

Capacity needs for technical analysis and decision making within Australian catchment management organisations

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Executive summary

A total of 18 senior managers of catchment management organisations (CMOs) were interviewed between December 2006 and March 2007 as a component of a research project titled “Enhancing and targeting the roles for capacity building in regional NRM”, funded by the Cooperative Venture for Capacity Building.

The tasks that CMOs are expected to carry out are complex and the funding base on which they operate varies. This study did not seek to scrutinise CMOs in how they make decisions. Rather, it has identified ways in which CMOs could make better use of technical and socio-economic information for NRM decision-making, and how government can support them in doing so. The study’s findings were summarised under a number of key headings:

- *Types of technical information used.* For assessing resource condition and informing management actions, CMOs largely use biophysical information.
- *Sources for technical information.* Good relationships with State agencies and universities are reported. However, there is a tendency to rely on local contacts and networks, which may lead to narrow advice where the science is changing quickly.
- *Consideration of economic and social information.* There is currently a low level of capacity to obtain and apply economic information. Although social information is used by some CMOs, its use is ad hoc.
- *Assessing the quality of technical information.* There is a lack of awareness of issues around research quality. The scientific rigour of research is often not considered and there is a heavy reliance on ‘grey literature’ (unpublished technical reports). On a positive note, the use of a Natural Resource Commission Standard by NSW CMOs provides guidance for CMO processes such as ‘collection and use of knowledge’.
- *Extent of interaction with other CMOs.* There is good interaction between CMOs within their own States and between neighbours.
- *Interpretation and integration of technical information.* Interpretation of research for decision-making is mostly the responsibility of senior CMO staff and technical advisory committees. All CMOs integrate information to some extent, but there is considerable scope for more formal, structured and systematic approaches.
- *Current use of evaluation processes.* The level of evaluation of past investments varies between organisations, but most evaluation is output-based.
- *Influence of National Action Plan (NAP) priority status.* Regions that are not priority regions under the NAP have had considerably fewer funds, and thus lower capacity to invest in data and advice.
- *Processes for involving the community in NRM decision-making.* Boards and committee structures generally appear to be an effective way to engage a wide range of community members. However, there is concern in some cases that the level of consultation is leading to burn-out of strongly engaged individuals.
- *Perceived success of community engagement.* The majority of CMOs would like to broaden their consultation to include stakeholders who are not normally engaged in NRM, with some CMOs utilising innovative ways to achieve this.

A number of recommendations are made for CMOs and for governments; both parties play a crucial role in increasing the capacities of CMOs for technical analysis and decision-making:

1. Economics: CMOs to make greater use of economics throughout their planning and prioritisation processes. Governments to provide guidelines.
2. Social science: CMOs to make more systematic use of social science. Governments to provide guidelines on roles for social science within CMO processes.
3. Biological and physical modelling: CMOs to make extensive and routine use of modelling to estimate likely NRM outcomes from investments, and to embed this in the planning and prioritisation process. Governments to invest in making suitable models and quality-assured data sets available to all CMOs.
4. Research quality: Governments to provide guidelines on processes for assessment of research quality.
5. Internal science intelligence: CMOs to strengthen their internal capacity to engage with researchers and to commission and evaluate research through creation of specialist positions for this role.
6. Research investments: Governments to remove the constraints (actual or perceived) on CMOs investing in research to (a) strengthen their planning and prioritisation, and (b) provide improved sustainable technologies for adoption by land and water managers.
7. Decision frameworks: Governments to work with regions to develop practical decision-making frameworks, focused on outcomes, to enhance integration, evaluation and thinking about community consultation. Decision frameworks need to be generally applicable across CMOs.
8. Decision frameworks: CMOs to support field officers responsible for decisions about specific funding for on-ground works, by providing them with advice and practical help with the decision process, use of data, and its integration. Provide stronger guidance based on priorities established through sophisticated modelling, and the improved decision framework.
9. Time pressures: Governments to reduce pressures on CMOs to act with a short-term focus. Develop more realistic timetables for investigation, planning and prioritisation prior to commencement of on-ground investments.
10. Funding conditions and accreditation: Governments to strengthen and communicate expectations about achievement of NRM outcomes by CMOs. Strengthen the requirements for demonstrating that planned intervention will likely achieve NRM outcomes prior to approval of funding. Strengthen emphases on science, economics and evaluation in the accreditation process.
11. Evaluation: Governments to provide strong guidance and support to CMOs on monitoring and evaluation. Recognise the central role of *ex ante* modelling in evaluation, and clarify and strengthen the link between evaluation and decision making.
12. Community consultation: CMOs to work together to develop and clarify the roles for community consultation within the decision making process, and establish processes for how community and scientific knowledge can be brought together, within the context of a publicly funded program.

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Acronyms

BRS	Bureau of Rural Sciences
CMA	Catchment Management Authority
CMO	Catchment Management Organisation
CVCB	Cooperative Venture for Capacity Building
LWA	Land and Water Australia
MER	Monitoring, Evaluation and Reporting
NAP	National Action Plan (for Salinity and Water Quality)
NHT	Natural Heritage Trust
NRM	Natural Resource Management
R&D	Research and Development
SIF3	Salinity Investment Framework 3

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1. Introduction

‘Capacity building’, in the context of natural resource management (NRM), describes a range of activities by which individuals, groups and organisations improve their ability to achieve sustainable NRM. The types of ‘capacity’ needed by individuals and organisations working in NRM can include awareness, skills, knowledge, motivation, commitment, confidence, access to networks, labour, technical options and funds. Capacity is needed across a range of stakeholders in regional NRM, such as regional bodies, Landcare groups, industry and government agencies (see <http://www.rirdc.gov.au/capacitybuilding/about.html>).

This research project (funded by the Cooperative Venture for Capacity Building or CVCB) has the aim of better identifying issues and areas where capacity building is the most appropriate and effective response to achieve NRM outcomes. The project, ‘Enhancing and targeting the roles for capacity-building in regional NRM’, is exploring capacity-building needs both within catchment management organisations and their partner agencies. Prior to this report, two in-depth case studies in the North Central region (Victoria) and South Coast (SCRIPT) region in WA provided insights into the issues around capacity-building for regional NRM and how organisations utilise information from both science and the community to make NRM decisions. This report is based on a broader study, with the following aim:

- To understand and document needs for capacity building within a range of regional NRM organisations in relation to technical analysis and decision analysis.

A series of telephone interviews was conducted with the aim of speaking with as many of the 56 regional NRM bodies, or catchment management organisations (CMOs), as possible. We were able to engage 18 CMOs in telephone interviews, with a good sample size in Victoria and New South Wales, and isolated cases in the other States.

Institutional arrangements for regional NRM vary between each Australian State (see Appendix A). Also, within States, each CMO is unique in its size, structure and capacity. They are also at different stages of maturity. CMOs in Victoria and New South Wales have been established as organisations for a number of years, whereas CMOs in the other states are still ‘finding their feet’, to a greater or lesser extent. However, given the institutional differences, CMOs face very similar capacity-building issues, as outlined in this report. All CMOs have responsibility for development of a regional catchment plan and investment strategy (as a requirement of NAP and NHT funding arrangements and State legislation), and they must work with the community to do this. The tasks that CMOs are expected to carry out are complex and the funding base on which they operate varies substantially. This study does not seek to scrutinise CMOs in how they make decisions. Rather, it aims to identify ways in which CMOs could make better use of technical and socio-economic information for NRM decision-making; and how government can support them in doing this.

