

Regional State of the Environment Report

2008–2009
Comprehensive Report



For the Councils
of the Greater Central West Region of NSW:

Bathurst, Blayney, Bogan, Bourke, Cabonne, Coonamble, Cowra, Dubbo, Gilgandra,
Lachlan, Mid-Western, Narromine, Oberon, Orange, Warren, Warrumbungle, Wellington



Central West
catchment
management authority

Acknowledgements



The preparation of the Regional State of the Environment Report 2008-09 was funded by the Central West Catchment Management with contributions from the 17 participating local Councils. It should be noted that this is a Comprehensive SoE report and shows trends, where possible, in relation to the data from the Supplementary report first produced in 2007-08 for the region. It should also be noted that there were two new Councils (Bogan and Cowra) participating in the 2008-09 reporting process. Brewarrina and Weddin Councils, which participated in 2007-08, did not do so in 2008-09.

Prepared for:

The 17 participating Councils and the Central West Catchment Management Authority
 30 Warne Street, Wellington, NSW
 PO Box 227, Wellington, NSW, 2820
 Tel: 02 6840 7800 Fax; 02 6840 7801
www.cw.cma.nsw.gov.au

Prepared by:

Molino Stewart Pty Ltd
 Phone: (02) 9354 0300
www.molinostewart.com.au

Design:

Wild Red Frog Design
 Phone: (02) 9975 3305

© Central West Catchment Management Authority and the Councils of Bathurst, Blayney, Bogan, Bourke, Cabonne, Coonamble, Cowra, Dubbo, Gilgandra, Lachlan, Mid-Western, Narromine, Oberon, Orange, Warren, Warrumbungle and Wellington.

All intellectual property and copyright reserved.

Apart from any fair dealing for the purpose of private study, research, criticism or review, as permitted under the *Copyright Act 1968*, no part of this report may be reproduced, transmitted, stored in a retrieval system or adapted in any form or by any means (electronic, mechanical, photocopying, recording or otherwise) without written permission. Enquiries should be addressed to one of the Councils listed above or the Central West Catchment Management Authority.



Contents

Abbreviations

MESSAGE FROM THE CHAIR	4	ABS	Australian Bureau of Statistics
INTRODUCTION	6	AGO	Australian Greenhouse Office
Why a Regional SoE Report?	7	AHIMS	Aboriginal Heritage Information Management System
Who is involved in the Regional SoE Report?	8	ANZECC	Australian and New Zealand Conservation Council
What are Catchment Management Authorities?	9	BASIX	Building Sustainability Index
The CMAs and the Councils at a glance	11	BOM	Bathurst Orange Dubbo Alliance
This report	12	Bureau of Meteorology	
LAND	14	CAP	Catchment Action Plan
Issue – Land degradation	14	Centroc	Central West Regional Organisation of Councils
AIR	20	CMA	Catchment Management Authority
Issue – Air pollution	20	CPRS	Carbon Pollution Reduction Scheme
WATER	26	DECCW	Commonwealth Scientific and Industrial Research Organisation
Issue – Water quantity	27	DIPNR	Department of Environment, Climate Change and Water
Issue – Water quality	34	EC	Department of Planning and Natural Resources (former)
BIODIVERSITY	42	EEC	Electrical Conductivity
Issue – Habitat loss	42	EPA	Endangered Ecological Community
Issue – Threatened species	50	ETS	Environmental Protection Authority
Issue – Invasive species	53	GHG	Emissions Trading Scheme
HUMAN SETTLEMENT	56	GM	Greenhouse Gas
Issue – Population and settlement patterns	56	GPT	Genetically Modified
Issue – Management of Aboriginal heritage	61	ha	Gross Pollutant Trap
Issue – Management of non-Aboriginal heritage	64	INFFER	Hectares
Issue – Noise pollution	67	km ²	Investment Framework For Environment Resources
WASTE	70	LBL	Square kilometres
Issue – Waste generation and pollution	70	LEP	Load Based Licensing
Issue – Waste treatment and disposal	74	LGA	Local Environment Plan
TOWARDS SUSTAINABILITY	80	LHPA	Local Government Area
Issue – Sustainable practices	81	ML	Livestock Health and Pest Authorities
Issue – Climate change	84	NAP	Megalitres
REFERENCES	90	NGERS	National Action Plan
APPENDIX – DATA CONTRIBUTED BY COUNCILS	92	NRM	National Greenhouse and Energy Reporting System
		NSW	Natural Resource Management
		PAS	New South Wales
		PoEO	Priorities Action Statement
		PVP	Protection of the Environment Operations
		REC	Property Vegetation Plan
		Regional SoE	Roadside Environment Committee
		RTA	Regional State of the Environment
		RVMP	Roads and Traffic Authority
		SoE	Roadside Vegetation Management Plan
		STP	State of the Environment
		WTP	Sewage Treatment Plant
			Water Treatment Plant

Message from the Chair

Building on the success of last year's Supplementary Regional State of the Environment (SoE) Report, the Central West Catchment Management Authority (CMA) is again pleased to support the Councils of the Greater Central West Region in the preparation of the 2008-09 Comprehensive Regional SoE Report, presented here.



ABOVE Tom Gavel, Chairman, Central West Catchment Management Authority

The Regional SoE Report is an opportunity to detail the work undertaken by the Councils to care for their local environment and, in so doing, support the targets outlined in the Central West CMAs Catchment Action Plan, as we all move towards vibrant communities and healthy landscapes.

This year's Regional SoE Report is seen as something of a transition document, as changes are being made by the Department of Local Government to Councils' planning and reporting structure, including the State of the Environment Report. Consequently, the region's Councils have taken the opportunity in this SoE to identify environmental issues that are likely to affect their communities into the future.

Sustainability and responsible environmental management are two clear objectives across the region and the main themes emerging from the Councils' environmental objectives include:

- Providing and promoting environmental leadership
- Protecting the environment, biodiversity and habitats
- Considering future generations in decision making, planning and resource use
- Sustainable practices within the community and within the council
- Supporting environmental, economic and cultural values
- Contributing to larger regional, national and worldwide environmental issues, as well as local ones
- Preparing for, and ameliorating, the impacts wrought by changes to climate.

