reduced agency extension services</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	Medium	<ul style="list-style-type: none"> <li>ABARE data<sup>25</sup> shows that:               <ul style="list-style-type: none"> <li>most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs<sup>26</sup></li> <li>a relative small area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Namoi	Scope for CMA\$ to get additional benefits (note1)	High	<ul style="list-style-type: none"> <li>Same rationale as BR/G CMA</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	High	<ul style="list-style-type: none"> <li>ABARE data shows that:               <ul style="list-style-type: none"> <li>most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>a relative large area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Central West	Scope for CMA\$ to get additional benefits (note1)	High	<ul style="list-style-type: none"> <li>Same rationale as BR/G CMA</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	Medium	<ul style="list-style-type: none"> <li>ABARE data shows that:               <ul style="list-style-type: none"> <li>most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>a relative small area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Lachlan	Scope for CMA\$ to get additional benefits (note1)	High	<ul style="list-style-type: none"> <li>Same rationale as BR/G CMA</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	high	<ul style="list-style-type: none"> <li>ABARE data shows that:               <ul style="list-style-type: none"> <li>most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>a relative large area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Murrumbidgee	Scope for CMA\$ to get additional benefits (note1)	High	<ul style="list-style-type: none"> <li>Same rationale as BR/G CMA</li> <li>Further benefits (historically) from the implementation of Land and Water Management Plans</li> </ul>

<sup>25</sup> Nelson, R., Alexander, F., Elliston, L. and Blias, A. (2004), *Natural Resource Management on Australian Farms*, ABARE eReport 04.7 Prepared for the Australian Government Department of Agriculture, Fisheries and Forestry, Canberra, May.

<sup>26</sup> Includes farms with a property representative who was involved in the Rivercare, Bushcare or Coastcare programs, the Murray Darling Initiative, other NHT programs or the NAP during the two year to 30 June 2002

CMA	Criteria	Rank	Why it was assigned this ranking
	Scope for CMA\$ to build on momentum & capacity (note2)	Medium	<ul style="list-style-type: none"> <li>▪ ABARE data shows that: <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>○ a relative small area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Murray	Scope for CMA\$ to get additional benefits (note1)	High	<ul style="list-style-type: none"> <li>▪ Same rationale as BR/G CMA</li> <li>▪ Further benefits (historically) from the implementation of Land and Water Management Plans</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	High	<ul style="list-style-type: none"> <li>▪ ABARE data shows that: <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>○ a relative large area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Lower Murray Darling	Scope for CMA\$ to get additional benefits (note1)	Very high	<ul style="list-style-type: none"> <li>▪ Same rationale as BR/G CMA</li> <li>▪ High groundcover</li> <li>▪ Further regulation through Western Lands Act 1901 and Crown Lands Act 1989</li> <li>▪ Further benefits (historically) from the implementation of Land and Water Management Plans</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	High	<ul style="list-style-type: none"> <li>▪ ABARE data shows that: <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>○ a relative large area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Western	Scope for CMA\$ to get additional benefits (note1)	Very high	<ul style="list-style-type: none"> <li>▪ Same rationale as BR/G CMA</li> <li>▪ High groundcover</li> <li>▪ Further regulation through Western Lands Act 1901 and Crown Lands Act 1989</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	High	<ul style="list-style-type: none"> <li>▪ ABARE data shows that: <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>○ a relative large area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Northern Rivers	Scope for CMA\$ to get additional benefits (note1)	High	<ul style="list-style-type: none"> <li>▪ Same rationale as BR/G CMA</li> <li>▪ Established knowledge in Acid Sulfate Soils</li> <li>▪ Regional Plans should provide sound foundation to build upon</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	Medium	<ul style="list-style-type: none"> <li>▪ ABARE data shows that: <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>○ a relative small area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Hunter/Central Rivers	Scope for CMA\$ to get additional benefits (note1)	High	<ul style="list-style-type: none"> <li>▪ Same rationale as BR/G CMA</li> <li>▪ Established knowledge in Acid Sulfate Soils</li> <li>▪ Regional Plans should provide sound foundation to build upon</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	Medium	<ul style="list-style-type: none"> <li>▪ ABARE data shows that: <ul style="list-style-type: none"> <li>○ most of the catchment has 0-20% of farms with a property representative involved in NHT or NAP programs</li> <li>○ a relative small area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
Southern Rivers	Scope for CMA\$ to get additional benefits (note1)	High	<ul style="list-style-type: none"> <li>▪ Same rationale as BR/G CMA</li> <li>▪ Established knowledge in Acid Sulfate Soils</li> <li>▪ Regional Plan should provide sound foundation to build upon</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	Medium	<ul style="list-style-type: none"> <li>▪ Assume same coastal characteristics as Northern Rivers</li> </ul>
Hawkesbury Nepean	Scope for CMA\$ to get additional benefits (note1)	High	<ul style="list-style-type: none"> <li>▪ Same rationale as BR/G CMA</li> <li>▪ Established knowledge in Acid Sulfate Soils</li> <li>▪ Regional Plans should provide sound foundation to build upon</li> </ul>

CMA	Criteria	Rank	Why it was assigned this ranking
	Scope for CMA\$ to build on momentum & capacity (note2)	<b>Very high</b>	<ul style="list-style-type: none"> <li>▪ ABARE data shows that: <ul style="list-style-type: none"> <li>○ a significant area of the catchment has 20-60% of farms with a property representative involved in NHT or NAP programs</li> </ul> </li> </ul>
<b>Sydney Metro</b>	Scope for CMA\$ to get additional benefits (note1)	<b>High</b>	<ul style="list-style-type: none"> <li>▪ Assume effective regulation through EP&amp;A Act</li> <li>▪ Established knowledge in Acid Sulfate Soils</li> <li>▪ Regional Plans should provide sound foundation to build upon</li> </ul>
	Scope for CMA\$ to build on momentum & capacity (note2)	<b>Low</b>	<ul style="list-style-type: none"> <li>▪ Assume low knowledge and participation rate from urban population</li> </ul>

**Notes:**

1 Data sources:

- Assessment and judgement by NRC Staff

2 Data sources:

- Nelson, R., Alexander, F., Elliston, L. and Blias, A. (2004) *Natural Resource Management on Australian Farms*, ABARE eReport 04.7. Prepared for the Australian Government Department of Agriculture, Fisheries and Forestry, Canberra, May.

## **Attachment 4 Approach to priorities assessments**

# Approach to priorities assessments

Attachment 3 outlined the results from NRC’s rapid assessment. This attachment describes the analytical process further, including the principles and methods behind assigning rankings.