The results of the telephone interviews are presented in the following sections, followed by discussion and recommendations:

1. Processes used by regional NRM organisations for obtaining technical information for NRM decision-making.
2. Processes used for interpreting, integrating and evaluation for NRM decision-making.
3. Consideration of local knowledge and community input in NRM decision-making.

2. Methods

A series of 18 structured telephone interviews was carried out between December 2006 and March 2007. The questions (see Appendix B) were open-ended to explore a range of views. Telephone interviewing was deemed the most appropriate method to speak to organisations, given their broad geographic spread across Australia.

The study was targeted at one senior management staff member in each catchment management organisation (CMO), either equating to program manager or team leader level (Table 1). It was thought that people at this level would most likely play the strongest role in decision-making about NRM investment and be most familiar with processes within the organisation. The findings reported here are the opinions and thoughts of the individuals interviewed. They are a sub-sample only of the organisations that they represent and should not be assumed to be representative of the opinions of entire organisations.

Table 1. *Interviewee's position in organisation*

Organisation	Position of interviewee	Organisation	Position of interviewee
NSW 1	Program Manager	VIC 5	Program Manager
NSW 2	Program Manager	VIC 6	Program Manager
NSW 3	Team Leader	QLD 1	Regional Coordinator
NSW 4	Program Manager	QLD 2	CEO
NSW 5	Program Manager	QLD 3	Regional Program Manager
VIC 1	Program Manager	SA 1	Program Manager
VIC 2	Program Manager	SA 2	Technical Manager
VIC 3	Program Leader	TAS 1	Regional NRM Facilitator
VIC 4	Program Manager	WA 1	Program Manager

A senior staff member in each organisation was initially contacted by phone to explain the project background and then sent an information paper. In some cases the contacted people were personal contacts while others were suggested by contacts in State agencies. The CMO contact person could then make a decision about which staff member would be most appropriate to participate. All 56 catchment management organisations throughout Australia were initially contacted, with 18 agreeing to participate. A series of telephone interviews were then conducted with the 18 regional NRM organisations from around Australia (including 5 organisations in New South Wales, 6 in Victoria, 3 in Queensland, 2 in South Australia, and 1 each in Tasmania and Western Australia).

Interviews were recorded on tape and later transcribed. Transcripts were anonymous, with a State name and number allocated to each CMO. Participants were able to check the transcripts for accuracy.

Commercial qualitative analysis software N Vivo 2.1 (QSR 2000) was used to code the data into nodes to reveal both major trends and outlying issues. Data could be sorted to reveal common responses and contrasts between organisations and States. Major trends for each question were transposed onto tables. In the following sections, all text in *italics* is a verbatim quote from the interviews.

3. Results: Use by CMOs of technical information for NRM decision-making

3.1 Types of technical information used

All CMOs surveyed largely use biophysical information (to a much greater extent than social or economic information) for the purposes of assessing broad classes of natural assets (e.g. land, water, biodiversity), resource condition and monitoring (see Appendix C, Table 1). A variety of technical information is used across asset themes/programs (e.g. water, biodiversity, land condition, marine, etc.). Technical information is used to inform catchment condition reports and development of various strategic plans:

'We are constantly sourcing technical information from science and research to inform our decision-making. The information is basically around asset condition and risk management' [Vic 1]; and

'We use maps, documents, references that help define our processes – our region has good information' [NSW 1]; and

'We use technical information to inform resource condition and management actions. We also like to find out what is happening in other places and if it could be applied to our region' [Vic 6].

In some cases technical information is sought in response to an identified knowledge gap in a catchment plan, with the CMO generating the technical information themselves:

'Our catchment report forms the baseline of the technical information. We now supplement that with work that we do that contributes to technical knowledge about targets, etc. It's mainly biophysical information' [QLD 3].

GIS and spatial approaches are used to varying degrees. Some CMOs are only just beginning to use GIS and recognised the need to improve staff skills in this area. The Queensland CMOs who were interviewed report the use of SPOT5 (a remote sensing tool) approaches to sub-catchment planning, but acknowledge that it is not yet used to its full potential:

'We haven't really used it to the best of what it has to offer. We don't yet have the in-house skills and it's pretty expensive. So at the moment we've got the data but haven't done much with it' [QLD 3].

One Victorian CMO (Vic 3) is using sophisticated modelling to make at least some of its decisions:

'We use CAT modelling and apply it down to the 1 ha scale and used it as the basis for one of our Catchment Tender projects and deciding how we award those tenders'.

All CMOs have technical specialists assigned for each asset theme, some but not all with scientific backgrounds of some type. It was reported by a few CMOs that these staff are responsible for obtaining their own technical information relevant to their field of expertise.

3.2 Consideration of economic information

Economic information is used to varying degrees across the CMOs interviewed (see Appendix C, Table 1). Four CMOs (NSW 5, VIC 1, VIC 6, QLD 1) had used economic information in order to make decisions about the likely success of on-ground works (using cost-benefit analysis).

Three CMOs use economic information for informing program development and to support market-based instruments projects (VIC 3, VIC 4, SA 2). Economic skills are not usually

available in-house so consultants are often commissioned. Some CMOs consider the importance of landholder benefits and adoptability of management actions:

'You are not going to go out and promote land management practices which don't have economic benefit as well as an environmental one, or people just won't adopt them. So the economic data is extremely important' [VIC 2].

Six regions [NSW 1, VIC 5, QLD 2, QLD 3, SA 1, TAS 1] report low use of economic data, but an intention to use it to a greater extent in the future.

In some regions it is difficult to obtain economic data:

'We don't use economic information in a strategic way because we can't get a lot of it'; and

'We don't have a lot of economic data in our region from the census information, we don't have many towns and our population is only 10,000 people' [SA 1].

3.3 Consideration of social information

The need for consideration of social information is becoming increasingly apparent for CMOs. Use of social information is quite extensive in some CMOs with consideration of demographics, attitudinal and values information and social profiling (see Appendix C, Table 1). The information is used for decision-making, service delivery and as general market research to better target communications and activities. In some CMOs (8), quite extensive social research has been carried out:

'We did work with a university looking at socio-economic drivers for landholders to get involved in NRM. We tied it in with GIS, so we can actually break the data into sections of the community. So we know what are the drivers? What are people's knowledge and values? Where does NRM fit in their values? What is the confidence with recommended NRM practices? It was very comprehensive' [VIC 3].

A number of CMOs have commissioned social research, reporting effective partnerships with universities and other research providers (e.g. BRS, LWA). Five CMOs reported little or no use of social data, but recognise it as a gap, and 3 reported 'ad hoc' use:

'As a region I think that we're not really doing very well in capturing the social aspects of adoption of practice change and NRM. In the current drought it becomes really obvious that if you don't take the social aspects into account, such as demographics and barriers to adoption, then you're only capturing a bit of the information that you need' [VIC 2].

One organisation felt the need to commission social information to inform their decision-making about the rapidly changing demographics of their region:

'Our catchments are slowly becoming urbanised so social information is becoming increasingly important – it is certainly a priority over the next 3 years' [QLD 3].

They also suggested that it is difficult to get access to social expertise:

'Social research is pretty challenging because firstly you have to recognise it as a science. It's a really skilled science and there are very few people out there to help do it' [QLD 3].

In NSW, awareness of the need for social information is increasing with 'talk at the State-level of assisting CMAs with social data' [NSW 4].

Responsibility for obtaining this information often lies with the managers who lead the various programs. One CMO (QLD 3) reported that their staff had strong biophysical science backgrounds so ‘had the capacity to understand this type of information’. Catchment Coordinators are also reported to have this role. However, it occurs largely in an ad-hoc way.