More specific objectives include:

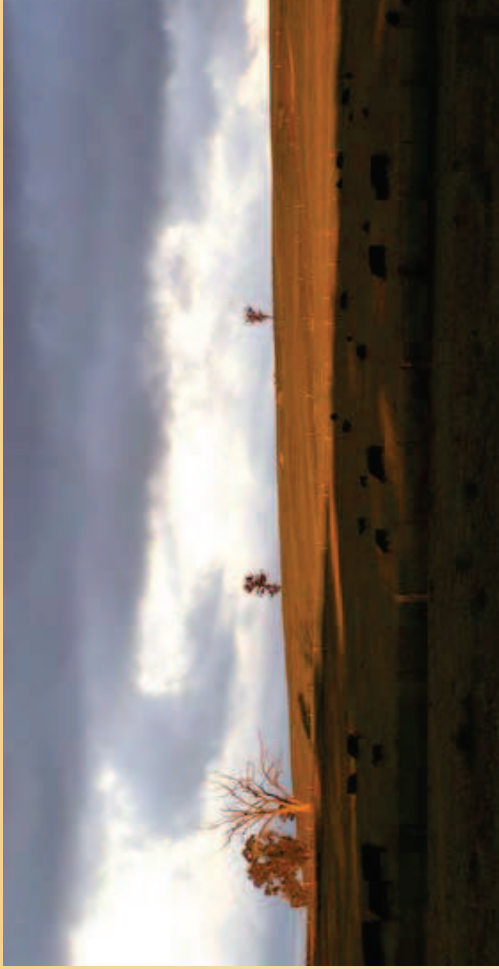
- Adopt and enforce strategies to maintain air quality
- Restore riparian corridors
- Reduce the amount of waste going to landfill.

In addition there is great emphasis on building partnerships between the community and the Councils to achieve these objectives.

Currently the Central West CMA and the Department of Environment, Climate Change and Water are providing information to the Councils which will help identify and protect the natural



RIGHT Bald Hill Reserve near Dubbo



resources of each Local Government Area through the planning reform process now underway. This process requires Councils to review their Land Use planning and Local Environment Plans, and creates an opportunity to recognise and put in place a greater level of environmental protection.

Working on a regional basis to identify and address issues in this way allows the Councils to take a proactive approach, which the Central West CMA commends and will continue to support through the Local Government Reference Group and the Salinity & Water Quality Alliance.

These groups continue to successfully develop the capacity of Local Government and their communities to undertake natural resource and water management activities, both on-ground and through the development of policy and the provision of training. In recognition of this, the Salinity & Water Quality Alliance and Central West CMA were recently presented with a Merit Award for Excellence in Stormwater Education by the NSW Stormwater Industry Association.

The environmental achievements detailed within this document once again show the tremendous effort being made by the regional Councils to care for their natural resources. The Central West CMA is proud to partner the Councils in caring for our catchments.

Tom Gavel

Tom Gavel
Chairman
Central West Catchment Management Authority

Rory Treweeke

Rory Treweeke
Chairman
Western Catchment Management Authority

Robert Gledhill

Robert Gledhill
Chairman
Lachlan Catchment Management Authority

ABOVE Cattle at sunset from Central West CMA photograph competition



Introduction

A State of the Environment (SoE) Report is an important management tool which aims to provide the community and Council with information on the condition of the environment in the local area. It also provides a platform for community action by raising awareness and understanding of key environmental issues which in turn helps people and organisations make informed decisions regarding future management actions to reduce the negative impacts on the environment.

The *Local Government Act 1993* requires that all local councils in NSW produce an annual SoE report on major environmental impacts, related activities and management plans.

Under the Act, councils are required to specifically report on:

1. Land
2. Air
3. Water
4. Biodiversity
5. Waste
6. Noise
7. Aboriginal heritage
8. Non-Aboriginal heritage, with particular reference, with regard to each such environmental sector, to:
 - management plans relating to the environment
 - special council projects relating to the environment
 - the environmental impact of council activities.

Under the Act, a Council must produce a Comprehensive SoE Report for the year ending after each election of Councillors. As there were Council elections in 2008, the 2008-09 report is a Comprehensive report. A Supplementary report is required in intervening years.

A Comprehensive SoE report differs from a Supplementary in that it establishes environmental indicators and reports on trends in relation to environmental indicators used in the report. It must also provide detailed information on the impact of activities implemented to improve the environment. A Supplementary report updates trends and reports on environmental impacts that have been introduced since the last Comprehensive report.

At the time of writing this report, the *Local Government Act 1993* was in the process of being amended. The amendments will allow for an Integrated Planning and Reporting Framework to guide Council's future strategic planning and reporting.

Below Livestock feeding in a drought-affected area



As part of the Framework, Councils will develop environmental objectives with their communities in relation to local environmental issues. These environmental objectives will form part of each Council's over-arching Community Strategic Plan. The information in the annual SoE Report should be used to inform Council's preparation of the Community Strategic Plan and continue to inform the required reviews of the Community Strategic Plan.

During the development of the new planning and reporting framework, the option to remove the requirement for a separate SoE Report was considered, as environmental reporting is to be integrated into reporting on the implementation of the Community Strategic Plan and Delivery Program. However, given concerns raised during consultation about the option to remove the SoE Report and the heightened importance of environmental management at a time of serious concerns about climate change, a separate SoE Report will continue to be required as the draft legislation currently stands.

This report reflects the transition from previous SoE reporting based on the 'traditional' themes as specified by the *Local Government Act 1993* (Air, Water etc.) to environmental issues and environmental objectives that could be developed by the 17 participating Councils in their Community Strategic Plans.