For each theme (biodiversity, water (riverine ecosystems, wetlands and estuaries) and land (soil)), the cross-regional values part of the framework asks:

1. How dependent are the nation's environmental, social and economic values on the landscape functions supported by the natural assets in the region? – analysts are guided to consider benefits to regional, state and national communities and industries, and any existing policies that state the governments’ values.
2. What is the level of threat to those assets, and hence the landscape functions and values dependent on those assets, in the region? – analysts are guided to use available scientific information and expert opinion.
3. What is the condition of those assets in the region compared with the condition needed to support landscape function and values? – analysts are guided to use available scientific information and expert opinion.

For each theme (biodiversity, water (riverine ecosystems and wetlands) and land (soil)), the synergies part of the framework asks:

1. What is the scope for CMA-delivered investment to get additional benefits on top of the regulatory system and other players' investments? – analysts are guided to consider whether regulation is already managing threats and improving condition, whether investment or action by other players (eg. LG, state or federal govt) is already managing threats and improving condition (detailed below).
2. What is the scope for further CMA-delivered investment to build on the capacity and momentum from past investments? – analysts are guided to consider the level of community involvement and participation in CMA programs, past levels of CMA investment in this theme (detailed below).

The following tables further describe the approach undertaken by an analyst to rank values, condition and threat and synergies for each theme. They also outline limitations and uncertainty in the analysis and suggest how it could be improved in the future with more information and time.

## 1 Biodiversity theme

**Table A4.1: Analytical approach to rank biodiversity values for each region – Step A**

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
<p>Use judgement to rank each region and consider at least the following:</p> <p>1. Consider function of native vegetation in the landscape, over both time and space eg. interaction with natural systems (eg. hydrology, ecosystems), interaction with social and economic systems (eg.</p>	<ul style="list-style-type: none"> <li>▪ Highly subjective</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>▪ Expert panel approach</li> <li>▪ NSW Biodiversity Strategy could assist to define principles for valuing biodiversity across the state, or may specify</li> </ul>

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
primary industries, visual amenity and tourism industry <ul style="list-style-type: none"> <li>Assume that natural systems are highly dependent on high quality 'biodiversity' (native vegetation as proxy) so consider mainly social and economic systems</li> </ul>			particular regions that are important to society
<b>Rank priority for inclusion in National Reserve System</b> 2 <ul style="list-style-type: none"> <li>Overlay CMA boundary map on IBRA priorities map and assess proportion of priority class within each CMA boundary</li> <li>Majority area 'very high' priority=very high; approx 50% area 'very high' priority and 50% area 'high' priority=high; majority area 'moderate' priority=medium; majority area 'low' priority=low</li> </ul>	<ul style="list-style-type: none"> <li>CMA boundaries overlays are estimation and not true representation</li> <li>Estimation only and relies on visual judgement</li> </ul>	<b>Low</b> - estimations are close to actual and should have low impact on outcome considering coarseness of data	<ul style="list-style-type: none"> <li>Use GIS to query and analyse data sets</li> </ul>

**Table A4.2: Analytical approach to rank biodiversity threat for each region - Step B**

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
<b>Identify best available information</b> 1 <ul style="list-style-type: none"> <li>Priority Action Statement - threatened species list ranking (DECC 2008)</li> <li>Relative vegetation pressure index mapping (DEC 2005)</li> </ul>	<ul style="list-style-type: none"> <li>Coarse scale but state-wide coverage</li> </ul>	<b>Low</b>	<ul style="list-style-type: none"> <li>Data should improve with the implementation of the state-wide monitoring and evaluation strategy, including specific data on pressures against each of the state biodiversity targets</li> </ul>
<b>Overlay CMA boundary map on vegetation pressure index map and assess proportion of pressure classes within each CMA boundary</b> 2	<ul style="list-style-type: none"> <li>CMA boundaries overlays are estimation and not true representation</li> <li>Estimation only and relies on visual judgement</li> </ul>	<b>Low</b> - estimations are close to actual and should have low impact on outcome considering coarseness of data	<ul style="list-style-type: none"> <li>Use GIS to query and analyse data sets</li> </ul>
<b>Standardise measure classes for each data set</b> 3 <ul style="list-style-type: none"> <li>Vegetation pressure index data set: Low = 1-19 % relative; strength pressure; Medium = 20-49; High = 50-79; Very high = 80 -100% (or cleared)</li> <li>Threatened Species listings: Low = 12-13 ranking; Medium = 9-11; High = 5-8; Very high = 1-4</li> </ul>	<ul style="list-style-type: none"> <li>Analysis relies on subjectivity in standardising measure classes</li> </ul>	<b>Medium</b>	<ul style="list-style-type: none"> <li>Scale and standardisation method might vary depending on nature of data - may be more appropriate to use quantitative data rather than qualitative rankings</li> </ul>
<b>Calculate overall threat measure</b> 4 <ul style="list-style-type: none"> <li>Generated by a matrix using standardised classes</li> <li>Threat classes ranged from very high (generally high pressures on vegetation and high listing of threatened species) to low (generally low pressure on vegetation and low listing of threatened species)</li> </ul>	<ul style="list-style-type: none"> <li>Analysis relies on subjectivity in assigning measure classes to matrix</li> <li>Rapid assessment</li> </ul>	<b>Medium</b>	<ul style="list-style-type: none"> <li>Depends on above improvements</li> </ul>

**Table A4.3: Analytical approach to rank biodiversity condition for each region - Step C**

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
<b>Identify best available information</b> 1 <ul style="list-style-type: none"> <li>Native vegetation extent mapping (modified from Keith 2004)</li> </ul>	<ul style="list-style-type: none"> <li>Coarse scale but state-wide coverage</li> <li>Uses vegetation extent as a</li> </ul>	<b>High</b>	<ul style="list-style-type: none"> <li>Condition data should improve with the implementation of the</li> </ul>