3.4 Sources of technical information

All, except for two organisations (Vic 1 and Vic 2) reported that State agencies were a major source for technical information (see Appendix C, Table 2). Effective partnerships, between CMOs and state agencies, and sharing of information are reported in most cases. State agency staff are often included on steering committees and technical groups, providing an effective means for CMOs to access information and research:

‘We have really strong networks in agencies, a couple of us have been in the business for over 20 years’ [QLD 3].

State agencies are seen as having much stronger technical backgrounds than CMOs. One CMO [SA 2] acknowledged that the CMO doesn’t need strong science skills when they can contract tasks out:

‘We bring the skills in if we need them. We are the facilitator and it’s all based on partnerships with agency staff and other networks across the catchment. We don’t need an empire, the skills are already out there’.

Twelve CMOs reported partnerships and shared projects with universities and other research organisations (e.g. CSIRO). A number of organisations host student projects and find this a cost-effective way to carry out research to inform their decision-making:

‘We have a good relationship with the universities in our State. They are often looking for student projects and it’s a cheaper way for us to get research done. The universities provide us with people who have good technical skills’ [SA 1].

Six CMOs reported that their own internal expertise was very good, as was the knowledge held within their region:

‘A lot of the data we need has already been generated. We are building on 10 years of NRM information that has been researched in this region. We know that the best information on certain issues comes from work done in this catchment’ [NSW 5].

Where there are research gaps that can’t be filled with internal expertise or within State agencies, private consultants are contracted to carry out the task:

‘We bring them in instead of me wasting my time, or my staff’s time trying to be at the cutting edge of salinity R&D. So it’s all about efficiencies. We don’t need to have all the skills in-house’ [Vic 3].

Use of published science as a source of technical information was reported by only one CMO [NSW 5].

Other sources of information include water authorities, industry groups, local knowledge, community-based experts, involvement in CRCs and CMO technical working groups.

3.5 How do CMOs choose where to get technical information?

The NSW CMOs reported that they have procedures for procurement and the collecting of knowledge, which has improved the processes that they use (see Appendix C, Table 3). This is done through their ‘Natural Resource Commission Standards’:

'We've actually become more conscious of how we choose and how we make decisions. The standard is a process standard – we have to validate where we get information and how we validate it. We have to make sure we seek the best available knowledge from a range of areas' [NSW 3].

Though at the same time, the same CMO acknowledges that:

'In reality we could still do better. Currently it's based on the resourcefulness of our staff and their contacts and connections. So we have room for improvement'.

Four CMOs (NSW 4, VIC 4, QLD 3, SA 2) report that they choose providers based on their existing, trusted networks:

'We generally know who is out there and who we have learnt to trust over the years' [SA 2]; and

'A lot of it is because of existing networks. We have preferred partners and have a strong system in place for our partnership models – we know who can deliver and if they are well recognised as a reliable source' [QLD 3].

3.6 Assessing the quality of technical information

A proportion of CMOs (6) rely on internal expertise within the CMO to assess the quality of technical information (see Appendix C, Table 3):

'I think we are pretty capable here and can make that assessment ourselves' [SA 2]; and

'That happens with the people in-house who manage those projects and understand what the quality is', though sometimes they also are required to *'bring in specialist advice if needed to review the work'* [VIC 3].

Some CMOs (3) assess the research against the project brief, suggesting that they see 'quality' in terms of delivery of the project/task. They claim to cover scientific rigour in the development of the brief:

'We generate very detailed project briefs where we spell out exactly what we want' [NSW 2]; and

'Sometimes there are scoping components to get the science as right as can be, then have that reviewed by other experts before you go to tender. So the brief is actually solid' [VIC 6].

Four CMOs reported the use of technical committees/groups [NSW 1, VIC 2, NSW 5, TAS1] to specifically perform the task of interpreting technical information.

'Theme teams are set up that consist of State agency, local government, specific expertise and have a role of interpreting and assessing the information'.

Very few CMOs suggested that they like to see where the information was published and consider who the experts in the field are.

One CMO (TAS 1) also had a peer review process that they used to assess quality. This involved a technical committee, with different areas of expertise, making an assessment regarding the rigour of the research.

One participant reported that sometimes you just have to use the information that you get, even if it is not the best quality:

'You can't just not take action, just because you don't have the data' [NSW 5].

3.7 Extent of interaction with other CMOs and information exchange

There are arrangements in each State that promote interaction and information exchange at a number of levels:

'We have planning days with other regional NRM Boards and also get together at a technical level to make sure that we know each other and for collaboration on projects' [SA 2];

'In QLD there is a Regional Groups Collective which consists of all regional bodies in the State (Chairs & CEOs). That works very well. We are also trying to get systems standardised' [QLD 2]; and

'NSW CMA General Managers get together, Chairs get together, business managers, monitoring people and so on. There are good networks across the 13 CMAs' [NSW 2].

In 2006 there was an inaugural conference for regional NRM organisations. A number of interviewees reported on the value of this conference for information exchange and establishing networks:

'It was really worthwhile. You were able to ascertain where you sat in the big scheme of things. It was the first time Australia-wide we had all been together. Just one thing you hear gives you a whole idea about how to solve something you've been struggling with' [NSW 2].

However there are still barriers and tensions to good information exchange reported by some CMOs:

'In our State the models are so different. There's a fair bit of looking over each other's shoulders and saying 'I wonder what they are doing and too bad, we are doing our own thing'' [QLD 3]; and

'There is a fair divide between NAP and non-NAP' (meaning those CMOs who are priority regions under the NAP program and those who are not) [NSW 1].

A number of CMOs reported that they had the closest relationships with their immediate neighbouring CMOs or those which had something in common, such as being coastal.

One organisation [VIC 3] had invested a lot of effort into getting better interaction with other CMOs:

'We encourage each of our staff members to increase their knowledge of what's happening around the traps, to do papers for conferences, just to try and get out there. If you don't do it for yourself then nobody is going to help you. We are trying to be progressive and apply best practice for what we are paid to do'.

4. Results: The capacities of CMOs for interpreting, integrating and evaluating information for NRM decision-making

4.1 Responsibility for interpreting technical information for decision-making

In all cases, either senior management staff, a CMO committee or a specific technical committee (or a combination of these options) have the responsibility for interpreting technical information for decision-making (see Appendix C, Table 4). Technical staff then also have a role for interpreting technical information for the community.

Nine CMOs reported that the interpretation of technical information is done by project officers, or those that commissioned the work at the on-ground level:

'It's up to all of us. If I commission the work then it's up to me to interpret it. We generally try to get staff who can manage and interpret their own work. Everyone has a role in making sure the right information is used in planning' [SA 2].

No participating CMOs outlined a formal process for interpreting information; one [NSW 3] reporting that it happens opportunistically:

'It depends on who gets it, as far as what is decided to do with it. Then the senior management team or project team decides what to do with the information, how to act on it and whether it's credible or not. It comes back to technical expertise and senior staff – it's opportunistic' [NSW 3].

CMOs generally receive a lot of technical information, much of it from research tasks they have contracted out. One CMO reported that they had around 400 contracts (though not many for research work leading to technical information) so it was unlikely that the Board would actually see many of the reports:

'The Board don't see many of the reports, unless it's something they have been specifically involved in' [NSW 1].

Technical committees can be a permanent process in a CMO, or they may be temporarily convened for specific purposes or projects. Technical committees are seen as a way of accessing expertise from a variety of stakeholders. One CMO also used a 'buddy system' to access expertise to interpret reports:

'We have a buddy system whereby our technical people assess as a form of peer review. Some projects also have steering committees that are made up of technical specialists to provide advice on how the work has gone' [TAS 1].