The Catchment Management Authorities (CMAs), created by the *Catchment Management Authorities Act 2003*, are also required to provide reports on the progress made towards the regional environmental planning framework, the Catchment Action Plan (CAP). This Regional SoE Report provides benchmarks for measuring catchment-scale changes in the environment as measured by the Local Governments, and should be linked into both Local Government and CMA management plans.



Why a Regional SoE Report?

This is the second Regional SoE report supported by the Central West CMA. It builds upon the first (Supplementary) Regional SoE Report produced for 2007-08. It was created to enable the community and the Councils of the central and western regions to gain a better understanding of the state of the environment in a regional context.

Environmental issues are not restricted to Council boundaries. Regional SoE reports are used to enable a better understanding of the state of the environment in a regional context and to identify future collaborative pathways. A regional approach to reporting:

- Facilitates a better understanding of the state of the environment across the region
- Encourages collaboration in regards to sharing ideas and resources
- Assists in the management of shared environmental resources
- Forges stronger regional links across participating Councils.

Above Although an Australian native, White Cedar can be invasive outside of its natural range

Councils are strongly encouraged to develop their SoE Report in partnership with other councils in their region and Catchment Management Authorities, as environmental monitoring and reporting is usually more useful when done at a regional and/or catchment scale.

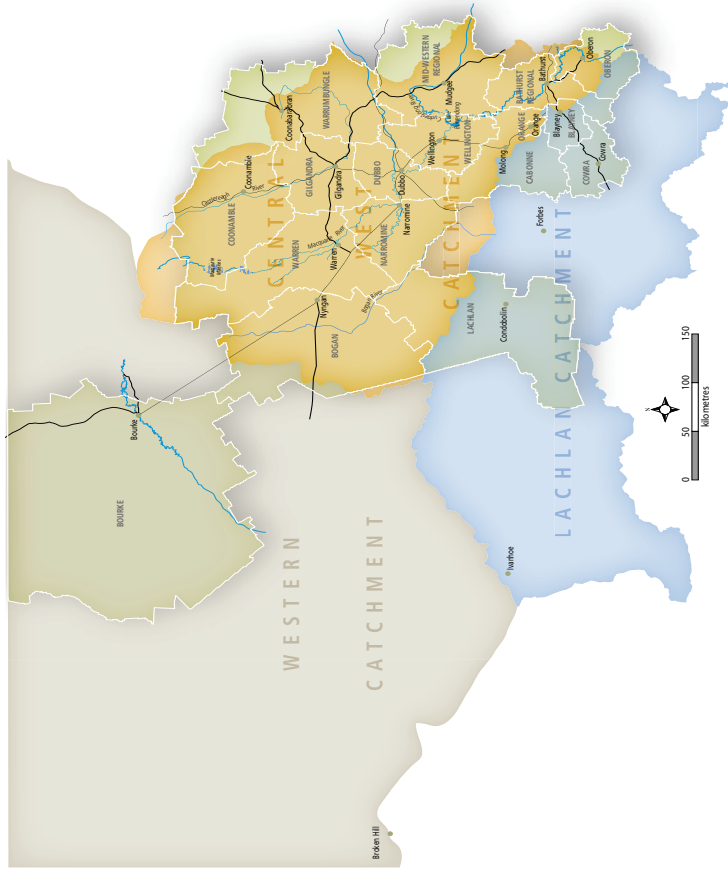


Figure 1 Map showing participating Council areas and catchment boundaries

The initiatives presented in this report for each participating Council do not reflect all of the initiatives undertaken by Councils during the reporting period. Furthermore, the format of the Regional SoE does not allow for each Council to identify progress on their environmental management and sustainability plans, which some Councils have previously included in their SoE reports. Councils can append additional information specific to their Council in the back of this report, should they wish.

Who is involved in the Regional SoE Report?

As shown in Figure 1, most of the participating Councils are situated, totally or partly, in the area of the Central West Catchment. Bourke

- Orange City Council
- Warren Shire Council
- Warrumbungle Shire Council
- Wellington Council

The participating Councils have provided data to be included in the Report, with additional regional information sourced by the Central West CMA.

What are Catchment Management Authorities?

Thirteen Catchment Management Authorities (CMAs) have been established across the State by the NSW Government to ensure that regional communities have a significant say in how natural resources are managed in their catchments.

The CMAs are locally driven organisations with a board that reports directly to the NSW Minister for Environment, Climate Change and Water (DECCW). These statutory bodies coordinate natural resource management (NRM) in each catchment. They are responsible for involving regional communities in management of NRM issues facing their region, and have been the primary means for the delivery of funding from the NSW and Federal Governments to help land managers improve and restore the natural resources of the State (NSW Government, 2005).

A profile of the three CMAs relevant to this report is provided below.

The Central West CMA

The Central West Catchment, located in Central Western NSW, has a diverse range of people and industries. It covers approximately 84,919km² from the central tablelands around Oberon, Bathurst and Rylstone to the western plains around Nyngan, Brewarrina and Coonamble. The catchment supports the major centres of Bathurst, Orange, Mudgee and Dubbo. There are also many other smaller but significant townships including Coonamble, Gularagambone, Nyngan, Warren, Narramine, Wellington, Gulgong, Peak Hill, Molong and Oberon.

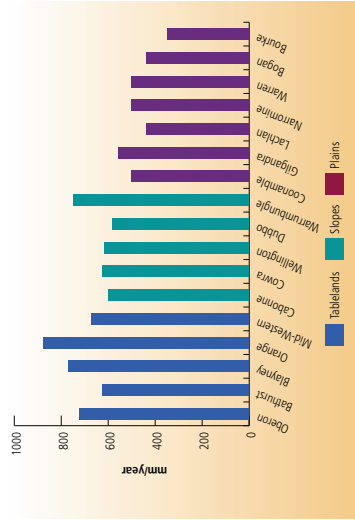
The total population of the Central West Catchment based on the 2006 Census was 183,303 persons incorporating a total Indigenous population of 13,093 persons,

which is 7.1% of the total population of the catchment (ABS, 2009). Major industries in the catchment include agriculture, agribusiness, tourism, mining and viticulture. One of the main reasons that natural resource management issues are so complex within the Central West Catchment is the highly diverse range of agricultural uses. The eastern highlands and western plains are dominated by grazing, the Central West slopes and inner plains support extensive winter cropping, Mudgee, Orange and the Bell River floodplain are places of intense viticulture and horticulture and the Macquarie River floodplain is home to irrigated cotton and other summer crops. The region also supports forestry and mining activities.

