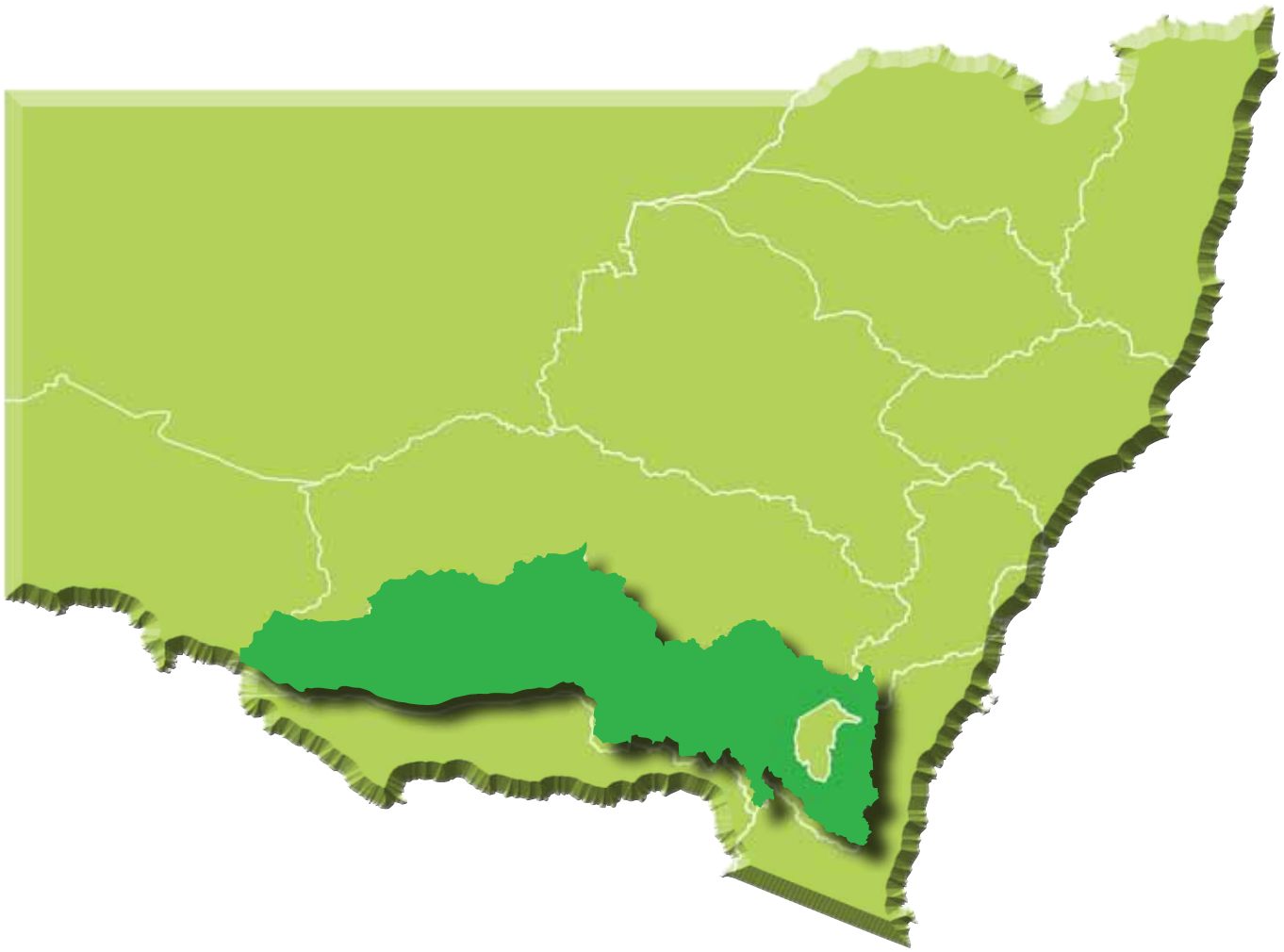
NSW GOVERNMENT

State of the catchments 2010

Overview

Murrumbidgee region



Background

Under the New South Wales Natural Resources monitoring, evaluation and reporting (MER) strategy (DNR 2006), a regionally based state of the catchments (SOC) report has been prepared. This report aims to provide the broad community and state and local government with information on natural resource condition and trends within a consistent reporting framework.