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
<ul style="list-style-type: none"> <li>Trends in reporting rate of Australian bird breeding species (NLWRA 2002)</li> <li>Expert knowledge</li> </ul>	<ul style="list-style-type: none"> <li>proxy for condition</li> <li>Bird data:                             <ul style="list-style-type: none"> <li>may not be best available</li> <li>may be impacted by seasonal variation (however, probably best state-wide coverage)</li> </ul> </li> </ul>		state-wide monitoring and evaluation strategy, including specific data on condition on native vegetation and native fauna
<p><b>2</b></p> <p><b>Overlay CMA boundary map on each mapping data set</b> - Assess proportion of:</p> <ul style="list-style-type: none"> <li>(i) native vegetation extent and</li> <li>(ii) trend classes for birds within each CMA boundary</li> <li>CMA boundaries overlaid on data sets</li> </ul>	<ul style="list-style-type: none"> <li>CMA boundaries overlays are estimation and not true representation</li> <li>Rapid assessment</li> </ul>	<b>Medium</b> - estimations are close to actual and should have low impact on outcome considering coarseness of data	<ul style="list-style-type: none"> <li>Use GIS to query and analyse data sets</li> </ul>
<p><b>3</b></p> <p><b>Standardise measure classes for each data set</b></p> <ul style="list-style-type: none"> <li>Vegetation extent data set: Low = &lt;30% vegetation extent; Medium = 30-49%; High = 50-70; Very high = &gt;70%</li> <li>Bird breeding trends: Low = Significant decrease; Medium = No significant change; High = Significant increase</li> </ul>	<ul style="list-style-type: none"> <li>Estimation only and relies on visual judgement</li> <li>Rapid assessment</li> </ul>	<b>Low</b> - estimations should have low impact on outcomes considering coarseness of data	<ul style="list-style-type: none"> <li>Scale and standardisation method might vary depending on nature of data - may be more appropriate to use quantitative data rather than qualitative rankings</li> </ul>
<p><b>4</b></p> <p><b>Calculate overall biodiversity condition</b></p> <ul style="list-style-type: none"> <li>Generated by a matrix using vegetation and bird measures</li> <li>Condition classes ranged from very high (generally high native vegetation extent and improvement in native bird breeding) and low (generally low native vegetation extent and decrease in native bird breeding)</li> </ul>	<ul style="list-style-type: none"> <li>Surrogate measure rather than direct measurement of condition</li> <li>Very limited variables</li> <li>Analysis relies on:                             <ul style="list-style-type: none"> <li>using coarse decision rules</li> <li>coarse data sets</li> <li>users subjectivity</li> </ul> </li> </ul>	<b>High</b>	<ul style="list-style-type: none"> <li>Condition data should improve with the implementation of the state-wide monitoring and evaluation strategy</li> <li>Also depends on above improvements</li> </ul>

**Table A4.4: Analytical approach to rank biodiversity synergies for each region - Step D&E**

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
<p>Evaluate scope for CMA delivered investment to get additional benefits to the regulatory system and other players' investments - <b>Use judgement to rank each CMA region against:</b></p> <ol style="list-style-type: none"> <li>the impact from regulation on clearing of native vegetation (High, Medium, Low)</li> <li>the real or perceived impact on native vegetation from statutory Regional Strategies (High, Medium, Low)</li> <li>the real or perceived impact on native vegetation from Regional Conservation Planning (High, Medium, Low)</li> <li>level of state government investment and policy that addresses biodiversity eg. through National Parks, Environment Trust, Biobanking, Priority Action Statements (High, Medium, Low)</li> <li>Level of local government investment (High, Medium, Low)</li> </ol> <p>Use average rank across the above considerations for each CMA region, to determine overall rank (Very high, High, Medium, Low).</p>	<ul style="list-style-type: none"> <li>Highly subjective</li> <li>Rapid assessment</li> <li>Potentially incomplete set of considerations</li> </ul>	<b>Medium</b>	<ul style="list-style-type: none"> <li>Need to consider other non-CMA policies, investment or regulation that help to manage threats or improve condition of biodiversity</li> <li>Use knowledge of CMA and agency staff to assign rankings</li> </ul>

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
2	<p>Evaluate scope for further CMA delivered investment to build on capacity and momentum from past investments – <b>Use data and expert judgement to rank each CMA:</b></p> <ol style="list-style-type: none"> <li>1. ABARE (2004) data - % of farms with a property representative involved in NHT/NAP programs during the two years to 30 June 2002</li> <li>o Significant area of CMA 20-&gt;60% = Very high; Most CMA area of 0-20%; Relative large area of 20- &gt;60% = High; Most CMA area of 0-20%; Relative smaller area of 20- &gt;60% = Medium; Little or no data=Low</li> </ol>	<ul style="list-style-type: none"> <li>▪ Highly dynamic area with many variables</li> <li>▪ No local or regional expert advice</li> <li>▪ Relies on information that may not be best available</li> <li>▪ Very coarse data set</li> </ul> <p><b>Very high</b></p>	<ul style="list-style-type: none"> <li>▪ Use knowledge of CMA and agency staff to assign rankings</li> <li>▪ Use data on past levels of CMA investment in the theme</li> <li>▪ Capacity data should improve with implementation of the MER Program</li> <li>▪ Consider data at other scales</li> <li>▪ Need to consider other institutions beside 'landholders' (e.g. local council)</li> </ul>

## 2 Water theme

**Table A4.5 : Analytical approach to rank riverine ecosystem/wetland values for each region – Step A**

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
1	<p><b>Use judgement to rank each region</b>, considering at least:</p> <ul style="list-style-type: none"> <li>▪ Consider function of healthy riverine systems in the landscape, over both time and space eg. interaction with natural systems (eg. habitat, fauna, soils), interaction with social and economic systems (eg. drinking, primary industries, recreation)</li> <li>▪ Assume that natural systems are highly dependent on high quality riverine systems so consider mainly social and economic systems</li> </ul>	<ul style="list-style-type: none"> <li>▪ Highly subjective</li> </ul> <p><b>Medium</b></p>	<ul style="list-style-type: none"> <li>▪ Expert panel approach</li> </ul>
2	<p><b>Rank value of important wetlands:</b></p> <ul style="list-style-type: none"> <li>▪ If no. of Ramsar wetlands &gt;2 = very high value; if no. of Ramsar wetlands is 1 = high value; if no Ramsar wetlands = low value</li> <li>▪ If no. of Nationally Important wetlands is &gt;15 = very high value; if no. of Nationally Important wetlands is 11-15 = high value; if no. of Nationally Important wetlands is 6-10 = moderate value; if no. of Nationally Important wetlands is 0-5 = low value.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Analysis relies on subjectivity in standardising measure classes</li> </ul> <p><b>Medium</b></p>	<p>Scale and standardisation method might vary depending on nature of data</p>

**Table A4.6: Analytical approach to rank riverine ecosystem/wetland threat for each region – Step B**

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
1	<p><b>Identify best available information</b></p> <ul style="list-style-type: none"> <li>▪ Habitat condition in reaches assessed using Habitat Index map data (CSIRO Land and Water, The Assessment of River Condition, 2001)</li> <li>▪ Nutrient and sediment load condition in reaches assessed (CSIRO Land and Water, The Assessment of River Condition, 2001)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Coarse scale but state-wide coverage</li> <li>▪ Limited threat indices used</li> <li>▪ Potential duplication: some of the subindices used to consider threat</li> </ul> <p><b>High</b></p>	<ul style="list-style-type: none"> <li>▪ Use expert opinion to assess most relevant measure of threats</li> <li>▪ Use of expert opinion and further research to establish best available data sets</li> <li>▪ Data should improve with</li> </ul>