One region had an Integrated Natural Resources Forum which brings together expertise from many organisations in the region. This was sometimes utilised in the role of a technical committee:

'We have an Integrated Natural Resources Forum in our region. It is made up of about 60 different organisations who use natural resources in the region. It includes local government, State government authorities, NGOs, industries, universities, regional directors of the CMA and local government CEOs. So it's a quite high level group. So sometimes things of a technical nature will be run through that committee for advice' [VIC 6].

All CMOs interviewed (except for SA 2, which is in the process of establishing a committee) reported that they use some kind of technical committee arrangement to provide technical expertise. Some CMOs have formal technical committees, others have theme teams, project

teams, steering committees or working groups that perform the same role. One organisation uses ‘theme teams’:

‘They do everything that is required to implement their theme, such as project development, adaptive management, monitoring. It’s an internal and broader external team as well. They meet monthly’ [NSW 1].

Another CMO also uses asset groups (e.g. land, water, biodiversity) to define technical committees:

‘It’s a formal mechanism to get feedback, assistance and mentoring with specialists in their own field. They have formal meetings but these people are also available on the phone if needed. We are a small organisation so we recognised early on that we couldn’t ask our technical people to operate in isolation’ [TAS 1].

In some instances, technical groups are assembled for specific tasks such as strategy development or specific projects. One such example related to monitoring and evaluation:

‘We have proposed to establish a technical reference group to provide guidance and oversight in monitoring and evaluation. We propose that this group become part of our governance framework’ [VIC 1].

4.2 Integrating different types of technical information for decision-making

In many cases (9) integrating different types of information for decision-making is carried out by senior staff (e.g. managers, catchment coordinators, theme leaders) but often not occurring within a formal process (see Appendix C, Table 4):

‘There is probably not a lot that goes on to be honest. We are voracious creators of data but probably not good users of it. There is no one individual that is dedicated to that role. There are a number of us that take it upon ourselves to make sure that data is integrated, but it’s really up to individuals to make it work’ [SA 2]; and

‘We have established strategic planning groups to ensure integration between plans and ensure flow of information from one asset to another. A lot of integration happens by osmosis between staff, though this can be a bit hit and miss’ [VIC 4].

Increasingly this task (5 CMOs) is thought to be the responsibility of Monitoring, Evaluation and Reporting Officers – whose role spans across theme areas in a CMO:

‘The MER coordinator is responsible for pulling all of that information out of each program and putting it together for reporting’ [VIC 2].

Note, however, that this relates only to reporting, not to planning and prioritisation.

It was acknowledged that integration is important but difficult to do in practice:

‘NRM and catchment management is a relatively young area and people still tend to provide their specialist expertise. It’s very hard to get people to think across disciplines’ [WA1]; and

‘It’s always a struggle and it doesn’t matter what organisation you are in, the nature of things is that you have to specialise in certain areas and then that creates a situation where things are not integrated. It takes effort to bring things together, it’s a perennial struggle’ [VIC 6].

In 5 CMOs, the production of a Regional Catchment Strategy is seen as an integrating process, though this also has its difficulties:

'The Regional Catchment Strategy is supposed to make that happen but in a very busy world the RCS Officer is seen as the person taking care of that so you don't necessarily get as much interaction across things' [VIC 6].

The CMO Boards and committees are also a way that information is integrated:

'Our corporate structure is another means of integration. There are a lot of people with different skills and backgrounds. Often the Boards are the audience that we present our final reports to. That's where it all comes together – it integrates through their knowledge' [VIC 5].

4.3 Perceived skills needed for interpreting and integrating information, and current skill gaps

The most important skills for sound interpretation and integration of information for decision-making are seen as being a strong technical background and the ability to think analytically and strategically (i.e. across discipline areas and knowing which parts of information are important for decision-making) (total of 12 responses, see Appendix C, Table 5):

'For NRM decision-making you need to be aware of linkages between assets – you can't just come in with a purely agricultural or biodiversity view' [VIC 2];

'You need good analytical skills and you have to be able to see the big picture as well as the detailed picture' [QLD 3]; and

'It's important to have strategic, conceptual and analytical skills. You need to be able to factor in all the issues, stakeholders and all the dynamics between those' [VIC 4].

Communication skills, particularly in interpreting information to landholders are also important.

'There need to be people who are geographically focussed who can act as translators to landholders. Their primary skill would be interface with landholders, but they should also have enough NRM background to know what the specialists are saying' [QLD 2].

Well-established networks, project management, monitoring and evaluation skills were also suggested. Knowledge of the region was only reported by one CMO (SA 1).

CMOs were also asked to nominate skill areas in which they would like to strengthen their capacity. Five CMOs would like to increase their skills in communication. Being able to communicate science to landholders is seen as a highly specialist skill which would benefit CMOs. A number of skill gaps were highlighted that fit into the area of integrating information including skills in: socio-economics, strategic thinking, monitoring and evaluation and spatial analysis (see Appendix C, Table 5).

4.4 Current use of evaluation processes within CMOs

The level of evaluation, and interpretation of what evaluation involves, is quite different across the CMOs interviewed (see Appendix C, Table 6). All CMOs acknowledged the importance of evaluation, although evaluation is at various stages of development in different regions. Three CMOs had no evaluation processes (NSW 2, VIC 4, VIC 5) and seven were at the stage of developing processes (quite often in response to setting up their Monitoring, Evaluation and Reporting frameworks):

'We don't do it very well. We've been focussing on strategic planning and implementation' [VIC 4]; and

'The only way to do it is to actually devote time to it. That is very difficult in a busy system where everyone is flat out delivering on projects' [VIC 5]; and

'We haven't been guided strategically by key areas of information that we need to know about' [NSW 3].

Evaluation is largely interpreted (9 CMO responses) as being based on outputs and tracking progress towards management targets, rather than also being about reflecting on and learning from past decisions and processes. Only five CMOs have the broader definition of evaluation. The NSW Natural Resources Commission Standard promotes the latter type of evaluation, as well as outputs:

'We don't just report about what we did. We report about what we did and [how it affected what we are trying to achieve]. So we are keen to look at outcome-based stuff, not just outputs' [NSW 5]; and

'The quantum leap from output to outcome is something that everyone is grappling with' [NSW 1]; and

The difficulties around integration of information also apply to evaluation:

'With the way a lot of funding comes in, it encourages a lot of short-term project based mentality. It is very difficult to fill in those gaps from project to project into some sort of bigger picture of how things are going. We've been spending a lot of energy on thinking about how we do evaluation meaningfully. For individual projects it is important to reflect on and how it contributes to the greater knowledge of how to improve practice in the future' [VIC 6]; and

'At State level we don't even have an integrated NRM strategy for the State. So how on Earth do you do it sensibly at a regional level? Often at a regional level we are expected to fix these things. The processes actively put barriers up to integrating it sensibly. Funding is in silos that all have their own set of parameters that don't mesh across NRM' [VIC 6].

4.5 Influence of National Action Plan (NAP) priority area status

Of the 18 CMOs interviewed, 13 contained NAP priority areas and 5 did not. CMOs containing NAP regions are able to access extra funding and resources, mostly to fund on-ground works or extension. This NAP funding is limited to issues relating to salinity and water quality:

'We have to invest 80:15:5 ratio of on-ground works, coordination and monitoring. It has to be a tight ship. There's nothing for research; it's got to be part of the project or monitoring component' [WA 1]; and

'The money is focussed on salinity and water quality and it can leave CMAs short of funds for other activities that don't fit those parameters' [NSW 5].