The Central West Catchment includes the Castlereagh, Bogan and Macquarie River valleys. It is flanked by the Barwon-Darling catchment to the west and north-west, the Namoi catchment to the north-east, Lachlan to the south and Hunter and Hawkesbury-Nepean catchments to the east. While the upper reaches of the Bogan and Castlereagh Rivers are largely unregulated, rivers in the Macquarie Valley are highly regulated. Windamere Dam on the Cudgong River upstream of Mudgee has a capacity of 368,000 ML and the Burrendong Dam located at the junction of the Macquarie and Cudgong River at Wellington has a capacity of 1,189,000 ML. River regulation and water extraction has had substantial effects on flow regimes, with changes to seasonal flow patterns, reduced variability and changes to flood intensity.

The region possesses a wide diversity of landforms, vegetation species and communities. It incorporates the internationally recognised Macquarie Marshes, the Warumbungles National Park and important areas of remnant Endangered Ecological Community Box Gum Woodland and grasslands. At the time of European settlement, the Central West Catchment supported a complex mosaic of forests, temperate and semi-arid woodlands, wetlands, shrublands, heaths and grasslands. Clearing and subsequent degradation has reduced this natural vegetation cover to a large number of small, isolated remnants on the less fertile and productive soils, and a smaller number of scattered larger reserved

Introduction



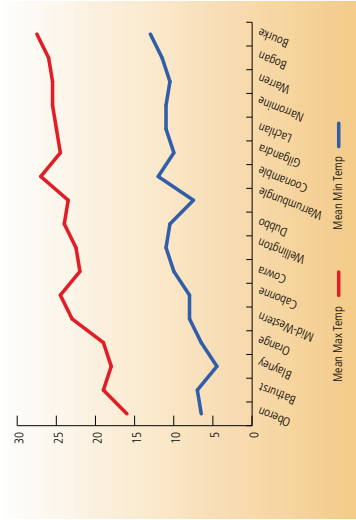
Source: BOM, 2009

Figure 3 Annual Average Rainfall of participating Councils

and house ownership. There is also a greater percentage of the population who have an Indigenous background with 7.3% of the region's population being of Aboriginal or Torres Strait Islander heritage compared to the national average of 2.3% (ABS, 2009). This variation in population characteristics translate to different challenges being presented to the Councils that are unique to the reporting region.

Climate in the Central West

The climate of the Central West is highly variable as it covers a large geographic area and a range of topographies. Broadly, these can be grouped into tablelands, slopes and plains, reflecting the influence of the Great Dividing Range in the east through the slopes



Source: BOM, 2009

12 2008-2009 Comprehensive Report

to the floodplains of the west and north-west. There is an overall decline in average annual rainfall moving west from the tablelands to the plains (Figure 3). Average daily minimum and maximum temperatures are lowest for the tablelands, intermediate for the slopes and highest for the plains (Figure 4).

The CSIRO has outlined the predicted impacts of climate change in the Central West Catchment (CSIRO, 2007a). It is predicted that storm intensity and frequency is likely to increase, decreasing the local reliability of rainfall. Extreme rainfall events will become more frequent, with a one in 40 year event predicted to increase by up to 20% by 2030. The number of days per year above 35°C is expected to increase from four to eleven by 2030. It is also thought that in areas of declining rainfall, the risk of land and water salinity will be increased.

This report

Themes

As discussed above, this report covers the 'traditional' themes used in NSW SoE reporting as required by legislation. The traditional reporting themes have been included under the following main themes for the report:

- Land
- Air
- Water
- Biodiversity
- Human Settlements
- Waste
- Towards Sustainability.

The last main theme ('Towards Sustainability') is a diversion from the traditional SoE reporting themes and reflects the desire for the participating Councils and CMAs to help move their local communities towards environmental sustainability.

Environmental issues

To respond to the proposed changes in SoE reporting related to the new Integrated Planning and Reporting Framework (DLG, 2009), each participating Council provided a list of environmental issues that could lead to the development of environmental objectives as required in future SoE reports. These environ-

mental issues were categorised and have been addressed under the main themes as follows:

- Land (Land Degradation)
- Air (Air Pollution)
- Water (Water Quantity, Water Quality)
- Biodiversity (Habitat Loss, Endangered Species, Invasive Species)
- Human Settlement (Population and Settlement Patterns, Noise Pollution, Management of Aboriginal Heritage, Management of Non-Aboriginal Heritage)
- Waste (Waste Generation and Pollution, Waste Treatment and Disposal)
- Towards Sustainability (Sustainable Practices, Climate Change).

It should be stressed that the number of issues related to each theme does not reflect the importance of that theme in comparison to other themes; it reflects more the range of disparate issues under each theme.

It should also be noted that although they are discussed primarily under one theme, several issues such as climate change, where the impacts are pervasive, are further discussed under other themes.

Environmental indicators

Indicators are important management tools used in environmental reporting. They summarise and communicate information about the condition of key aspects of complex environments so that our decision making can be better informed.

In this report, a suite of indicators has been identified that help report on the environmental themes and issues listed above.

While many of the indicators for this Report have been selected from past Council SoE Reports and the 2007-08 Regional SoE Report, some new indicators have been selected, for which most of the participating Councils can provide meaningful data. Where indicators are new, data from previous years is not available to enable the presentation of environmental trends over time.

A list of Councils, that provided data for each indicator is found in the report appendix.

As stressed above, a Comprehensive SoE report such as this needs to include trends related to the environmental indicator data collected. Thus where comparison with 2007-08 or previous data is possible, trends



ABOVE Cattle farmers in Coonamble

for the indicators are provided in a summary table at the commencement of each theme chapter. The trends are highlighted as below using up arrows (signifying improvement), sideways arrows (no or little change) and downward arrow (showing a worsening trend).