Reporting is based on 13 natural resource themes, in accord with the NSW state-wide natural resource management (NRM) targets (NRC 2005), which can be broadly grouped as shown in Figure 1. The targets fall under the Green State priorities and targets in the NSW State Plan 2010.

The MER strategy specifies that SOC reports will:

- provide a preliminary assessment of the condition of natural resources in the catchments of each region
- inform natural resource managers' policy and investment decisions within and between regions
- assess progress towards natural resource condition targets.

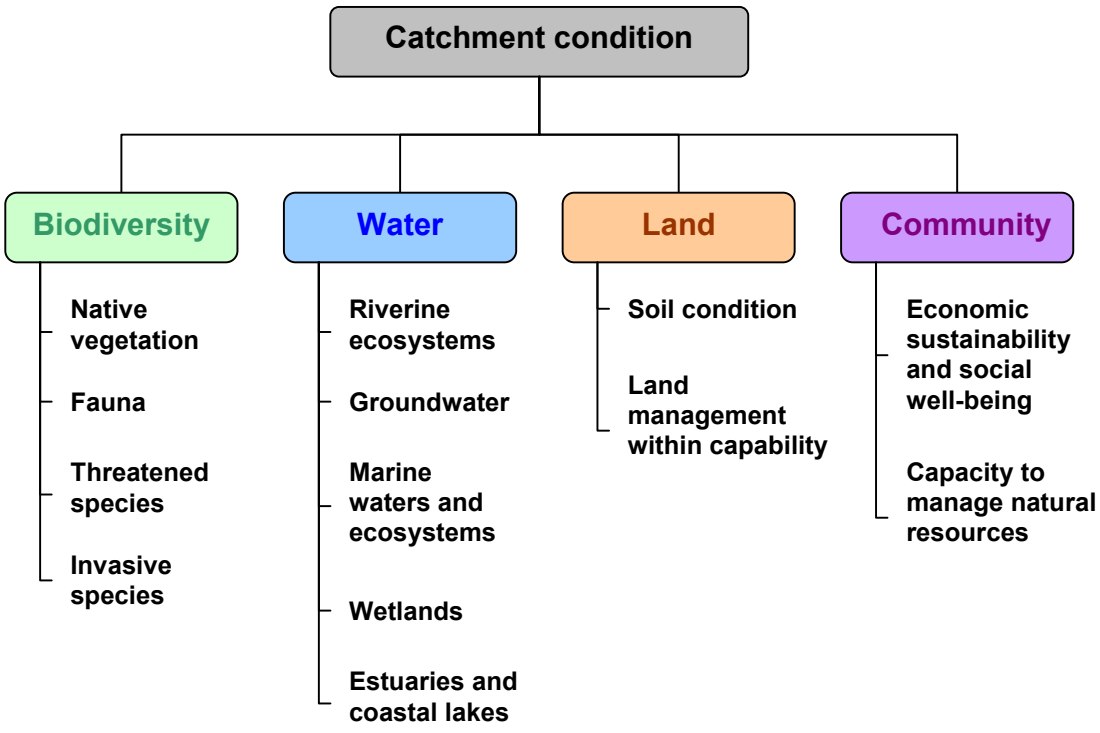


Figure 1 Resource themes categorised by state-wide targets

Detailed technical reports describe the methods used to derive the information contained in this overview report. At the time of publication of the *State of the catchments (SOC) 2010* reports, the technical reports were being prepared for public release. When complete, they will be available on the DECCW website: www.environment.nsw.gov.au/publications/reporting.htm.

Note: All data on natural resource condition, pressures and management activity included in the SOC reports, as well as the technical reports, was collected up to January 2009.

As there is limited historical data available for trend analysis, this SOC report represents the first baseline of catchment condition across the Murrumbidgee region. Ongoing data collection will allow assessment of trends in condition for future SOC reporting. The extensive data and information underlying the report will assist to inform policy, planning and investment decisions by natural resource managers.

Each SOC report is based on the geographic extent of the region in NSW managed by each of 13 catchment management authorities (CMAs). While the SOC reports use indicators of condition relevant to state-wide targets, it is recognised that CMAs will have translated these into more specific, locally relevant 'catchment' targets. To the extent that the state-wide and catchment targets and indicators align, these reports will aid the reporting by CMAs of progress towards catchment targets.