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
<ul style="list-style-type: none"> <li>▪ Levels of consumptive use compared to inflows 2004-05 (Australian Water Resources 2005)</li> <li>▪ Grazing pressure on wetlands (NLWA 2002)</li> </ul>	<p>also formed part of the environment index used to determine condition</p>		<p>the implementation of the state-wide monitoring and evaluation strategy, including assessments of pressures on each state water target</p> <ul style="list-style-type: none"> <li>▪ Investigate using available regional scale information from CMAs and other data sources</li> <li>▪ Include data on groundwater</li> </ul>
<p>2 <b>Overlay CMA boundary map on maps and assess proportion of pressure classes within each CMA boundary</b></p>	<ul style="list-style-type: none"> <li>▪ CMA boundaries overlays are estimation and not true representation</li> <li>▪ Estimation only and relies on visual judgement</li> <li>▪ Pressure classes sometimes scattered across CMA area that increases likelihood of misjudging proportions</li> </ul>	<p><b>Medium</b> – CMA boundary estimations are close to actual and should have low impact on outcome considering coarseness of data.</p>	<ul style="list-style-type: none"> <li>▪ Use GIS to query and analyse data sets</li> </ul>
<p>3 <b>Standardise measure classes for each data set</b></p> <ul style="list-style-type: none"> <li>▪ Habitat Condition of reaches data set: Substantially to severely modified = Low, Moderately modified= Medium, Largely unmodified = High, Not assessed = not assessable</li> <li>▪ Nutrient and sediment load condition of reaches data set: Substantially to severely modified = Low, Moderately modified= Medium, Largely unmodified = High, Not assessed = not assessable</li> <li>▪ Level of consumptive use compared to inflows 2004-05: High = High, Moderate = Medium, Low =Low, Area not assessed = not assessable</li> <li>▪ Grazing pressure on wetlands. Grazing pressure = High, Grazing pressure not a threat or no nationally important wetlands = Low, Unknown = not assessable.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Analysis relies on subjectivity in standardising measure classes</li> </ul>	<p><b>Medium</b></p>	<p>Scale and standardisation method might vary depending on nature of data</p>
<p>4 <b>Calculate overall threat measure</b></p> <ul style="list-style-type: none"> <li>▪ Generated by a matrix using standardised classes</li> <li>▪ Threat classes ranged from medium to high. This is because all catchments had medium to high pressures in at least some parts of their catchment areas.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Analysis relies on subjectivity in assigning measure classes to matrix</li> <li>▪ Rapid assessment based on visual assessment and judgement</li> <li>▪ Potential duplication of data – the habitat and nutrient and sediment load indices also form part of the environment index used to assess condition</li> </ul>	<p><b>High</b></p>	<ul style="list-style-type: none"> <li>▪ Use of expert opinion and further research to establish best measures of threats and available data sets, for instance more detail on hydrological threats, land use and population/development pressures, invasive species</li> <li>▪ Include information on potential impacts of climate change variability</li> <li>▪ Investigate using available regional scale information from CMAs and other data sources</li> <li>▪ Include data on groundwater</li> <li>▪ More pressure data should become available when the CSIRO reports on over</li> </ul>

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
			allocation are released <ul style="list-style-type: none"> <li>Use GIS to query and analyse data sets</li> </ul>

**Table A4.7: Analytical approach to rank riverine ecosystem/wetland condition for each region - Step C**

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
1	<p><b>Identify best available information</b></p> <ul style="list-style-type: none"> <li>Biological condition of reaches based on Biota Index (ARC B) - River Reaches (CSIRO Land and Water, <i>The Assessment of River Condition</i>, 2001)</li> <li>Assessment of river reaches based on environmental features based on Environment Index (ARC E) - River Reaches (CSIRO Land and Water, <i>The Assessment of River Condition</i>, 2001)</li> <li>Condition of nationally important wetlands (NLWA, <i>Assessment of Terrestrial Biodiversity</i> 2002)</li> </ul>	<p><b>High</b></p> <ul style="list-style-type: none"> <li>Coarse scale but state-wide coverage</li> <li>Uses an "environment index" as a proxy for condition that includes indices that are "drivers" rather than a response.</li> <li>Data is 5 + years old</li> </ul>	<ul style="list-style-type: none"> <li>Condition data should improve with the implementation of the state-wide monitoring and evaluation strategy</li> <li>More condition data should become available when the sustainable rivers audit report is released within the next one-two months</li> <li>Use of expert opinion and further research to establish best available data sets</li> <li>Investigate using available regional scale information from CMAs and other data sources</li> <li>Include data on groundwater</li> </ul>
2	<p><b>Overlay CMA boundary map on each mapping data set - Assess condition classes within each CMA boundary</b></p> <ul style="list-style-type: none"> <li>CMA boundaries overlaid on data sets</li> </ul>	<p><b>Medium</b></p> <ul style="list-style-type: none"> <li>CMA boundaries overlays are estimation and not true representation</li> <li>Rapid assessment</li> <li>CMA area often contains a range of condition classes where judgements are made to relative proportions</li> </ul>	<ul style="list-style-type: none"> <li>Use GIS to query and analyse data sets</li> </ul>
3	<p><b>Standardise measure classes for each data set</b></p> <ul style="list-style-type: none"> <li>Biological condition of reaches data set: severely to extremely impaired = Low, significantly impaired = Medium, reference condition = High, Not assessed = Not assessable</li> <li>Condition of reaches based on environmental features data set: Substantially to severely modified = Low, Moderately modified = Medium, Largely unmodified = High, Not assessed = not assessable</li> <li>Condition of nationally important wetlands: Degraded and Fair = Low, Good = Medium, Near pristine = High. Unknown = not assessable.</li> </ul>	<p><b>Medium -</b></p> <ul style="list-style-type: none"> <li>Estimation only and relies on visual judgement</li> <li>Rapid assessment</li> </ul>	<p>Scale and standardisation method might vary depending on nature of data</p>

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
4	<p><b>Calculate overall riverine ecosystem condition</b></p> <ul style="list-style-type: none"> <li>▪ Generated by a matrix using biological condition of river reaches, condition of river reaches based on environmental features and condition of nationally important wetlands.</li> <li>▪ Condition classes ranged from medium to low - based on an assessment of all measure classes. No CMA scored high or very high condition, although Southern Rivers was close high based on the biological condition measure.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Surrogate measure rather than direct measurement of condition</li> <li>▪ Very limited variables</li> <li>▪ Analysis relies on:                             <ul style="list-style-type: none"> <li>○ using coarse decision rules</li> <li>○ coarse data sets</li> <li>○ visual judgements</li> <li>○ user subjectivity</li> </ul> </li> </ul> <p style="text-align: center;"><b>High</b></p>	<ul style="list-style-type: none"> <li>▪ Condition data should improve with the implementation of the state-wide monitoring and evaluation strategy</li> <li>▪ Use of GIS to query and analyse data sets would increase accuracy</li> <li>▪ Use of experts would allow informed judgements to be made and suitability of data sets to be checked.</li> <li>▪ Investigate using available regional scale information from CMAs and other data sources</li> <li>▪ Include data on groundwater</li> </ul>