- ↑ improvement
- no or little change
- ↓ worsening trend

There is an explanation for each trend within the chapter and possible reasons for it occurring.

Pressure-State-Response

The conventional way of reporting on each theme is using the 'Pressure-State-Response' model. This order has been modified to State-Response in this report to initially highlight the current situation. Wording has also been changed as follows: Pressure to 'Threat', State to 'Condition'. The new terms are thought to be less technical.

In this report, Condition-Threat-Response is related to each environmental issue as sub-headings. Environmental indicators are tagged to one of these sub-headings. A further sub-heading called 'Future Challenges' is found at the end of each issue report and lists suggested future actions and concerns relevant to the reporting for that theme.

Land

This chapter focuses on the condition of the land in the participating Council areas. The landscape of the reporting area is diverse in character, including residential, agricultural, industrial and natural landscapes. Land is a natural asset that can be considered to consist of a diversity of geological forms; topsoil availability; soil health; land that supports natural systems; and land available to support a variety of human uses (including open space for public access).

The riverine and floodplain areas provide great aesthetic and recreational opportunities for the region's residents and tourists, as well as important water resources for the economy and environment. Land provides a number of services that we rely on, including food production, rural/urban lifestyles and work and recreation opportunities that ultimately support human health. Land resources also provide a range of environmental services.

A major issue in the region is land degradation caused by soil erosion, salinity and contamination.

tablelands and slopes have ratings of poor soil health, but there is a trend toward improved cropping and grazing management practices.

Lower nutrients and poorer soil types are characterised in the tablelands due to higher total rainfall. The geology of the area is dominated by coarse grained, acidic rocks resulting in sandy textured soils that are developed in-situ and susceptible to erosion (Central West CMA, 2007). The slopes have variable geology with soils types that are less fragile and have higher nutrient levels. They also have naturally higher salt stores, increasing the risk of land degradation due to salinity (Central West CMA, 2007). The plains are dominated by alluvial and aeolian soil development resulting in higher fertility and clay contents that have a higher shrink-swell potential and can be susceptible to compaction problems.

Erosion

Erosion is a significant land factor that influences water quality in our streams and habitat quality. Erosion generally occurs where land has been disturbed or where water concentrates, such as unsealed roads, roadsides and driveways, agricultural areas (cropping, land clearing and over grazing), industrial areas, stormwater outlets, where vegetation is otherwise removed and in waterways. Impacts from erosion include loss of arable land and habitat, weed invasion, soil loss, dust storms and sedimentation of waterways.

Although Councils do not hold data on the extent of erosion affected land in their LGAs, the Central West CMA reports that 100,000 ha of land is affected.

Salinity

While there are many causes of salinity (including irrigation and removal of vegetation), the effects on land resources can be very



significant regardless of the cause. Salinity changes the soil structure, increasing the erosion hazard. Limited vegetation will grow on saline areas, reducing feed for stock, habitat for native species and changing the local ecosystem. Salt also affects infrastructure such as roads and buildings which may cause high economic impacts for the local Council and community. For example, the salinity impacts on rural roads have been costed between \$100/km/year (very slight impact) and \$1200/km/year (severe impact) (DIPNR, 2005). Salinity levels in rivers are discussed in the Water chapter.

Identified by the recent Murray Darling Basin Salinity Audit, and confirmed by the Central West Catchment Salinity Risk Assessment (Humphries, 2000), the Bogan, Castlereagh and Macquarie catchments are recognised as being among the most "at risk" of serious salinity problems.

Contamination

Contaminated land has the potential for immediate or long-term adverse effects on

human health and the environment. Land contamination is usually the impact of past land uses such as service stations, fuel depots, horticultural facilities, orchards, sheep dips, agri-chemical dumps, pistol ranges, mines, landfills and gasworks. A site is classified as contaminated when hazardous substances occur at concentrations that are above normal background levels, posing a potential risk to human health or the environment. The Department of Environment, Climate Change and Water (DECCW) maintains a register of contaminated sites, and local Councils also register further contaminated sites such as old landfills. Some participating Councils also maintain a list of potentially contaminated sites based on past land use.

Indicator – Number of contaminated land sites (Contaminated land register)

Under the Contaminated Land Management Act 1997, DECCW may declare that some contaminated lands are "significant enough to

ABOVE Erosion gullies at Sawpit Creek, Bathurst, prior to rehabilitation

Table 4 Summary table of indicator trends – Land Degradation

Issue	Indicator	2007-08	2008-09	Trend
Contamination	Number of Contaminated land sites – contaminated land register	6	6	↔
	Number of Contaminated land sites – potentially contaminated sites	523	755	↑

- ↑ improvement
- ↔ no or little change
- ↓ worsening trend

Note – the above trends are for data in 2007-08 and 2008-09 from the same sources. They should be read in terms of limitations outlined in the discussion below. Note also that there are some new indicators for 2008-09 for which no comparison could be made with 2007-08. Refer to the Appendix for Councils included in trend data.

*Wiradjuri saying— 'Ngangaana-gu Kairai billa's
dya Kairai billa's durai ngangana ngindui'
'Look after the land and the rivers and the land
and the rivers will look after you'*

(Cec Grant – 2001)

use of fertilisers is also a major contributing factor to soil acidification.

Inappropriate development and land use change

Inappropriate development in environmentally sensitive areas can contribute to land degradation, for example, development in areas of highly erodible or fragile soils, on saline prone soils or on land which fronts streams or in wetland areas can exacerbate land degradation issues. Inappropriate subdivision of rural lands can also threaten agricultural productivity and biological diversity.

Climate Change

The predicted impacts of climate change will vary depending on various land features such as fertility, biology and physical soil characteristics mentioned above, as well as the area of green cover and water availability. However, while there is no uniform response, it is generally accepted that as temperatures rise, soil moisture and thus nutrient availability decreases, as does the soils ability to support vegetation.