The reports have been prepared by the NSW Government natural resource agencies – the Department of Environment, Climate Change and Water (DECCW), NSW Office of Water (NOW) and Industry & Investment NSW (I&I), in collaboration with CMAs and the NSW Natural Resources Commission (NRC). Report preparation is anticipated to occur on a three-year cycle to coincide with, and provide input to, the NSW state of the environment report.

Reporting structure

The SOC reporting structure consists of a hierarchy of four information products: catchment overview report (this document), individual theme reports, supporting technical reports and data links. Interested parties can choose to enter any level of the hierarchy and access the information product best suited to their needs and interest. The catchment overview report and the 13 individual theme reports (11 for inland regions) together form the SOC report for a region.

This overview report summarises the condition of the region for each theme, the pressures influencing the condition, and the management responses. It is drawn from the condition, pressure and management activity information contained in each theme report.

The *assessment* section (containing *condition* and *pressures*) of each theme report includes the following common elements:

- a statement of the state-wide target
- a brief description of what each indicator means
- a condition rating generally using a dark green, light green, yellow, orange and red colour scale representing (respectively) 'very good', 'good', 'fair', 'poor' or 'very poor' condition. Some themes used different colour ratings to reflect existing published reporting methods (eg the riverine theme uses sustainable rivers audit ratings). Where possible, an indicator condition rating for each spatial reporting unit is given, for example, for each wetland, estuary, soil monitoring unit (SMU) or groundwater system
- a pressure rating using the same green/red colour scale but representing 'very low', 'low', 'moderate', 'high' or 'very high' pressure – again by spatial reporting unit
- an indication of trend in condition, using arrows for 'improving', 'no change' or 'declining' trend
- an indication of trend in pressure using arrows for 'decreasing', 'no change' or 'increasing' trend
- a data confidence rating for condition and pressure indicators of high, medium or low
- aggregated regional condition, pressure, trend and data confidence ratings, where practical

- a comparison of the condition and pressure in each region with NSW as a whole, by indicator, where available
- maps showing spatial reporting units and ratings, where appropriate.

For some themes, indicators have been aggregated to give an overall index rating by spatial reporting unit and region, of either condition or pressure, for that theme. However, further analysis is required to test the sensitivity of the aggregated indices to differing degrees of catchment (or waterway) disturbance from human activity.

Not all of the elements listed above could be adequately assessed with the data available. Table 1 indicates where some of these data gaps occur.

Rating scores for indicators and indices

A scoring system for rating the value of a condition indicator or index has been developed for each of the 13 reporting themes. Scores have been based on a five-category system where one is regarded as 'very poor 'and five as 'very good'. A 'very good' score generally relates to a resource in near pristine or 'reference' condition, whereas 'very poor' indicates the resource is highly degraded and is unlikely to ever return to reference condition.

Scoring the intervals between the very good and very poor categories represents a particular challenge. Moving down a category should correspond with a measurable biological or ecological threshold in system condition. However, sufficient data and scientific understanding is often not available, thus the adoption of simpler methods of categorisation is required. Methods may include dividing the range of indicator values into five equal groups based on values, other statistical techniques and expert opinion. Each of these methods has been used in the SOC reports, depending on the data.

Similar scoring techniques have been used for assessing pressure indicators and for scoring indicators and indices on a state-wide scale.

The Murrumbidgee region

The Murrumbidgee region is bounded by Cooma in the east, Balranald in the west, Temora to the north and Henty to the south. The region covers an area of about 84,000 km^2 (8.4 million hectares).