There were also a number of benefits arising from being a NAP priority region. One CMO reports that being a NAP region actually helps with research (which was a conflicting opinion from the other CMOs):

‘With the resources you get for being in a NAP region, it allows you to do both technical and research work, and it enables you to have programs such as monitoring and coordination role. It’s good to have those integrating roles rather than it being up to individual programs’ [VIC 2]; and

‘The NAP label helps us with connections to Best Practice groups, local authorities, industries, etc.’ [QLD 1].

The ‘Non-NAP’ CMOs report that, relative to their NAP-funded counterparts, they have a lower ability to interpret and integrate information. They stated that they have not had the same level of resources to gather good information. They have had to rely on other sources of funding such as research grants and industry funds:

‘We struggle, particularly with salinity. All the NAP regions have done their mapping and prioritising. We’ve done bits and pieces but haven’t been able to do anything comprehensive’ [NSW 4].

5. Results: Consideration of local knowledge and community input in NRM decision-making

5.1 CMO processes for involving community in NRM decision-making

Catchment management organisations all share the responsibility of planning and implementing NRM with communities. Therefore they have structures that promote community membership on a Board and various committees, advisory, working groups and/or steering groups (see Appendix C, Table 7). Some CMOs see themselves as ‘facilitators of partnerships’ with many parts of the community:

‘We are a company with community-based membership from local government, Landcare, catchment associations, urban groups. Our strongest community link is through our whole partnership arrangement. We actually link with the key industries, our extension network through Landcare, local government. We’ve used the partnership model’ [QLD 3].

Five CMOs fund community-based positions (Landcare and/or implementation staff) which perform a major role in community consultation and engagement.

Community consultation also occurs during the development of catchment plans/regional strategies. Some CMOs prefer to consult the community at the ‘draft’ stage, whereas others do an early and later phase of consultation:

‘When the regional strategy was developed we did two years of consultation with lots of public meetings and getting together with sectors. There was consultation at both ends of the development process. Then when we did the Investment Strategy we went out again to all the major sectors of the community’ [TAS 1].

Two of the CMOs collect a levy from the community, which they report enhances the ownership by the community:

‘We raise a rate on the land; it’s a historical arrangement and we have a long history of doing works in our region. We are very conscious that we have to maintain community confidence that we are doing the right thing. It does engender community interest and involvement because we are able to go out and do specific things’.

Two CMOs reported the use of surveys to help target their community engagement activities:

'The benchmarking survey gives us an idea of who our community stakeholders are, how best to engage them and where the highest level of community engagement is. So that helps us to be a bit more strategic about our community consultation' [NSW 2].

One CMO was trying innovative ways to engage different parts of the community who aren't usually involved in regional NRM. They run a lot of field days, have made a movie of community anecdotes about wetlands and have had a very successful 'kids conference' attended by 500 children from across their region: *'we just want to try some different approaches'* [VIC 3].

5.2 Perceived success of community engagement

A number of CMOs (8) felt that they had successfully engaged the community (see Appendix C, Table 7):

'Our structure is ideal for consultation, the committees, Boards and how we engage them. There's a lot of work in supporting those interactions but it's pretty much the core work of what the CMA does' [VIC 5].

However, the vast majority (14) would either like to improve consultation to groups in the periphery of NRM or acknowledged difficulty in engaging some parts of the community, for a variety of reasons. Firstly, many people don't see how they are relevant to NRM:

'The first plan we did was a bit hit and miss with consultation, but not through lack of effort. I'm not sure that people understood what it was all about' [SA 1].

Some (VIC 6, QLD 3) would like to better engage the peri-urban community:

'Where partnerships are strong there is good engagement with the community. But the biggest gap is our peri-urban group. But we have really good success stories with many parts of the community' [QLD 3].

And there are other factors that are barriers to successful community interaction:

'I think we could do it better, but it's the tyranny of distance and economic and social pressures' [QLD 2].

If the community is directly affected by a decision, or if the topic is something that directly interests them, then community engagement is likely to be better:

'I think you get more people when the issue directly involves them in their neighbourhood'; and

'If workshops are on the right subjects then the community will be engaged' [SA 2].

Two CMOs (NSW 5, QLD 1) suggested that the community is feeling over-consulted and would now just like to see on-ground action:

'Our community have complained about being 'consulted to death'. They are tired of talk and just want to see action. It's not just us doing consultation; other people are out there talking about NRM; people just get worn out with it' [NSW 5]; and

'The message we get firmly is that the community just want us to get on with the job' [QLD 1].

There were various opinions about the worth of community consultation:

'I'm not a fan of community consultation because I don't think it works particularly well. There aren't too many people that do it well. And I don't think the community takes too much of an interest in NRM as I believe they should. It is hard to engage them no matter what you do. A lot of people are happy enough to leave it in our hands. When you get 10 people out of 1.5 million turning up for consultation, you are only reaching a small part of the community. NRM is a fairly ethereal topic' [SA 2].

There is also a feeling that community consultation can never be perfect:

'There is such a range of community up here that you'll always be not pleasing someone. We've got capacity but never enough money to fund it all, so there will always be someone who is not happy with a decision. We've gone through a huge range of consultation, some sections of the community would say it's great and others would say mediocre' [NSW 1].

6. Discussion

Although regional NRM arrangements vary widely between the States (Pannell et al. 2007) and regional NRM bodies vary enormously in their character, size and structure, they face a common set of difficulties relating to the use of technical information for NRM decision-making and community consultation processes. It should be said that the tasks that CMOs are expected to carry out are very complex, and the funding base on which they operate varies substantially. Nevertheless, all would benefit from the better use of technical and socio-economic information in NRM decision-making.

6.1 Use by CMOs of technical information for NRM decision-making

NRM problems are intrinsically complex and multifaceted (LWA 2006). CMOs must deal with physical, biological, economic and social information, within a policy context, when attempting to plan, prioritise, and evaluate their investments. This is a formidably difficult task, and understandably it is one that all of the CMOs have struggled with to a greater or lesser extent.

A number of specific capacity weaknesses in the use of technical information have been identified in this study. Perhaps the most striking was the low level of capacity to access and apply economics. The minority of CMOs who did use economics did so to a very modest extent and in a very limited way, mainly through the conduct of Benefit Cost Analysis of specific programs or interventions. We believe that economics should play a greater role in regional NRM than it currently does.

Pannell (2007) lists a wide range of questions where economics is highly relevant to CMOs, including questions at the farm level (e.g., Are particular environmentally friendly farming practices likely to be attractive to commercial landholders, and if so, on what scale?), the catchment level (e.g., How would agricultural management need to be adjusted in a catchment to achieve particular environmental targets at least cost?), and the regional level (e.g. How should the funds of the environmental program be targeted to achieve the greatest environmental benefit for the available resources?). These questions are of central relevance to CMOs, but few of them are being tackled with the help of economic expertise.

It was notable that a number of CMOs are considering behaviour change by landholders as primarily a social process, but neglecting economic influences on behaviour. Economic factors are particularly important where the achievement of meaningful salinity outcomes requires commercial landholders to make large and costly changes. We know that salinity management requires large-scale land-use changes in most regions. This means that the economic motivations of commercial landholders will inevitably be important, and must be considered in the planning process. Social factors are particularly important in areas where the number of small non-commercial landholders is high. Even though social information is used by some CMOs, its use appears to be ad hoc, and very uneven between different CMOs.