This is particularly prevalent in arid lands compared to forested areas and combined with increased temperatures, causes a "baking" of the land.

Soils can also be either a net sink or a net source for greenhouse gases (GHG). In more densely vegetated areas, including perennial pastures, carbon dioxide (CO₂) is plentiful due to plant respiration. Because of the high availability of CO₂ in these areas, the growth rate of plants is also increased.

This enhances soil organic matter and results in healthier soils. Healthier soils will support a greater population of micro-organisms. These soil micro-organisms also contribute CO₂ to the environment, however their contribution to building soil and soil carbon is far more significant. A current estimate of global carbon stocks in soil is approximately 1750 +/- 250 Gt (Royal Society, 2001).

Response Agricultural lands

A significant focus of CMA funding programs has been improving soil management in agriculture, not only for soil health but also

each of the 17 LGAs and compares 2007-08 figures with 2008-09 where reported by Councils.

It should be noted that it is difficult to compare this data across LGAs due to the fact that much of it relies on different registers maintained by Council that differ in content and may not be updated on a regular basis. One of the reasons for the high value recorded for Dubbo is that this Council have attempted to identify all possible sites that may contain contamination due to past or present land use.

Comparing those Councils that reported in 2007-08 with the same Councils in 2008-09, there appears to be an increase in the number of potentially contaminated sites across the region and thus a 'worsening trend' for this indicator (as shown in the summary table, Table 4, at the start of this chapter). However, another possible reason for the increase in contaminated sites could be due to better reporting methods. Councils are becoming more aware of previously contaminated sites and are including them on their registers so that these issues can be addressed should a change in land use warrant it.

Threat

Land Clearing

The clearing of natural vegetation compounds land degradation problems such as erosion and salinity. Rainfall and overland flow, that is usually taken up by vegetation, erode sections of the land away producing a gully effect. The excess water also soaks into the ground and adds to rising water tables which bring salt deposits with them, increasing soil salinity and reducing the productivity of soils.

Agriculture

Agriculture can cause significant impacts on land if it is not managed sustainably. These impacts can include loss of groundcover, causing erosion and therefore loss of topsoil, changes to soil structure and health, increases in soil acidity and increased areas of soil scalds. Extreme impacts may lead to desertification and loss of soil fertility. Intensive agriculture in the plains areas of the Central West is also causing rising acidity levels in areas that due to a lower rainfall have not previously experienced these problems. The inappropriate

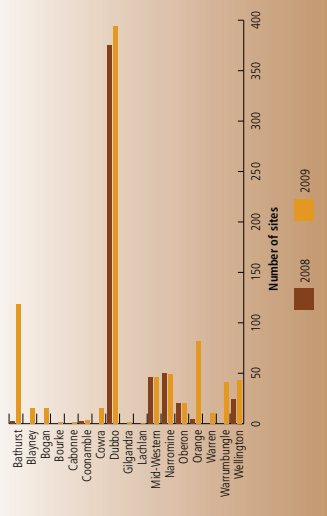


Figure 5 Number of potentially contaminated sites in each LGA

warrant regulation". These lands are listed in a register of contaminated lands found on the DECCW website at <http://www.environment.nsw.gov.au/cimapp/aboutregister.aspx>.

As shown in the summary table (Table 4) at the front of this chapter, the number of sites on the contaminated land register in the region remained the same in 2008-09 (the total in 2007-08 was six but Weddin Council with one site was not involved in this report. Cowra Shire Council, now included in 2008-09 is also six). Apart from Cowra Shire, the registered contaminated sites are located in Bathurst, Dubbo and Orange LGAs.

Indicator – Number of contaminated land sites (potentially contaminated sites)

Local Councils deal with other contamination under the planning and development framework, including State Environmental Planning Policy No. 55 – Remediation of Land and the Managing Land Contamination – Planning Guidelines. This type of site, although possibly contaminated, does not pose an unacceptable risk under its current or approved use to the best of Council's knowledge.

The planning and development process will determine what remediation is needed to make the land suitable for a different use.

In 2008-09, local Councils across the reporting region identified 738 potentially contaminated sites. Figure 5 shows the number of potentially contaminated sites in

as well. This contributes to wind and water erosion, soil structure decline, organic carbon loss and salinity. To improve soil health, the main management actions that are being implemented are based on maintaining optimal groundcover all year round, minimising ground disturbance from machinery and compaction by stock and machinery (Lachlan CMA, 2006).

Indicator – Extent of erosion affected land rehabilitated

This is a new indicator and thus cannot provide a trend for 2008-09. From the responses by two Councils that reported and the Central West CMA, 14,514 ha of erosion affected land was rehabilitated across the region from 2005-2009.

Inappropriate development and land use change

Some Councils are using Environmentally Sensitive Area mapping provided by DECCW and other relevant state agencies in their planning processes and decisions to help protect against inappropriate development. Councils are also attempting to address inappropriate sub-division of rural lands and development of environmentally sensitive land through the LEP process and other planning controls.

Urban Sediment

Many of the reporting Councils have developed sediment and erosion control policies, which although relating primarily to urban areas, aim to mitigate the effects of stormwater on water quality.

For example, they may require builders to install sediment controls around a site to prevent any soil material leaving the site, and to keep and stockpile topsoil for rehabilitation purposes. This is further discussed in the Water chapter.

Contamination

A range of projects have been undertaken across the reporting area to address this issue. Responses to contamination include both research to locate and identify contaminated sites, and on ground works to address contamination issues.

Many of the Councils have identified a list of potentially contaminated sites and are seeking funding or cooperative projects. For example, Lachlan Shire Council has identified that priority areas are older landfills and disused service stations. It is noted that there is only limited information for potentially contaminated sites.

There are several projects being carried out across the region involving the rehabilitation of contaminated sites. For example, Wellington Shire Council is working on a former gasworks site. Bathurst Regional Council is also remediating a gasworks site (see case study).