**Table A4.8: Analytical approach to rank riverine ecosystem/wetland synergies for each region - Step D&E**

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
1	<p>Evaluate scope for CMA delivered investment to get additional benefits to the regulatory system and other players' investments - <b>Use judgement to rank each CMA region against:</b></p> <ol style="list-style-type: none"> <li>1. the impact from regulation on water extraction - dependent on whether rivers are regulated or not (High, Medium, Low)</li> <li>2. level of state and Commonwealth government investment and policy that addresses riverine ecosystems and wetlands eg. through Riverbank, Living Murray, Wetland Recovery program (High, Medium, Low)</li> </ol> <p>Use average rank across the above considerations for each CMA region, to determine overall rank (Very high, High, Medium, Low).</p>	<ul style="list-style-type: none"> <li>▪ Highly subjective</li> <li>▪ Rapid assessment</li> <li>▪ Potentially incomplete set of considerations</li> </ul> <p style="text-align: center;"><b>High</b></p>	<ul style="list-style-type: none"> <li>▪ Review and include all existing programs for instance, River Reach, Murray Wetlands working group, Nature Conservation Water Trust, salinity programs funded outside of NAP etc</li> <li>▪ Consider a wider range of government defined priorities i.e. not just wetlands but other aspects such as overall river functioning, threatened species etc</li> <li>▪ Use knowledge of CMA and agency staff to assign rankings</li> </ul>
2	<p>Evaluate scope for further CMA delivered investment to build on capacity and momentum from past investments - <b>Use data and expert judgement to rank each CMA:</b></p> <ol style="list-style-type: none"> <li>1. ABARE (2004) data - % of farms with a property representative involved in NHT/NAP programs during the two years to 30 June 2002                             <ul style="list-style-type: none"> <li>○ Significant area of CMA 20-&gt;60% = Very high; Most CMA area of 0-20%; Relative large area of 20- &gt;60% = High; Most CMA area of 0-20%; Relative smaller area of 20- &gt;60% = Medium; Little or no data=Low</li> </ul> </li> </ol>	<ul style="list-style-type: none"> <li>▪ Highly dynamic area with many variables</li> <li>▪ No local or regional expert advice</li> <li>▪ Relies on information that may not be best available</li> <li>▪ Very coarse data set</li> </ul> <p style="text-align: center;"><b>Very high</b></p>	<ul style="list-style-type: none"> <li>▪ Use knowledge of CMA and agency staff to assign rankings</li> <li>▪ Use data on past levels of CMA investment in the theme</li> <li>▪ Capacity data should improve with implementation of the MER Program</li> <li>▪ Consider data at other scales</li> <li>▪ Need to consider other institutions beside 'landholders' (e.g. local council)</li> </ul>

**Table A4.9: Analytical approach to rank estuary and coastal lakes values for each region – Step A**

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
1	<p>Use judgement and consider at least the following:</p> <ul style="list-style-type: none"> <li>Consider <b>current values based on estuaries and coastal lakes</b>, based on statements in CAP and Regional Strategies and input from discussion with expert</li> <li>Consider values placed more generally on <b>environment</b> and relevant economic and social values in CAPs and regional strategies</li> <li>Consider Healthy Water Commission’s ranking for conservation value</li> </ul>	<ul style="list-style-type: none"> <li>Highly subjective</li> </ul> <p><b>High</b></p>	<ul style="list-style-type: none"> <li>Expert panel approach</li> <li>Access knowledge and data held by agencies</li> <li>Access data that is available from Comprehensive Coastal Assessment projects</li> </ul>

**Table A4.10: Analytical approach to rank estuaries and coastal lakes threat for each region – Step B**

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
1	<p><b>Identify best available information</b></p> <ul style="list-style-type: none"> <li>Predicted population growth in DoP Regional Strategies</li> </ul>	<ul style="list-style-type: none"> <li>Only one measure of threat and may not be the best measure</li> <li>Subjective judgement made as to what level of population increase may mean for condition of coastal lakes and estuaries</li> </ul> <p><b>Very High</b></p>	<ul style="list-style-type: none"> <li>Use experts and literature review to identify best measures of threat / causal links</li> <li>Identify data sets / evaluated data to measure these threats in each CMA region</li> <li>Data should improve with the implementation of the state-wide monitoring and evaluation strategy, including specific data on pressures against each of the state biodiversity targets</li> <li>CMAs, DECC and local government may hold more relevant and up-to-date information</li> </ul>
2	<p><b>Use regional strategy data to calculate expected population growth in each CMA region</b></p>	<ul style="list-style-type: none"> <li>Regional strategies do not always correspond to CMA boundaries</li> <li>Population growth varies in different parts of CMA region, although in most cases predominantly on coast</li> <li>Where regional strategies and CMA boundaries do not correspond, estimated population growth is based on a range drawn from relevant regional strategy areas</li> </ul> <p><b>Medium</b></p>	<ul style="list-style-type: none"> <li>Obtain base data sets and analyse for CMA areas/ use GIS to query and analyse data sets</li> <li>There are likely to be other measures of threats that can be used – see comments above</li> </ul>
3	<p><b>Rank level of threat</b></p>	<ul style="list-style-type: none"> <li>Analysis relies on subjectivity in ranking threat</li> <li>Analysis broadly considers CMAs have high level of threat based on estimated growth rates of @ 20% or more over next 25 years. However, subjective judgement made on Sydney Metropolitan region (medium) based on already high population levels and Southern Rivers region (medium) as population coming off lower numerical base.</li> <li>Rapid assessment</li> </ul> <p><b>High</b></p>	<ul style="list-style-type: none"> <li>Need further identification of evidence between rate and level of population growth and level of threat on estuaries and coastal lakes</li> <li>Need more spatial information about growth patterns and likely impacts on estuaries (e.g. region may have high growth but majority of estuaries may be in protected national park regions)</li> <li>Regional strategies indicate planning mechanisms to reduce impacts and identify major growth areas. Need to analyse in more detail against spatial location or flow on effects to estuaries/coastal lakes</li> </ul>