A second important finding was that very few CMOs are using sophisticated biological or physical modelling tools to inform their decision making. More sophisticated approaches, including models, can contribute to planning in a number of areas, but are particularly important for assessing works to mitigate salinity. Indeed, we are aware of situations in the Murray-Darling Basin where modelling has shown that the sorts of investments being made by local CMOs are, if anything, likely to make river salinity worse, and reduce water yields.

Perhaps because of the limited use of sophisticated technical information by CMOs, it seemed that in some cases there was complacency about how much technical expertise is needed internally. We suggest that a reasonably high level of technical expertise is necessary within CMOs if they are to become smart purchasers of technical advice and data. As a minimum, even if technical experts are not employed internally, we suggest that a staff member should be given clear responsibility for overseeing research-related issues. The most common current strategy of relying on technical advisory committees is better than an absence of technical advice, but is unlikely to be able to provide the level of active oversight that is needed. This relates in part to the fact that there are many potential providers of data and technical advice who may be persuasive but who lack an appreciation of the real decision-making needs of CMOs.

Given the relatively low-key role for science in current regional processes, there is a tendency to rely on existing local contacts and networks. This is fine up to a point, but may lead to narrow and out-of-date advice, especially on subjects that are undergoing rapid growth of knowledge, as salinity has been doing since around 1998.

There is also a lack of awareness of issues around research quality. In other research we have found that much, if not most, of the research results provided to CMOs are not formally peer reviewed through publication. We consider this to be of considerable concern, as peer review is the standard method for quality control in research. A study published only in the 'grey literature' (unpublished technical reports) should not be treated as being equally credible as research published in a peer-reviewed international journal. Unpublished technical reports are not necessarily poor quality, but our examination of a substantial sample of this grey literature strongly reinforced our concerns. None of the CMOs seemed to be worried about, or even aware of, this issue. Again, they need to build capacity to become smart purchasers.

Overall, there is a clear need to build capacity in CMOs in these specific areas of knowledge and analysis in order to enhance the achievement of NRM outcomes. There would be considerable scope for government to streamline the required learning process and reduce duplication of learning effort among CMOs by developing well targeted training initiatives for CMOs.

An apparently positive development is the use of a Natural Resource Commission Standard ([www.nrc.nsw.gov.au/ documents/Standard%20for%20quality%20NRM.pdf](http://www.nrc.nsw.gov.au/documents/Standard%20for%20quality%20NRM.pdf)) by a number of NSW CMOs. This standard provides guidance for CMO processes such as 'collection and use of knowledge', 'community engagement' and 'monitoring and evaluation'. CMOs are advised to 'assess the credibility, validity, reliability, relevance and accessibility of available information' (NRC 2005). While this is good advice, we expect that almost all CMOs will need to build capacity in order to be able to implement it.

A different sort of capacity issue is that regions that are not priority regions under the NAP have had considerably fewer funds, and thus lower capacity to invest in data and advice. This appears likely to change in the next phase of the NHT.

6.2 The capacities of CMOs for interpreting, integrating and evaluating information for NRM decision-making

An important conclusion of this study is the need to build capacity in integration of information for decision making. This is an acknowledged area of weakness for many CMOs, and an unacknowledged weakness for some others. A study by Paton et al. (2004) also found that CMOs had limited capacity for integrating different types of knowledge.

The term “integration” is often used loosely and with little tangible understanding of what it should really mean in practice. By “integration” we mean the bringing together of disparate types and sources of information for prioritisation and planning.

By this definition, all CMOs integrate information to some extent, but we believe that there is considerable scope for improvement by taking more formal, structured and systematic approaches to decision making. Integration is not an end in itself, and it cannot meaningfully occur independent of decision making, but it requires a level of sophistication in decision making that is not present in most CMOs. The SIF3 framework (Ridley and Pannell, 2005) provides an example of a tool that can greatly assist with integration of information for decision making. It provides a highly structured and systematic approach that embeds a wealth of existing research knowledge in a decision tree.

Currently, in some CMOs, many of the decisions about actual spending on on-ground interventions are made by relatively junior and inexperienced field officers with limited technical expertise, and with little capacity to integrate the information that would be necessary to make good decisions (as reported in Seymour et al., forthcoming). They are not adequately supported by their CMO with advice or practical help with the decision process, use of data, or its integration. In this situation, the prospects of achieving worthwhile NRM outcomes appear remote.

We suspect that part of the problem is the lack of emphasis on achievement of NRM outcomes by the funding programs. Indeed, a relatively short-term focus, emphasising activity and delivery of outputs, is encouraged by the programs. This is reflected, for example, in a concerning comment from one CMO that ‘You can’t just not take action, just because you don’t have the data’. In fact, from the point of view of responsible use of public funds, not taking action is often the best course, either because the prospective action is not a high enough priority, or because further information and analysis is needed to determine what the action would achieve, and its priority relative to other actions. The solution is not just to exhort CMOs to increase their capacity. Rather, some fundamental changes to the operation and conditions of the funding programs are needed, to change the incentives faced by CMOs and their staff and the expectations that are communicated to them from government.

A related issue is the weakness in evaluation. The CMOs generally acknowledge that they need to improve their evaluation processes, but the problem appears to be even deeper than they realise. Of particular concern is that in most cases, their concept of evaluation is limited to only the delivery of outputs and tracking progress towards regional resource condition and management action targets (i.e. levels of activity), rather than also including reflection and learning from past decision-making and processes, and assessment of progress towards the achievement of NRM outcomes.

In addition, they perceive evaluation as an activity to be conducted *ex post*, after interventions have been completed and their effects have been realised. For issues like salinity, where processes occur on the time frame of decades, this is quite unrealistic. Within the time frame of government programs, meaningful evaluation of progress by CMOs towards salinity outcomes require modelling of the impacts of current or expected management changes and comparing this with the results from expected management in the absence of the CMO intervention. This is fundamentally no different to the sort of modelling that should be (but generally is not) conducted during the planning phase. This highlights that the evaluation strategy should be tightly linked to decision making, and should be an evolution of the *ex ante* evaluation done during planning. The pressing need to strengthen this aspect of the regional system is obvious. It may have flow-on benefits by strengthening the focus on outcomes generally.

6.3 Consideration of local knowledge and community input in NRM decision-making

The importance of strong community input to NRM decision making (Harrison and Burgess 2000) is acknowledged by the funding programs, and emphasised in program documents to a greater extent than is the importance of making good use of scientific information. Therefore it is not surprising that CMOs have given emphasis to community consultation.

However, it is acknowledged by the CMOs that community consultation is not easy. Many community members do not wish to engage, and of those who do, opinions vary so that there will inevitably be those who think that their inputs have not been adequately considered. There is also a tension between what some community members would like program funds to be spent on, and what investments can be justified on the basis of cost-effectiveness and appropriate use of public funds considering relative levels of public and private benefits (Pannell, 2006).

Based on this study, CMOs generally feel that they do not need to consult to a greater extent with their communities. Indeed, there is concern in some cases that the level of consultation is leading to burn-out of strongly engaged individuals, with them feeling ‘consulted to death’.

The development and application of stronger formal decision frameworks, as outlined earlier, would help to clarify the roles of community consultation within the decision making process, and how community and scientific knowledge should be brought together for decision making.

6.4 Responding to capacity needs

We have identified a number of areas where there is a need to build capacity within CMOs if they are to have a greater chance of achieving the NRM outcomes for which they were established. Some of these capacity gaps are recognised by a significant number of CMOs, some are unrecognised by most, and none are recognised by all. In view of this, our final observation is that it will not be sufficient for governments to develop training programs or materials for CMO staff. Governments also need to change the rules and operation of their funding programs to create incentives for CMOs to strengthen their capacities and processes and to provide strong practical support to them.