Indicator – Number of contaminated sites rehabilitated

All 17 participating Councils reported on this indicator for 2008-09. They reported that 24 sites across the region have been rehabilitated. The data for trend analysis for this indicator is very limited as only one local Council reported on this indicator in 2007-08.

Salinity

Salinity management has traditionally been the role of the agricultural sector and the State Government, through remedial works, education programs and monitoring of river salinity levels.

Councils are starting to address the issue, depending on the current level of risk identified in the LGA and therefore the priority of the issue to the local community. For example, Dubbo City Council has identified urban salinity as an issue for some years. Urban salinity can affect infrastructure such as buildings, driveways, fences and roads, as well as limiting plant growth. Council has therefore invested in a range of management options to effectively monitor and manage salinity in and around Dubbo.

An example of the management options put in place by Dubbo City Council is the Dubbo Urban Salinity Network. Commencing in 2004 and consisting of 129 bores covering the Dubbo urban area, the Network is one of the best monitoring networks in Australia. Groundwater levels and conductivity data are collected monthly to assist Council in effectively managing salinity across the urban area.

Data collected by Dubbo City Council has identified salinity issues in areas not previously considered to be at risk. Council is now using the data collected since 2005 to develop groundwater, soils and salinity hazard mapping to assist in future land use planning and salinity management.

The Central West CMA has a salinity management program under the CAP. This program targets the replanting and management of recharge areas through the use of perennial plants and other vegetation on agricultural land. It also addresses improving water efficiency in irrigation areas to limit groundwater recharge in saline areas, and encourages Councils to address urban salinity issues.

Indicator – Extent of salinity affected land rehabilitated

This is a new indicator for 2008-09. The Central West CMA reported that 89,011 ha of salinity affected land in the region has been rehabilitated from 2005-2009.

The Central West CMA, reported in its 2008-09 Annual Report that through its salinity management program, significant inroads had been made in achieving salinity related management targets. This progress is shown in Table 5.

Future challenges

Future challenges related to land degradation across the region include:

- Understanding the nature and extent of erosion across the region
- Obtaining consistent data in relation to some land degradation issues (e.g. potentially contaminated sites)
- The availability of funding to address land degradation issues. Note that the Water Quality and Salinity Alliance is developing a five year plan that will outline actions and can be used to support funding applications.

A further challenge is to ensure that Environmentally Sensitive Area mapping, prepared by the relevant state agencies to highlight the location and diversity of sensitive lands, is used by the Councils to protect rural lands and ecosystem services they provide from

Case Study: Site Remediation of Bathurst Gasworks

Bathurst Regional Council was able to gain funding of \$500,000 from the NSW Environmental Trust to implement remediation works at the former Bathurst Gasworks site, a scheduled site under the Contaminated Lands Management Act 1997. Bathurst Regional Council has entered into a Voluntary Remediation Agreement with DECCW which allows remediation works to be undertaken as funding becomes available. The Stage 1 Remediation Project included the removal of more than 190m³ of tarry wastes from a variety of structures on the site such as a tar well and tar separator tanks. The tarry wastes were mixed with fly ash and approximately 80% were treated by a process known as Batch Thermal Description. The remaining tarry wastes were treated by cement fixation and stabilisation. All treated wastes were able to be classified as solid waste and were disposed of at the Bathurst Waste Management Centre. The Stage 1 Remediation Project has been successful in removing tarry wastes from the site that were known to be impacting on the surrounding soil and groundwater.

In June 2009, Bathurst Regional Council was awarded \$90,453 to undertake further remediation works at the former Bathurst Gas Works site. The Stage 2 Remediation Project will commence later in 2009 and will include the installation of additional groundwater monitoring wells, laboratory analysis of groundwater samples from the wells and an assessment of two gasometers (or gas holders) present on the site. The results of the Stage 2 Remediation Project will allow Bathurst Regional Council and DECCW to negotiate what further remediation works, if any, will be required at the site.

Table 5 Central West CMA progress against targets for salinity land management

Management Target	Goal	Progress (June 2009)
MTSA2 – Large interception plantings on 30,000 ha of key upland landscapes	30,000 ha	7,346 ha
MTSA3 – Remnant vegetation in 150,000 ha of key saline landscapes	150,000 ha	10,626 ha
MTSA5 – Perennials increased by 100,000 ha in identified recharge landscapes	100,000 ha	56,210 ha
MTSA6 – Water efficient farming systems in 300,000 ha of dryland cropping farming	300,000 ha	46,424 ha
MTSA8 – All 17 local Government Councils involved in urban salinity management	17 Councils	13 Councils

Source: Central West CMA Annual Report 2008-09

Note other four Councils have their main urban centre outside Central West Catchment boundaries.

undesirable settlement and agricultural intensification which could compromise both biodiversity and primary production.

The atmosphere is an essential natural asset that supports the health of the planet and our quality of life. Our atmosphere also regulates the type and amount of radiation that hits the earth's surface from the sun (the ozone layer), regulates temperature (through the 'greenhouse effect') and provides the gases that plants need to grow and animals, including people, need to breathe.

However, there are substances in the air which may impair the health of humans, plants and animals, reduce visibility or change the temperature balance. While many of these substances, including greenhouse gases and some pollutants (such as dust) occur naturally, human based activity has rapidly increased the amount of these substances in our atmosphere, which has resulted in impacts to air quality and changes to our earth's climate system.

These changes include depletion of the ozone layer, while monitoring of the ozone layer shows a recent stabilisation of atmospheric ozone, levels are still significantly below pre-1980 levels. One of the most significant environmental issues facing our community is human induced climate change caused by greenhouse gases, whereby the addition of carbon dioxide and some other gases to the atmosphere is increasing the rate at which our atmosphere warms. As climate change will have an impact on all other themes in this report, greenhouse gases and their impacts are covered in detail in the

Towards Sustainability chapter and are also mentioned in other chapters.