**Table A4.11: Analytical approach to rank estuaries/coastal lakes condition for each region – Step C**

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
<p><b>1 Identify best available information</b></p> <ul style="list-style-type: none"> <li>▪ List of major estuaries provided on NSW Government website: <a href="http://www.iqqm.com/estuaries/inventory/index_ns.shtml">http://www.iqqm.com/estuaries/inventory/index_ns.shtml</a></li> <li>▪ Condition of estuaries and coastal lakes sourced from OzCoasts website; based on National Land and Water Resources Audit (NLWRA) 2001</li> </ul>	<ul style="list-style-type: none"> <li>▪ Assume list of major estuaries is comprehensive</li> <li>▪ Data is available for 118 of the 127 major estuaries listed</li> <li>▪ Data is from 2001</li> <li>▪ Data quality for each estuary may vary widely</li> </ul>	<b>High</b>	<ul style="list-style-type: none"> <li>▪ Condition data should improve with the implementation of the state-wide monitoring and evaluation strategy, including specific data on condition on native vegetation and native fauna</li> <li>▪ CMAs, DECC, DoP, Lands and DPI may hold more up-to-date information</li> <li>▪ Threats arising from uncertainty and potential impacts from climate change should be included</li> </ul>
<p><b>2 List relevant estuaries/coastal lakes under each CMA region</b></p>	<ul style="list-style-type: none"> <li>▪ Assumes list is complete and accurate</li> </ul>	<b>Low</b> NSW Government provides a list of major estuaries in each CMA region	<ul style="list-style-type: none"> <li>▪ Check completeness of estuaries list with DECC</li> </ul>
<p><b>3 Use NLWRA measure classes and determine % of estuaries in each class</b></p> <ul style="list-style-type: none"> <li>▪ NLWRA 2001 estuaries condition rankings are near pristine, largely unmodified, modified, and extensively modified.</li> </ul>		<b>Medium</b> NLWRA 2001 has already ranked estuaries into 4 condition classes	<ul style="list-style-type: none"> <li>▪ Use more up to date data</li> </ul>
<p><b>4 Calculate overall condition</b></p> <ul style="list-style-type: none"> <li>▪ Based of where majority of estuaries in each condition class sit within the CMA region.</li> <li>▪ Generally where there is a higher proportion of estuaries in the region in modified to extensively modified condition – condition is ranked as low</li> <li>▪ Generally where there is a higher proportion of estuaries in the region in near pristine to largely unmodified condition – condition is ranked as high</li> <li>▪ Some judgement calls</li> </ul>	<ul style="list-style-type: none"> <li>○ Some subjectivity and judgement calls</li> <li>○ For instance, in Northern Rivers 54% were in modified or extensively modified condition, but judgement made that based on spread of percentages, overall condition of estuaries in CMA region is medium</li> <li>○ Does not consider number of estuaries in each region compared to the total state (for instance there are 60 estuaries in Southern Rivers and only 16 in Hunter Central Rivers)</li> <li>○ Level of modification may not correlate with ecological condition (i.e. where estuary is extensively modified but high investment has been made in modifications to improve condition)</li> </ul>	<b>High</b>	<ul style="list-style-type: none"> <li>▪ Condition data should improve with the implementation of the state-wide monitoring and evaluation strategy</li> <li>▪ Also depends on above improvements</li> <li>▪ Expand ranking to consider a weighting based on the number of estuaries in the region compared to the state.</li> </ul>

**Table A4.12: Analytical approach to rank estuary and coastal lakes synergies for each region - Step D&E**

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
<p>Evaluate scope for CMA delivered investment to get additional benefits to the regulatory system and other players' investments - <b>Use qualitative judgement to rank each CMA region using the following information:</b></p> <p>1. the real or perceived impact from existing regulation on reducing threats and improving condition of estuaries</p> <p>2. the Estuary Management program based on % of estuary management plans commenced and the % of estuary management plans implemented</p> <p>3. specific funding of large estuary programs and potential additional benefits CMAs may/may not be able to add</p> <p>4. the perceived benefits of incorporating with regional planning and LEPs</p> <p>5. High level discussion with expert</p>	<ul style="list-style-type: none"> <li>▪ Highly subjective</li> <li>▪ Rapid assessment</li> <li>▪ Potentially incomplete set of considerations</li> <li>▪ It is assumed where there is progress on Estuary Management Planning and Implementation, the scope for CMA investment and activities to get additional benefits is higher</li> </ul>	<p><b>Very High</b></p>	<ul style="list-style-type: none"> <li>▪ Consider other non-CMA policies, investment, regulation and activities that are managing threats or improve condition of estuaries and coastal lakes and where CMAs can add benefit</li> <li>▪ Use further details from Estuary Management Planning process (i.e. evaluate opportunities associated with each estuary) to determine where there is most scope for CMAs to add benefits</li> <li>▪ Use knowledge of CMA and agency staff and other experts to review and assign rankings</li> <li>▪ Use other data available from Comprehensive Coastal Assessment projects</li> </ul>
<p>Evaluate scope for further CMA delivered investment to build on capacity and momentum from past investments - <b>Use data and expert judgement to rank each CMA:</b></p> <p>1. ABARE (2004) data - % of farms with a property representative involved in NHT/NAP programs during the two years to 30 June 2002</p> <p>o Significant area of CMA 20-&gt;60% = Very high; Most CMA area of 0-20%; Relative large area of 20- &gt;60% = High; Most CMA area of 0-20%; Relative smaller area of 20- &gt;60% = Medium; Little or no data=Low</p>	<ul style="list-style-type: none"> <li>▪ Highly dynamic area with many variables</li> <li>▪ No local or regional expert advice</li> <li>▪ Relies on information that may not be best available</li> <li>▪ Very coarse data set</li> </ul>	<p><b>Very high</b></p>	<ul style="list-style-type: none"> <li>▪ Better knowledge might include: social benchmarking studies (willingness to participate); CMA and agency staff; data on past levels of CMA investment in the theme; CMAs' cost sharing ratios; past capacity building programs</li> <li>▪ Capacity data should improve with implementation of the MER Program</li> <li>▪ Need to consider other institutions beside 'landholders' (e.g. local council)</li> </ul>

### 3 Land theme

**Table A4.13: Analytical approach to rank land values for each region – Step A**

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
<b>Use judgement to rank each region, considering at least:</b>			
1	<ul style="list-style-type: none"> <li>Consider function of healthy soil resource in the landscape, over both time and space eg. interaction with natural systems (eg. support of flora and fauna populations, nutrient cycling and drainage, and minimising erosion), interaction with social and economic systems (eg. primary industries)</li> <li>Assume that natural systems are dependent on high quality soil resources so consider mainly social and economic systems</li> </ul>	<ul style="list-style-type: none"> <li>Highly subjective</li> </ul> <p><b>Medium</b></p>	<ul style="list-style-type: none"> <li>Expert panel approach</li> </ul>

