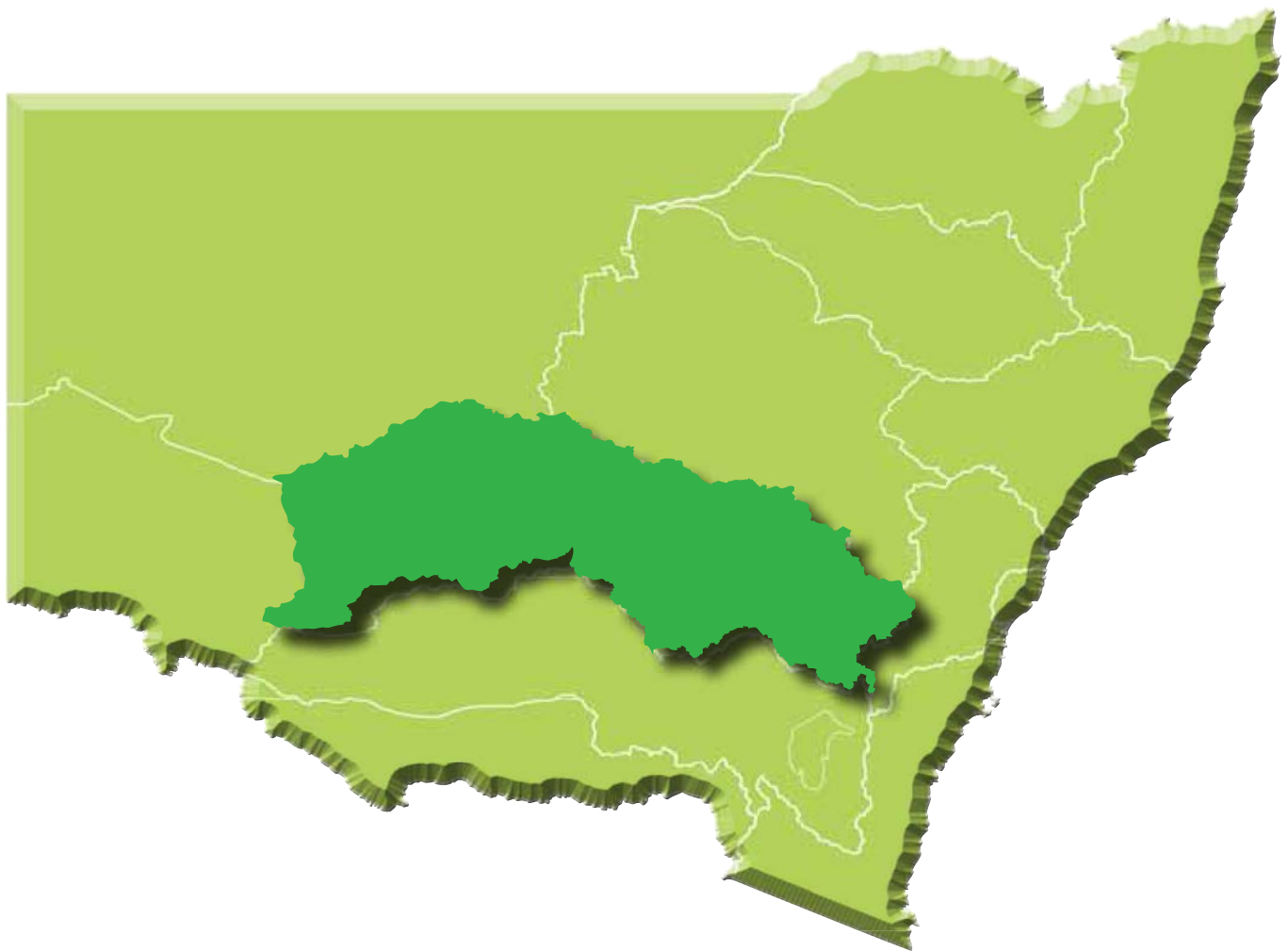


Overview

Lachlan 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.