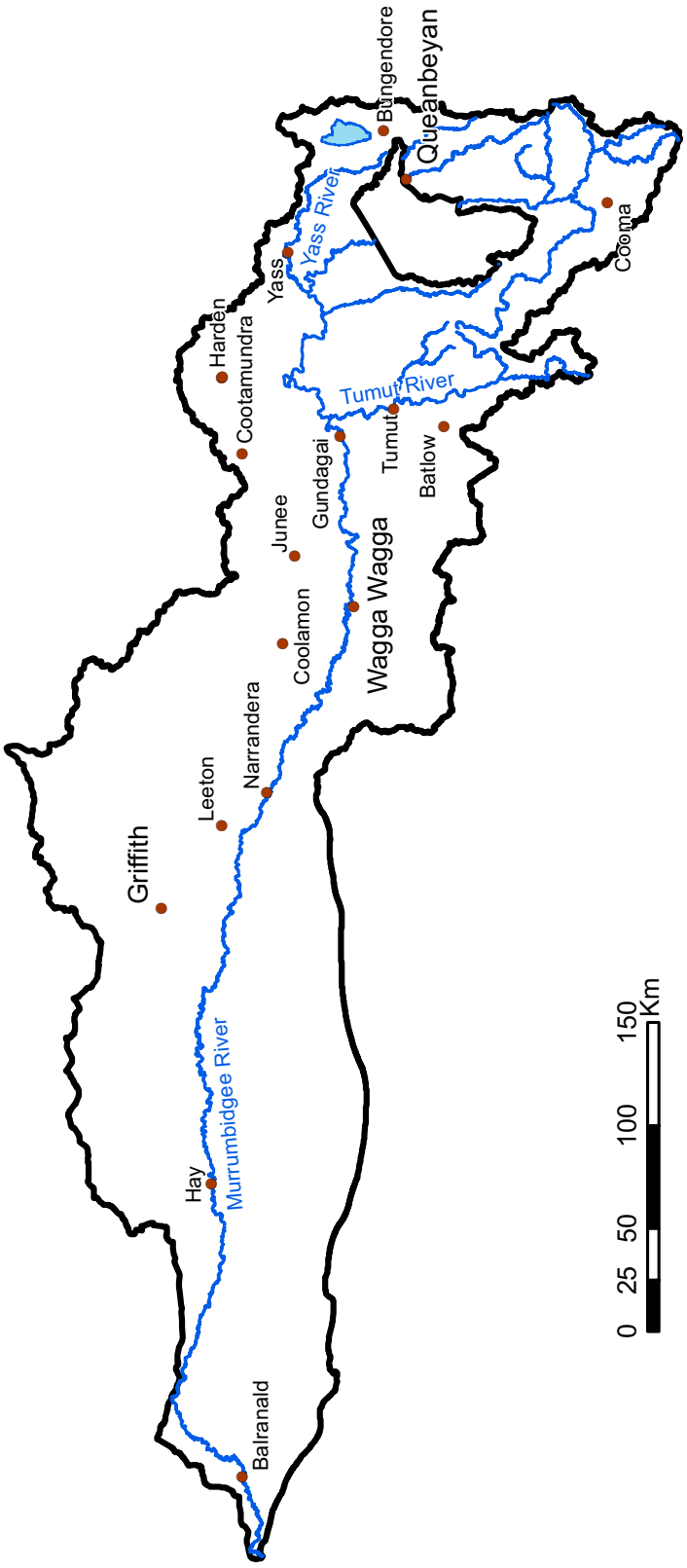
Landscapes range from the alpine areas of Kosciuszko National Park and the Monaro plains, to the grazing and grain belts of the south west slopes and plains, and the shrublands and grasslands of the semi-arid western Riverina.

The Murrumbidgee River is the main stream running through the region. The Murrumbidgee River is a regulated system and has 14 dams and eight large weirs. The two largest dams, Burrinjuck Dam near Yass and Blowering Dam near Tumut, control water for the Murrumbidgee Irrigation Area and the Coleambally Irrigation Area situated in the lower Murrumbidgee.

Land-use includes dryland and irrigated agriculture, forestry, national parks and tourism.

The regional population is 545,000 with an annual population growth rate of 1.5%. Major urban centres and towns are:

- Cooma, Queanbeyan, Canberra and Yass in the upper region



Murrumbidgee region

- Gundagai, Cootamundra, Tumut, Junee, Wagga Wagga, Henty and Narrandera in the mid-region
- Leeton, Griffith, Coleambally, Hay and Balranald in the lower region.

The Murrumbidgee CMA is responsible for involving communities in the management of natural resource issues facing the region through partnerships and collaborations. The CMA is also the primary means for delivering outcomes of natural resource funding provided by the NSW and Australian governments.