7. Recommendations

Each recommendation is either for CMOs or for governments. Many of the recommendations for government are for them to streamline the learning process, reduce duplication of learning effort across CMOs, and standardise CMO processes on best practice, rather than requiring each CMO to invent things for themselves.

1. Economics: CMOs to make greater use of economics throughout their planning and prioritisation processes. Governments to provide guidelines on roles for economics within CMO processes.
2. Social science: CMOs to make more systematic use of social science. Governments to provide guidelines on roles for social science within CMO processes.
3. Biological and physical modelling: CMOs to make extensive and routine use of modelling to estimate likely NRM outcomes from investments, and to embed this in the planning and prioritisation process. Governments to invest in making suitable models and quality-assured data sets available to all CMOs.
4. Research quality: Governments to provide guidelines on processes for assessment of research quality.
5. Internal science intelligence: CMOs to strengthen their internal capacity to engage with researchers and to commission and evaluate research through creation of specialist positions for this role.
6. Research investments: Governments to remove the constraints (actual or perceived) on CMOs investing in research to (a) strengthen their planning and prioritisation, and (b) to provide improved sustainable technologies for adoption by land and water managers.
7. Decision frameworks: Governments to work with regions to develop practical decision-making frameworks, focused on outcomes, to enhance integration, evaluation and thinking about community consultation. Decision frameworks need to be generally applicable across CMOs.
8. Decision frameworks: CMOs to support field officers responsible for decisions about specific funding for on-ground works, by providing them with advice and practical help with the decision process, use of data, and its integration. Provide stronger guidance based on priorities established through sophisticated modelling, and the improved decision framework.
9. Time pressures: Governments to reduce pressures on CMOs to act with a short-term focus. Develop more realistic timetables for investigation, planning and prioritisation prior to commencement of on-ground investments.
10. Funding conditions and accreditation: Governments to strengthen and communicate expectations about achievement of NRM outcomes by CMOs. Strengthen the requirements for demonstrating that planned intervention will likely achieve NRM outcomes prior to approval of funding. Strengthen emphases on science, economics and evaluation in the accreditation process.

11. Evaluation: Governments to provide strong guidance and support to CMOs on monitoring and evaluation. Recognise the central role of *ex ante* modelling in evaluation, and clarify and strengthen the link between evaluation and decision making.
12. Community consultation: CMOs to work together to develop and clarify the roles for community consultation within the decision making process, and establish processes for how community and scientific knowledge can be brought together, within the context of a publicly funded program.

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APPENDIX A: Regional NRM arrangements in Australian States

Structure and functional arrangements between regional NRM organisations varies between each State. Firstly, they have different names. They are called Catchment Management Authorities in New South Wales and Victoria, Catchment Councils in Western Australia, Natural Resources Management Boards in South Australia, Regional NRM Groups in Queensland and Regional Committees in Tasmania. In each state, there is an overarching committee of some sort, although their roles vary widely. All regional NRM bodies in all States have the common responsibility of development of a Regional Catchment Plan or Strategy and working with the community to do this. The ACT and Northern Territory are not included in this report.

A common arrangement for all States, as part of the NAP and NHT bilateral agreement, is the establishment of a Joint Steering Committee to coordinate State and Commonwealth investment. It is made up of representatives from State and Commonwealth agencies, local government and regional groups (see example: <http://www.nrm.gov.au/state/nsw/jsc.html>).

Table 1. Comparison of regional NRM bodies between Australian States

State	Title of regional bodies (and number of)	Statutory status	Key State agency who manages relationship
NSW	Catchment Management Authorities (13)	Statutory	Department of Natural Resources (DNR)
Vic	Catchment Management Authorities (10)	Statutory	Department of Sustainability and Environment (DSE)
WA	Regional NRM Groups or Catchment Councils (6)	Non-statutory Incorporated associations	Department of Agriculture and Food (DAF)
SA	Regional NRM Boards (8)	Statutory	Department of Water, Land and Biodiversity Conservation (DWLBC)
QLD	Regional 'committees', 'groups' and 'associations' (14)	Non-statutory Mixture of limited companies, incorporated associations & advisory bodies	Department of Natural Resources and Water (DNRW)
TAS	Regional Natural Resource Management Committees (3)	Non-statutory	Department of Primary Industries and Water (DPIW)

For more information see Pannell et al. (2007)

APPENDIX B – INTERVIEW QUESTIONS

1. Obtaining & using technical information

- 1.1 What technical information (from science or research) does your organisation use to make decisions about NRM investment?
- 1.2 How well is the technical information integrated with economic data to assist with CMO decision-making? Who has the responsibility for doing this?
- 1.3 How well is the technical information integrated with social research data to assist with CMO decision-making? Who has the responsibility for doing this?
- 1.4 Who does your organisation get technical information from? How do you choose where to get it from?
- 1.5 How does your organisation assess whether the technical information they use is of good quality?
- 1.6 Who within your organisation has the role of interpreting the technical reports?
- 1.7 Is your organisation supported by a technical committee? If yes, how often do they meet? Can you describe their role for me? Are they making a difference? What sort of difference and to what?

2. Technical skills/capacity of staff & resources

- 2.1 Who in the organisation is responsible for integrating technical, economic and social information, and how does this get fed into the decision-making process?
- 2.2 What skills do you think are needed to interpret and integrate technical information for NRM decision-making? Are there any existing processes or structured framework in place to help with integration of technical, economic and social information? Do you think specific skills are poor/missing within the organisation? What could be done to address this?
- 2.3 Does being a NAP region (not being a NAP region) affect the capacity of your organisation to interpret and integrate technical information? What effect does it have?

3. Community

- 3.1 Briefly describe what processes are in place to ensure that the community is involved in regional NRM planning and decision making.
- 3.2 Do you feel that your organisation has successfully engaged the community? Why do you think this way?

4. Evaluation

- 4.1 How does your organisation ensure that it learns from past NRM decisions? Are there any evaluation processes in place? How does it feed into future decision-making?

5. Interaction with other regional NRM bodies

- 5.1 Does your organisation interact with other regional bodies to share technical information? If so, then how?

Appendix C: Results summary tables

Table 1. Responses of CMOs for types of information used (and extent of use of socio-economic information)

CMO	Biophysical information	Spatial imagery (e.g. GIS)	Social information	Economic information	Community information / local knowledge	Landscape modelling techniques	Monitoring data	Scientific literature
NSW 1			Demographics					
NSW 2			Demographic and attitudinal	Not used strategically				For soils and vegetation
NSW 3			Ad hoc use	Ad hoc use				
NSW 4				Difficult to access data			GIS-based	
NSW 5			Demographics and land use	Benefit-cost analysis				Some use
Vic 1			Demographics	Benefit cost analysis				
Vic 2			Very low use	Strong use				
Vic 3			Extensive use	To inform MBIs		Catchment modelling	Data	
Vic 4			Community values	To inform MBIs				
Vic 5			Ad hoc use					
Vic 6		Poor use	Very low use	Very low use				Literature reviews
QLD 1		SPOT 5	Demographics	Benefit-cost analysis				
QLD 2			Social benchmarking					
QLD 3		SPOT 5						
SA 1			Ad hoc	Poor data for region				
SA 2			Demographics	To inform MBIs				
TAS 1			Attitudinal surveys	Low use				
WA 1								