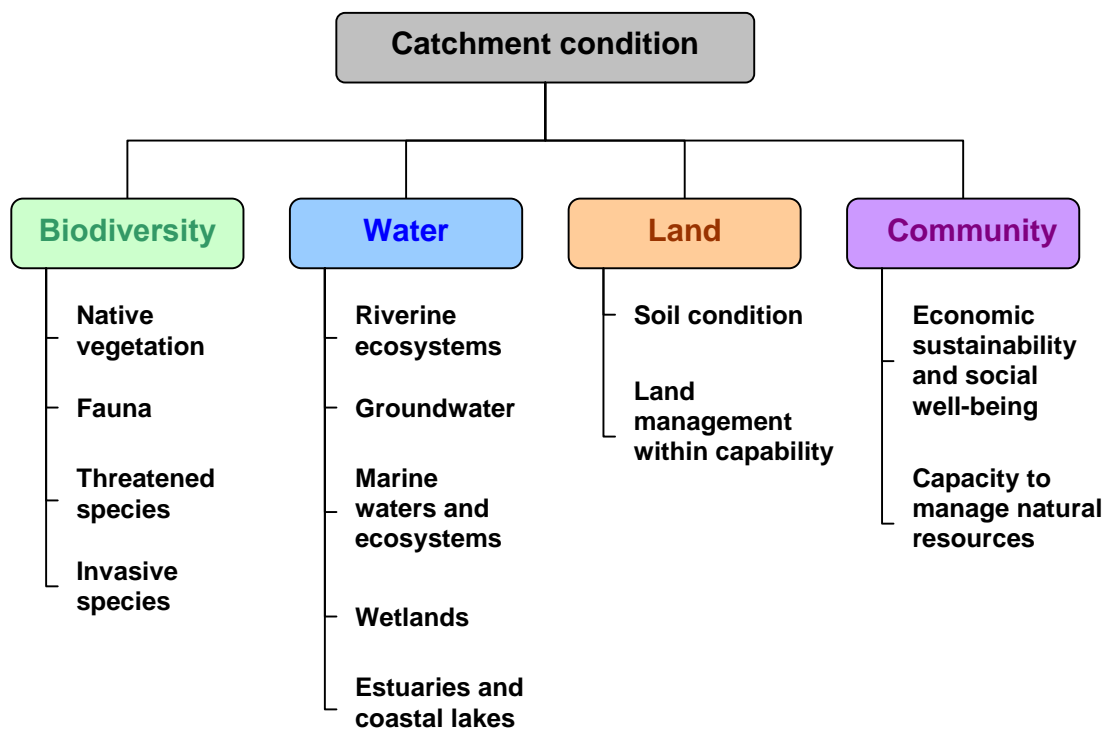


Figure 1 Resource themes categorised by state-wide targets

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 Lachlan 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 Lachlan region

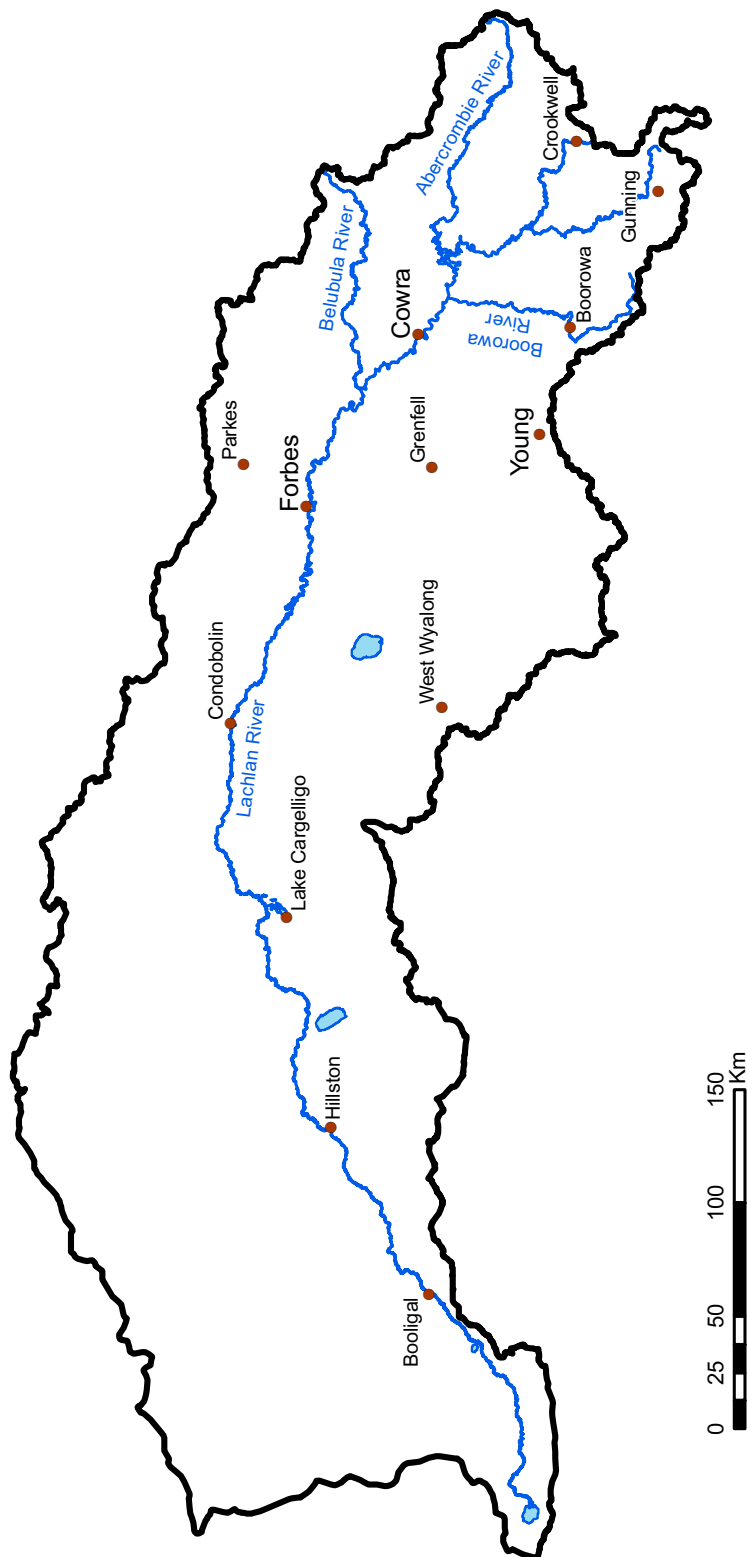
The Lachlan region is located in central west NSW and covers an area of 84,700 km². The Lachlan River rises near Lake George in the far east of the region and terminates in a series of wetlands and diverging creeks 1,450 km to the west.