Catchment condition for 2008

Table 1 summarises the theme-based ratings for the Murrumbidgee region. The condition ratings can be compared with those for NSW overall, where the latter rating is available. Ratings for condition and confidence, along with pressure ratings, are also shown where data was available. (Note: the table should be read in conjunction with the theme reports which contain more contextual information including, where available, confidence ratings for pressures and the pressure ratings for NSW overall).

Table 1 Murrumbidgee region SOC ratings

State-wide target	Region condition	Data confidence	NSW condition	Region pressure
Native vegetation		M		
Fauna		L		
Threatened species		L		
Invasive species (impact)*		M		
Riverine ecosystems				
Groundwater				
Wetlands		L		
Soil condition		L–M		See LMwC
Land management within capability (LMwC)		L		
Economic sustainability and social well-being				
Capacity to manage natural resources	F–P	L–M		

Condition	Rating	Confidence	Pressure	Rating
Very good		H – High	Very low	
Good		M – Medium	Low	
Fair		L – Low	Moderate	
Poor			High	
Very poor			Very high	
Not rated			Not rated	

* Invasive species' impact is a pressure on natural resource condition and is rated on a green/red scale of very low, low, moderate, high and very high.

Biodiversity

- **Native vegetation** – the overall status of native vegetation (extent and condition) was rated fair. Intact native vegetation occurs primarily in the west and east and covers around 30 per cent of the total region. Overall extent is below the state average. Vegetation condition rated only fair as most vegetation communities show some degree of modification. Greatest modification, by area, is associated with dryland agriculture and plantations.
- **Fauna** – the overall sustainability (based on a small number of species that are actively monitored) is rated poor. Within Murrumbidgee Region, five of 559 species of terrestrial vertebrates recorded since European settlement have become extinct. A further nine species (13 per cent) of mammals, 37 species (11 per cent) of birds, 10 species (27 per cent) of amphibians and 21 species (20 per cent) of reptiles are estimated to have lost at least half their pre-European distribution under a variety of pressures.
- **Threatened species** – recovery of threatened species in the region rated very poor (based on data available for only seven of the 180 threatened species, excluding extinct, within the region). Five fauna species are presumed extinct; one fauna species and four flora species are critically endangered; 36 fauna species and 28 flora species are endangered. There are 10 endangered ecological communities.
- **Invasive species** – the impact of invasive species in the region is rated moderate. While the relative impact of individual invasive species has not been assessed, the majority of the new and emerging invasive species in the region are weed species. There are six emerging freshwater pests (fish) and two emerging pest animal species (feral horses, and feral and wild deer). Invasive species that are widely distributed in NSW and present in the region are foxes, freshwater pests and wild dogs. The proportion of non-native fish species to native species is 63 per cent averaged over all sites.

Water

- **Riverine ecosystems** – an overall rating for riverine ecosystem condition was not determined. There were many water quality monitoring sites in the Murrumbidgee River catchment relative to other regions. The percentage of samples that exceeded total phosphorus guidelines varied greatly between sites and ranged from very low to very high across the region. Turbidity results across the region ranged from sites with no exceedances through to sites with a moderate percentage of exceedances. Over half the results showed stable trends in water quality. Water temperature was stable across the upper half of the catchment and unclear at the lower sites due to insufficient data. One site in the upper catchment showed a decreasing trend in electrical conductivity since the early 1990s. Turbidity results were the least reliable. However, several sites across the region had rising trends. The overall macroinvertebrate condition was rated poor to moderate. The overall fish condition was very poor. Overall hydrologic condition was rated as poor to moderate.
- **Groundwater** – the condition of groundwater dependent ecosystems (GDEs) is not monitored directly as they have yet to be fully identified and mapped. The ability of groundwater systems to support GDEs has therefore been determined by assessing the condition of groundwater management areas (GWMAs) against seven indicators. Overall condition has not been rated; however, the GWMAs in the region are generally in good to very good condition. There is a very poor condition ranking for the impacts of localised groundwater use in the Lower Murrumbidgee Deep and the Mid Murrumbidgee GWMAs. This is causing large variations and declines in

groundwater levels. The main pressures are land-use change (river regulation and agriculture) and, in some GWMAs, groundwater use and the level of entitlement.