**Table A4.14: Analytical approach to rank land (soil) threat for each region – Step B**

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
1	<p><b>Identify best available information</b></p> <ul style="list-style-type: none"> <li>Predicted potential mean annual sheet and rill erosion for NSW mapping (DNR adapted from NLWRA 2002)</li> <li>Known extent of salinity outbreaks mapping (DNR data 2005)</li> <li>Distribution of sodic soils and sodic soil profiles in NSW (DLWC 2003)</li> <li>Acidification hazard for agricultural land in NSW (DLWC 2003)</li> <li>Acid sulfate soil priority management areas and areas at risk mapping (DLWC 2003)<sup>27</sup></li> <li>Wind erodibility of soils mapping (DLWC 2002)</li> </ul>	<ul style="list-style-type: none"> <li>Coarse scale but state-wide coverage</li> <li>No expert knowledge</li> </ul> <p><b>Low</b></p>	<ul style="list-style-type: none"> <li>Use expert opinion to assess most relevant measure of threats and further research to establish best available data sets</li> <li>Data should improve with the implementation of the state-wide MER Program, including specific data on pressures against each of the state land targets</li> </ul>
2	<p><b>Overlay CMA boundary map on each mapping data set</b></p> <ul style="list-style-type: none"> <li>CMA data layer already digitally mapped on sheet and rill erosion, sodic soils and acidification data sets</li> <li>CMA boundaries overlaid on remaining data sets</li> </ul>	<ul style="list-style-type: none"> <li>CMA boundaries overlays are estimation and not true representation</li> </ul> <p><b>Low</b> - estimations are close to actual and should have low impact on outcome considering coarseness of data</p>	<ul style="list-style-type: none"> <li>Apply CMA boundary layer to all mapping data sets</li> </ul>
3	<p><b>Assess proportion of measurement categories occurring within each CMA boundary for each mapping data set</b></p>	<ul style="list-style-type: none"> <li>Estimation only and relies on visual judgement</li> </ul> <p><b>Low</b> - estimations should have low impact on outcomes considering coarseness of data</p>	<ul style="list-style-type: none"> <li>Use GIS to query and analyse data sets</li> </ul>
4	<p><b>Determine and record most significant measurement category occurring within each CMA boundary and assign threat level class for each data set</b></p> <ul style="list-style-type: none"> <li>Based on spatial distribution within catchment and potential and/or real impact of threat on soil condition (i.e. apply risk averse principle - select a higher measurement category over a lower measurement category where appropriate)</li> </ul>	<ul style="list-style-type: none"> <li>Analysis relies on: <ul style="list-style-type: none"> <li>using coarse decision rules</li> <li>using comparisons between CMAs and threats to assign threat</li> </ul> </li> </ul> <p><b>High</b></p>	<ul style="list-style-type: none"> <li>Use GIS to query and analyse data sets</li> <li>Larger peer review of decision rules</li> <li>Clear reference or benchmark sites</li> </ul>

<sup>27</sup> Adapted from Naylor *et.al.* 1998; Davies and Mumby 1999, Tulau 1999 (numerous papers)

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
<ul style="list-style-type: none"> <li>Threat level ranges from very low to very high</li> </ul>	<ul style="list-style-type: none"> <li>levels (i.e. relative measures rather than relying on strict absolute values)</li> <li>o user subjectivity</li> </ul>		<ul style="list-style-type: none"> <li>to allow more accurate relative judgements</li> </ul>
<p><b>Calculate threat index and assign overall threat level class to each CMA</b></p>			
<p>6</p> <ul style="list-style-type: none"> <li>Weight soil threats considering: <ul style="list-style-type: none"> <li>Australian and NSW Government priorities</li> <li>Potential and/or real impact of threat on soil condition (triple bottom line)</li> <li>Spatial distribution at a state scale</li> <li>Current management practices and effectiveness</li> </ul> </li> <li>Weights ranged from 1 – 0, with salinity weighted at 1 (high government priority) and Acid Sulfate Soils weighted at 0.2 (small state-wide distribution and increasingly effective management practices)</li> </ul>	<ul style="list-style-type: none"> <li>Analysis relies on users subjectivity</li> </ul>	<b>Low to Medium</b>	<ul style="list-style-type: none"> <li>Larger peer review of weightings</li> </ul>

**Table A4.15: Analytical approach to rank land (soil) condition for each region - Step C**

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
<p>1</p> <p><b>Identify best available information</b></p> <ul style="list-style-type: none"> <li>Soil type maps in Isbell, R.F., McDonald, W.S. and Ashton, L.J. (1997) Concepts and Rational of the Australian Soil Classification. ACLEP, CSIRO Land and Water, Canberra.</li> <li>Williams, J., Hook, A. and Gascoigne (1998) Farming Action/Catchment Reaction – the effect of dryland farming on the natural environment. CSIRO Publishing, Victoria.</li> <li>Expert knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Coarse scale but state-wide coverage</li> </ul>	<b>Low</b>	<ul style="list-style-type: none"> <li>Condition data should improve with the implementation of the state-wide monitoring and evaluation strategy</li> <li>Use of expert opinion and further research to establish best available data sets</li> <li>Investigate using available regional scale information from CMAs and other data sources</li> </ul>
<p>2</p> <p><b>Overlay CMA boundary map on each mapping data set</b></p> <ul style="list-style-type: none"> <li>CMA data layer mapped on soil type distribution map sheet and rill erosion, sodic soils and acidification data sets</li> <li>CMA boundaries overlaid on remaining data sets</li> </ul>	<ul style="list-style-type: none"> <li>CMA boundaries overlays are estimation and not true representation</li> </ul>	<b>Low -</b> estimations are close to actual and should have low impact on outcome considering coarseness of data	<ul style="list-style-type: none"> <li>Apply CMA boundary layer to all mapping data sets</li> </ul>
<p>3</p> <p><b>Assess proportion of predominant soil types occurring within each CMA boundary and assign measure class</b></p> <ul style="list-style-type: none"> <li>Measure classes ranged from 5 (very predominant in landscape) to 1 (some occurrence in the landscape)</li> <li>A score of 0 equalled very little or no occurrence in the landscape</li> </ul>	<ul style="list-style-type: none"> <li>Estimation only and relies on visual judgement</li> </ul>	<b>Low –</b> estimations should have low impact on outcomes considering coarseness of data	<ul style="list-style-type: none"> <li>Use GIS to query and analyse data sets</li> <li>Scale and standardisation method might vary depending on nature of data</li> </ul>
<p>4</p> <p><b>Calculate condition of soil health in each catchment and assign overall measure of condition for individual CMAs</b></p> <ul style="list-style-type: none"> <li>Based on: Historical and current land uses; and Resilience of the predominant soils type to these land</li> </ul>	<ul style="list-style-type: none"> <li>Inference measure rather than direct measurement of soil condition</li> </ul>	<b>Medium to High</b>	<ul style="list-style-type: none"> <li>Condition data should improve with the implementation of the state-wide</li> </ul>