The landscape varies markedly from east to west and forms three general divisions: tablelands, slopes and plains.

More than 106,000 people live in the region. The principal towns are Crookwell, Cowra, Young, Forbes, Parkes, Condobolin, West Wyalong and Hillston.

Agricultural production is the main land-use.

The Lachlan 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.



Lachlan region

Catchment condition for 2008

Table 1 summarises the theme-based ratings for the Lachlan 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 Lachlan 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		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 covers around 40 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 very poor. Within the Lachlan region, six of 554 species of terrestrial vertebrates recorded since European settlement have become extinct. A further eight species (12 per cent) of mammals, 34 species (10 per cent) of birds, 11 species (30 per cent) of amphibians and 24 species (21 per cent) of reptiles are estimated to have lost at least half of 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 six of the 134 threatened species, excluding extinct, within the region). Six fauna species and two flora species are presumed extinct; 30 fauna species and 16 flora species are endangered. There are 12 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 four emerging freshwater pests (fish) and one emerging pest animal species (feral deer). Invasive species that are widely distributed in NSW that are present in the region are freshwater pests and wild dogs. The proportion of non-native fish species to native species is 54 per cent averaged over all sites.

Water

- **Riverine ecosystems** – an overall rating for riverine ecosystem condition was not determined. The percentage of samples that exceeded total phosphorus guidelines was high to very high at all sites across the region, with the exception of one site. The percentage of samples that exceeded turbidity guidelines was moderate to high across the whole region, with the exception of two sites with insufficient data for analysis. The lack of recent data at many sites meant that just over half the trend results could not be reported. No sites had a rising or falling trend in water temperature. One site had a rising trend in electrical conductivity, while the trend at the remaining sites was stable or unclear. Turbidity results were the least reliable; however, three sites in the upper catchment and the site at the end of the catchment had rising turbidity trends. The overall macroinvertebrate condition was rated poor to moderate. The overall fish condition was very poor. Overall hydrologic condition was rated moderate to good.
- **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. The alluvial aquifers have the lowest condition rankings. The localised clustering of groundwater use in some of these GWMAs, such as the Lower Lachlan and some of the zones in the Upper Lachlan GWMA, 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 Lachlan 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 disturbance caused by vegetation clearing/modification in the catchment, point sources, grazing and impoundments without fish passage.

Land

- **Soil condition** – the overall soil condition in the 10 SMUs across the Lachlan region, which cover about 45% of the region, was rated fair. 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 acidity, organic carbon, 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 'Cowra Trough Red Soils – Cowra' SMU, which is predicted to show a decline in condition. The expected trend across indicators is stable except for wind erosion, organic carbon and soil structure 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 except acidification. The degree of land management within capability is tending to decline across indicators except for sheet erosion, gully erosion and salinity/waterlogging which are stable.

Community

- **Economic sustainability and social well-being (ESSW)** – overall condition was not assessed, but trends were either static or improving. Individual indicators to assess the likely benefit of NRM on maintaining ESSW rated either good or fair. The impact of skills and the effectiveness of NRM decision-making on ESSW was rated good while the impact of business, employment, networking and participation in NRM was rated only fair. ESSW is variable across the region. The eastern end of the catchment with higher rainfall is seen as faring better; however, drought is still affecting local economies. Key pressures include population change, market forces and drought/ climate change. Agricultural employment showed a lower decline than in other parts of NSW, while employment in mining increased significantly over the last decade.
- **Capacity to manage natural resources** – overall, the adaptive capacity of land managers in the region was rated fair to poor. The five capitals (*human, financial, physical, natural and social*) were assessed for the central and western areas. For the central area, the capacity of local land managers to contribute to effective NRM was assessed as relatively low for each of the five capitals. In the western area, *human* capital was seen as making a significant contribution to effective NRM. *Financial* and *natural* capitals were rated lowest of the five capitals in both areas.

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 in 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 Lachlan 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 Lachlan CAP can be found at www.lachlan.cma.nsw.gov.au/about/catchmentactionplan.aspx.

Management responses of the Lachlan CMA for the Lachlan region are captured in 35 management targets comprising:

- land (seven targets)
- rivers and groundwater (10 targets)
- biodiversity (12 targets)
- community (six 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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DECCW 2010/385 ISBN 978 1 74232 698 6 November 2010

Cover photos: Ken Stepnell/Nigel Blake/Paul Meek/R Nicolai/DECCW