- **Wetlands** – overall, wetlands in the Murrumbidgee region are in very poor condition. The confidence in the assessment is low due to the limited data available. The greatest pressure on wetlands in this region is from catchment and habitat disturbance caused by feral animals, grazing, vegetation clearing/modification in the catchment and lack of protection of wetlands.

Land

- **Soil condition** – the overall soil condition in the 10 SMUs across the Murrumbidgee region, which cover about 51% of the region, was rated good. Individual SMUs were rated as being in either fair or good condition but with large variation between monitoring sites within SMUs. The lowest scoring indicators within individual SMUs were rated poor and included sheet erosion, soil structure and soil salinity.

  Expected trend for SMUs, based on the degree to which land management is within capability, is steady except for the 'Boree Plains', 'Cullarin Metasediments' and the 'Murrumbidgee Alps' SMUs, which are predicted to show a decline in condition. The expected trend across indicators is stable except for wind erosion and organic carbon which are predicted to decline.

  Pressures on soil condition depend on land-use and management practices and are reported in 'land management within capability'.

- **Land management within capability** – the overall rating for land management within capability was fair. The ratings for individual SMUs were poor to fair but, as for soil condition, with large variation between sites. Land in the region was managed beyond its capability in at least one SMU for each of the hazards. The degree of land management within capability is tending to improve across indicators except for acid sulfate soils which is declining and wind erosion which is stable.

Community

- **Economic sustainability and social well-being (ESSW)** – there is no socio-economic report for the Murrumbidgee catchment because the Murrumbidgee CMA chose not to participate in the process.
- **Capacity to manage natural resources** – overall adaptive capacity of land managers in the region was rated fair to poor. Across the Murrumbidgee region the five capitals (*human*, *financial*, *physical*, *natural* and *social*) are at comparable levels, though *financial* and *physical* capital are rated slightly lower than the others. *Social* capital is pulled down by low rates of Landcare membership. All indicators of *financial* capital are low.

Key pressures

Effective catchment management relies on monitoring not just the status or condition of the resource, but also the underlying causal factors or pressures (occasionally natural forces but largely human activities) that have the potential to degrade the resource. The monitoring programs for a number of themes involve sampling at locations in catchments that are relatively undisturbed and reference condition, as well as in moderately to highly disturbed systems. By doing this, the

sampling is designed to test the effect of different disturbances or pressures on condition, so that effective management responses can be selected.

Examples of high-level pressures on the environment that the reports have identified as applying to the Murrumbidgee region include:

- mining impacts
- ongoing land-use and land management
- deforestation/removal of riparian vegetation
- invasive species
- water extraction
- climate change
- social and economic pressures.

The links between high-level pressures and condition are often complex; the high-level pressures ultimately translate into direct system stresses (stressors such as high nutrient levels), which consequently manifest as symptoms of degradation. Land-use and land management are common pressures across nearly all themes. There are also links between themes, where a condition indicator for one theme can be a pressure on an indicator in another theme.

Data sources

In general, only baseline information is available for this report. Data gathered during 2007–08 by NSW agencies has been the primary source of information, supplemented with existing data where available and of suitable quality. This also applies to the management activities included in each theme report. Data collected subsequent to 2007–08 will be included in future reporting and is available from the respective custodians.

Assessments made about the trends in resource condition refer to time scales in the various natural resource themes. In many cases no trend information could be obtained because long-term datasets are not available. Assessments of current condition have been made against a defined reference. In many cases this reference condition is defined as 'pre-European' but in some themes a shorter-term reference has been used and that is indicated in each of the themes.

There is an ongoing need to improve the data collection and analysis systems that are necessary to support the compilation and reporting process. Information about pressures and trends is also lacking across a significant number of themes for various reasons, including lack of existing quantitative data and the time-consuming nature of data collection, quality assurance and analysis. As the intention of the MER strategy is to trial indicators for long-term monitoring, the agencies are in the process of confirming indicator selection. The process of developing the pilot SOC reports involves providing agencies and CMAs with information on which to base that selection.

While the primary data source has been NSW agencies, searches were conducted for data from other potential custodians including CMAs, local councils, water authorities and universities. After checking sampling methods and quality assurance procedures, some of this data has been used to complement the state-wide data.