Table 2. CMO sources of technical information

CMO	In-house expertise	State government agencies	Private consultants	Universities and research organisations	Landholders	Published science	Technical working groups	Internet	Other CMOs
NSW 1									
NSW 2									
NSW 3									
NSW 4									
NSW 5									
Vic 1									
Vic 2									
Vic 3									
Vic 4									
Vic 5									
Vic 6									
QLD 1									
QLD 2									
QLD 3									
SA 1									
SA 2									
TAS 1									
WA 1									

Table 3. Processes used by CMOs to decide where to get technical and socio-economic information and assessing the quality of the information

CMO	Processes used to choosing sources of technical and socio-economic information	Processes used by CMOs to assess the quality of technical information
NSW 1	Procurement guidelines and process	Assessed against original project brief
NSW 2	Guidelines for Procurement, tender process	Assessed against original project brief
NSW 3	NSW Natural Resources Commission Standard	No process
NSW 4	Providers chosen from established networks	Use of internal expertise to make assessment of quality
NSW 5	Data generated in their own catchment is preferred	Use of technical groups, consideration of who are leaders in the field
Vic 1	Open tender process	Assessed against original project brief
Vic 2	Technical reference committee select providers	Use of Technical Review Committee to assess quality
Vic 3	Set criteria for choosing providers, open tender process	In-house project managers assess quality
Vic 4	Providers chosen from established networks	Use of technical advisory group
Vic 5	Project steering committee used, open tender process	Processes in place but not rigorous
Vic 6	Open tender process with a small panel used to assess providers	Review panels for some projects
QLD 1	Data generated in their own catchment and from own staff is preferred	Quality not assessed before applying on the ground
QLD 2	Opportunistic approach to get data wherever and whenever they can	Professional judgement of CMO staff
QLD 3	Providers chosen from established networks	Trust and professional judgement of CMO staff
SA 1	Opportunistic approach to get data wherever and whenever they can	Rely on external providers to have a rigorous process in place
SA 2	Procurement guidelines and reliance on trusted networks of providers	Professional judgement of CMO staff
TAS 1	Staff obtain information from own trusted networks and contacts	In-house specialists perform in-house review of quality
WA 1	Good data generated in own catchment, utilise trusted networks and contacts	Use of technical groups to make assessment

Table 4. Processes used by CMOs to interpret and integrate technical and socio-economic information for decision-making

CMO	CMO responsibility for interpretation of information				CMO responsibility for integration of different types of information					
	Project officers	Senior managers	Technical advisory groups*	CMO Board	Project officers	Senior managers	Technical advisory groups*	Monitoring & Evaluation Officer	Regional planning & target setting	CMO Board
NSW ¹ 1										
NSW 2										
NSW 3										
NSW 4										
NSW 5										
Vic ² 1										
Vic 2										
Vic 3										
Vic 4										
Vic 5										
Vic 6										
QLD ³ 1										
QLD 2										
QLD 3										
SA ⁴ 1										
SA 2										
TAS ⁵ 1										
WA ⁶ 1										

Table 5: Skills needed for interpreting and integrating information / Perceived skill gaps of CMOs / Current level of evaluation

CMO	Skills needed for interpreting and integrating information	Perceived skill gaps in CMOs
NSW 1	Solid technical base, well established networks	Monitoring and evaluation skills
NSW 2	Making good use of skills in CMO Board and committees	Water management knowledge
NSW 3	Analytical and spatial analysis skills	Spatial data analysis skills Social and economic skills
NSW 4	Analytical, strong technical background	Estuary/marine and threatened fauna
NSW 5	Communication and facilitation skills	Water management skills
Vic 1	Strategic and analytical skills	Social science skills
Vic 2	Wide knowledge base	Skills in interpreting information for communication to the community
Vic 3	Strong technical background and ability to know which parts of information are relevant for decision-making	CMA would rather outsource tasks if can't be addressed internally
Vic 4	Strategic planning, technical knowledge, monitoring and evaluation	Strategic planning, GIS skills
Vic 5	-	Integrative, strategic thinkers
Vic 6	Patience and persistence	Social research skills
QLD 1	Interpretation of information for landholders	Community engagement Adult learning principles
QLD 2	Interpretation of information for landholders	Community engagement
QLD 3	Strong science background	-
SA 1	Strong knowledge of the region, comprehension skills to interpret reports	Strategic planning Monitoring and evaluation
SA 2	Project management	Biodiversity skills
TAS 1	Broad, strategic thinking skills	Science communicator
WA 1	Strategic thinking and communication skills	Communicator to community

Table 6. *Current CMO processes for evaluation*

CMO	No evaluation	Some informal evaluation	Some evaluation processes but need for improvement	Outputs-based evaluation	Broader processes for evaluation (consideration outputs, progress towards targets, reflection on past processes and outcomes)
NSW ¹ 1					
NSW 2					
NSW 3					
NSW 4					
NSW 5					
Vic ² 1					
Vic 2					
Vic 3					
Vic 4					
Vic 5					
Vic 6					
QLD ³ 1					
QLD 2					
QLD 3					
SA ⁴ 1					
SA 2					
TAS ⁵ 1					
WA ⁶ 1					

Table 7. *Consideration of local knowledge / community input into NRM decision-making*

CMO	Processes for involving community in NRM decision-making	Perceived success of community engagement
NSW 1	Community-based Board, CMO positions throughout catchment	Not all parts of community feel engaged, some feel over-consulted
NSW 2	Community consultation meetings for catchment NRM plan Benchmarking survey of community	CMA feel they have been very successful
NSW 3	Community-based advisory groups, staff based across region	Good but still fine-tuning interaction with local government
NSW 4	CMA-funded community support officers, community reference groups, community levy collected	Good community engagement and community are very interested in NRM
NSW 5	Board including community members, community forums and consultation sessions for Catchment Action Plan development	Community are feeling over-consulted and would rather see on-ground action. Frustration in non-priority areas where can't access grants
Vic 1	Community advisory committees	Successful in community engagement but feel they could improve
Vic 2	Implementation Committees and Board with community members	Would like to improve in communicating programs and outcomes
Vic 3	Advisory committees and Board with community members, survey of community perceptions, innovative ways to involve community	Quite successful from trying innovative approaches to community consultation and communication
Vic 4	Advisory committees and Board with community members, community forums for catchment plan development	Successful in some parts of the community Drought has had a negative impact on community involvement
Vic 5	Committee and Board structure allows for community input Acknowledgment that consultation is hard work	Some parts of the community not involved for a variety of reasons
Vic 6	Community-based committee and Board structure, consultation meetings for catchment NRM plan, CMA-funded positions	Successful community consultation but would like to involve other parts of the community
QLD 1	Major sub-catchment planning program, employment of field staff to work with community, consultation for NRM plan development	Successful in some areas but would like to improve 'representativeness' of community engagement
QLD 2	Community panels to make decisions about NRM investment Community forums for strategic planning	Difficult to engage some parts of community because of distance and socioeconomic factors
QLD 3	Community-based structure, partnerships ensure community involvement, communications Officer employed in region	Successful at high level (peak body, local government, Landcare) Peri-urban community consultation is a current gap
SA 1	Extensive community consultation for NRM plan	Successful in some areas of community but not others
SA 2	Extensive community consultation for NRM plan, Communications Officer employed in region	Community engagement successful in areas where community are directly impacted by NRM decisions
TAS 1	Open membership structure that involves all major community stakeholders, consultation at various planning and investment stages	Effective structure has resulted in good community engagement
WA 1	Very open and inclusive structure that involves many parts of the community	Successful community consultation but would like to involve other community stakeholders on the periphery of NRM