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
uses	<ul style="list-style-type: none"> <li>▪ Analysis relies on:               <ul style="list-style-type: none"> <li>○ using coarse decision rules</li> <li>○ coarse data sets</li> <li>○ users subjectivity</li> </ul> </li> </ul>		monitoring and evaluation strategy

**Table A4.16: Analytical approach to rank land synergies for each region - Step D&E**

Steps	Limitations or assumptions with this step	Uncertainty level with this step (VL to VH)	Can we improve this step in the future?
<p>Evaluate scope for CMA delivered investment to get additional benefits to the regulatory system and other players' investments - <b>Analyst exercises judgement based on consideration of:</b></p> <p>1</p> <ul style="list-style-type: none"> <li>▪ Legislation that regulates soil condition or threatening processes (eg Soil Conservation Act 1938; Environmental Planning and Assessment Act; Native Vegetation Act)</li> <li>▪ Existing knowledge and extension services by agencies</li> </ul>	<ul style="list-style-type: none"> <li>▪ Unverified assumptions</li> </ul>	<b>Medium</b>	<ul style="list-style-type: none"> <li>▪ Requires larger peer review</li> <li>▪ Review and include all existing programs and policies that manage threats to soil or promote improvements (funded outside of NAP)</li> <li>▪ Use knowledge of CMA and agency staff to assign rankings</li> </ul>
<p>Evaluate scope for further CMA delivered investment to build on capacity and momentum from past investments - <b>Use data and expert judgement to rank each CMA:</b></p> <p>2</p> <p>2. ABARE (2004) data - % of farms with a property representative involved in NHT/NAP programs during the two years to 30 June 2002</p> <ul style="list-style-type: none"> <li>○ Significant area of CMA 20-&gt;60% = Very high; Most CMA area of 0-20%; Relative large area of 20- &gt;60% = High; Most CMA area of 0-20%; Relative smaller area of 20- &gt;60% = Medium; Little or no data=Low</li> </ul>	<ul style="list-style-type: none"> <li>▪ Highly dynamic area with many variables</li> <li>▪ No local or regional expert advice</li> <li>▪ Relies on information that may not be best available</li> <li>▪ Very coarse data set</li> </ul>	<b>Very high</b>	<ul style="list-style-type: none"> <li>▪ Use knowledge of CMA and agency staff to assign rankings</li> <li>▪ Use data on past levels of CMA investment in the theme</li> <li>▪ Capacity data should improve with implementation of the MER Program</li> <li>▪ Consider data at other scales</li> <li>▪ Need to consider other institutions beside "landholders" (e.g. local council)</li> </ul>

## **Attachment 5 Evaluation of the priorities assessments process**

# Evaluation of the Priorities Assessment Process

The NRC used the Standard for Quality NRM to evaluate the quality of its rapid assessment process. The following table contains the results of this evaluation and shows what can be done to improve the process when it is next undertaken.

**Table A5.1: Opportunities for improvement in the priorities assessment process**

Component of the Standard	Did the NRC's rapid priorities assessment meet the Required Outcome of the Standard?	Next steps to check and refine priorities assessments
Collection and use of knowledge	<p>Used publicly available information and data, though not the most current information.</p> <p>Assessed and documented assumptions made and the validity of assessments (Attachments 3&amp;4).</p> <p>Accessed some external expertise to check methods and rankings, and to suggest improvements for the next stage.</p>	<p>Determine and use 'best available' – draw on a wider range of data and information, eg. evaluated data held within agencies, being developed through state MER Program, and any existing policies and strategies.</p> <p>Use experts within state and Commonwealth natural resource agencies, and CMAs.</p>
Determination of scale	<p>Optimal spatial scale for the assessment is the catchment to state scales. However much of the information used was at the national scale.</p> <p>Attempted to integrate assessments of multiple benefits (environmental, economic and social) and consideration of temporal and institutional scale issues.</p>	<p>GIS should be used to query and analyse data sets, and scale up and down as required.</p> <p>Check assessment results against finer scale data.</p> <p>Improve understanding of the asset condition required to support landscape function, and hence values, for all themes</p>
Opportunities for collaboration	<p>Some collaboration with other parties (thematic 'experts') to develop assessment methods and find best data sources.</p> <p>Minimal collaboration with other parties to rank regions against assessment questions – NRC did not pursue these opportunities because cost of doing so in timeframes was considered prohibitive.</p>	<p>Involve broader range of parties with an interest or stake in the process – but ensure that costs of their involvement do not outweigh the benefits.</p>
Community engagement	<p>Did not engage the participation of a broader community in the process.</p>	<p>Define the relevant community for this process.</p> <p>Ensure that a diversity of views and values is incorporated – evaluate whether a community panel approach would be appropriate.</p>
Risk management	<p>Defined the limitations and assumptions associated with the data sources consulted, and categorised uncertainty.</p> <p>Did not consider severity of these risks.</p> <p>Recommended that process be revisited to check and refine all assessments.</p>	<p>Determine key risks and impacts associated with incomplete information and develop strategies to minimise risks.</p>

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Monitoring and evaluation	Evaluated quality of process (in this table) and used the results to guide improvements in the 'next steps'.	Continue adaptive approach - following second run of priorities assessment process, evaluate against the Standard and identify opportunities for improvement in any subsequent runs.
Information management	All information used has been documented and is accessible to stakeholders. Assessments have been made transparent.	With experts and collaborators, develop an information management system (for all assessments) that meets all user needs and satisfies requirements.

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## Attachment 6 NRC's assessment of likely effectiveness of CMA-delivered investment

Table A6.1 Assessment of likely effectiveness of CMA-delivered investment

Regions	Likely effectiveness of CMA-delivered investment	
	How confident are we that CAP targets will promote state targets?	What is the extent of progress made so far on the NRC's recommended actions from CAP reviews?#
	Rank level of confidence (VH, H, Some, Low)	Rank progress (Significant, Good, Some, Limited)
Border Rivers/Gwydir	High	Some-good
Namoi	High	Some-good
Central West	Some	Good-significant
Lachlan	High	Some-good
Murrumbidgee	Some	Good
Murray	High	Some-good
Lower Murray Darling	Some	Some-good
Western	Some	Good-significant
Northern Rivers	High	Good
Hunter/Central Rivers	Very high	Some
Southern Rivers	Some	Good
Hawkesbury Nepean	High	Some-good
Sydney Metro	N/A	N/A

# N/A if no CAP or strategic progress letter received. Where no CAP or strategic progress letter received, the ranks have been assumed to be equal to the lowest ranking.