CMAs are required to monitor the effectiveness of management actions implemented under catchment action plans (CAPS). However, methods for incorporating this performance data, without biasing the representative nature of condition reporting at regional and state-wide scales,

remain to be developed. Some limited case study data has been incorporated in the pressure or management activity sections of the theme reports to demonstrate the effectiveness of a specific management action at a local scale.

Data limitations

The state-wide monitoring programs have been designed to report at state and regional scales. Because of the extent and complexity of natural resource assets in NSW and the variability between them, monitoring programs by necessity often sample at a number of discrete points. If sufficient points are sampled at appropriate locations and frequency, assessments can be confidently made of condition and trend. However, not all natural resource systems will be sampled for SOC reporting and there will be a need to develop models with the capacity to predict condition in those systems for which funding is not available. These models can then assist CMAs, state agencies, local councils and other natural resource managers to conduct risk assessments and assign priorities for investment accordingly.

Data gaps affect the ability to score some indicators and an index may score higher or lower depending on which component indicator data is available. If insufficient indicator data is available to rate the index, the index has been left unscored. There are opportunities for standard monitoring designs and sampling protocols to be developed for a number of indicators. Data collected by natural resource managers wishing to understand the condition of a particular system can then be of an appropriate standard and can complement the state-wide monitoring program.

Gaps in data coverage are evident in this report and these will need to be addressed through a forward development program of new data collection. As with all monitoring, the cost of resourcing data collection will need to be balanced against the inferential strength required from the program.

Management responses

Determining priorities for action often involves a risk assessment where tradeoffs are made between the condition of a natural resource, the severity of the pressure being exerted by human activity, the inherent capacity of the resource to sustain that pressure without adverse effect, the values ascribed to the resource by the community and the benefits and costs of action. Responses can be designed to target either the socio-economic drivers of landholder and manager decision-making, the human activity causing the pressure, a reduction in environmental stressors affecting the condition or else the degraded condition of the resource itself.

State and local government, CMAs, industry and the community respond to the pressures and threats posed to environmental health at a range of levels, from state-wide regulatory action to conserve natural resources, policy and strategy initiatives, public opinion and consumer preference campaigns, research and environmental information programs, land-use planning and economic instruments, through regional planning and investment, to local planning, education, capacity building, best management practice and on-ground protection and rehabilitation works.

The State Plan NRM targets are being addressed through state, regional and local partnerships. The CAPs and the published investment strategies that support them are the key documents that coordinate and drive the effort to improve natural resources across NSW. The CAPs describe the whole-of-Government approach to address each of the state-wide targets at the regional scale. The Murrumbidgee CAP can be found at www.murrumbidgee.cma.nsw.gov.au/about/mcma-cap.aspx.

Management responses of the Murrumbidgee CMA for the Murrumbidgee region are captured in

42 management targets comprising:

- land (nine targets)
- water (14 targets)
- biodiversity (seven targets);
- community (12 targets).

Implementation costs are included in the CMA investment strategy.

NSW Government agencies' theme specific management actions to support the achievement of the state-wide and CAP targets, along with specific regional actions by the CMA and various local activities, are described in the 'management activity' section of the relevant SOC report. The actions listed will be amended and refined as part of the adaptive management process.

Statutory planning

Statutory planning often addresses multiple aspects of natural resource condition and environmental pressures, on a range of scales. The planning process creates a strategic framework to identify, assess and prioritise land-uses and to assist in strategic investment for the revitalisation/management of natural resource values.

Land-use planning in the region is primarily conducted through local environmental plans (LEPs). All LEPs in NSW are currently being reviewed by local government in consultation with NSW Government agencies and the local community. The plans aim to ensure that appropriate development occurs in the landscape with consideration of future population demands, economic issues and the protection of natural resources and environmental assets in the area. LEPs are statutory controls against which development proposals are assessed.

A number of state environmental planning policies (SEPPs) provide further protection for specific areas (eg koala habitat, rural lands). In addition, the Department of Planning has prepared a series of regional strategies to guide sustainable growth while strongly protecting valuable natural and cultural assets.

Further reading

DNR 2006, *NSW Natural Resources monitoring, evaluation and reporting strategy*, NSW Natural Resources and Environment CEO Cluster Group, Department of Natural Resources, Sydney.

NRC 2005, *Recommendations – State-wide standard and targets*, Natural Resources Commission, NSW Government, Sydney.

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