Issue – Air Pollution

Condition

Regional Air Quality

Indicator – Number of days that air pollution maximum goals were exceeded

Much of the State-level air quality monitoring is confined to the Greater Metropolitan area which includes Sydney, Wollongong and Newcastle. DECCW has recently begun monitoring at one site in the reporting region, Bathurst; however, ozone and particulates are the only air pollutants measured at this site. Particulates can include particles, dust, smoke, plant spores, bacteria and salt. Particulate matter may be a primary pollutant, such as smoke particles, or a secondary pollutant formed from the chemical reaction of gaseous pollutants.

Human activities resulting in particulate matter in the air include mining; burning of fossil fuels; transportation; agricultural and hazard reduction burning; the use of incinerators; and the use of solid fuel for cooking and heating. Particulate matter can be usefully classified by size. Large particles usually settle out of the air quickly while smaller particles may remain suspended for days or months. Rainfall is an important mechanism for removing particles from the air.

The size of a particle also determines its potential impact on human health. Larger particles are usually trapped in the nose and throat and swallowed. Smaller particles may reach the lungs and cause irritation there. Fine particles can be carried deep into the lungs and irritate the airways. When exposed to particulate pollution, people suffering from heart disease may experience symptoms such as chest pain, and shortness of breath.

Table 6 Summary table of indicator trends – Air Pollution

Issue	Indicator	2007-08	2008-09	Trend
Air Pollution	Number of days that air pollution maximum goals for particulate matter were exceeded*	1	5	↑
	Number of premises on the National Pollution Inventory**	42	51	↑
	Number of Environment Protection Licences issued	158	202	↑
	Number of air quality complaints to local Councils	194	66	↓

* Data collected at Bathurst – only monitoring station.

** Compares 2006-07 data with 2007-08

- ↑ improvement
- ↔ no or little change
- ↓ worsening trend

Note – the above trends are for data in 2007-08 and 2008-09 from the same sources. They should be read in terms of limitations outlined in the discussion below. Note also that there are some new indicators for 2008-09 for which no comparison could be made with 2007-08. Refer to the Appendix for Councils included in trend data.

Particulate pollution can also aggravate existing respiratory diseases such as asthma and chronic bronchitis (DECCW, 2009).

The National Environment Protection Measure (NEPM) sets maximum goals or standards for each pollutant type, except for visibility, which is set by DECCW. When these goals are exceeded, they are recorded. The graph for Bathurst (Figure 6) shows the number of days per year that particulate matter exceeded the standards.

PM10 is used to define air particles that are up to 10 micrometers in diameter and are among the coarser particles that can be measured in air quality analysis. As shown in Figure 6, the number of days that the air pollution maximum for particulates (PM10) was exceeded for 2008 was only one day, slightly less than the two days for 2007.

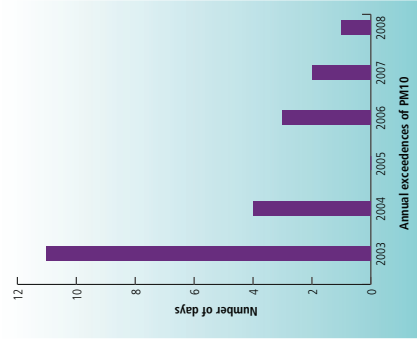
However, as shown in the summary table (Table 6), when comparing 2007-08 with 2008-09 there was an increase in exceedances and thus a worsening trend.

Air Quality Complaints

Indicator - Number of air quality complaints to local Councils

As shown in the summary table (Table 6) at the start of this chapter, the number of complaints to the local Councils about air quality matters (not including odour issues) reduced significantly from 194 complaints in 2007-08 to 66 complaints in 2008-09. This comparison involved the same eleven Councils. Note that

Figure 6 Number of days that air pollution goals were exceeded at Bathurst



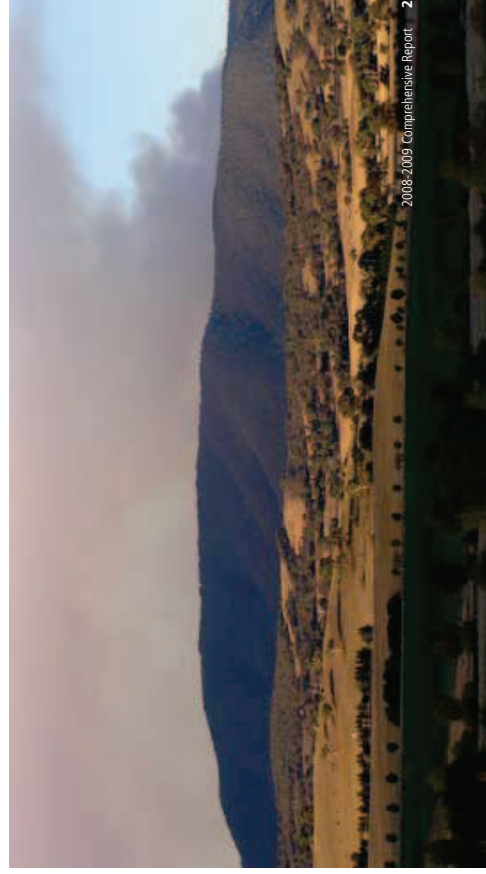
Source: DECCW website

odour may have been included in the 2007-08 air quality data.

There were a total of 104 air quality complaints received in 2008-09 from all 17 participating Councils. The types of air quality complaints across the Council areas are shown in Figure 7.

Burn-offs were the main specified air quality complaint with complaints about wood smoke and dust also significant. The high number of air quality complaints for Dubbo appear to be due to asbestos complaints, spray painting and emissions from food outlets.

There were 103 air quality complaints received on the EPA Pollution Line across the





The atmosphere surrounding the earth consists of a complex mix of gases that support life on earth by providing air for us to breathe and maintaining a suitable temperature. This balance includes nitrogen (78%), oxygen (21%), carbon dioxide (0.04%), small trace amounts of other gases and water vapour.

amounts of particulates. Bushfire management activities involving the prescribed use of fire (for hazard reduction) are highly regulated, both operationally and with regards to potential environmental impacts. The local area Bush Fire Risk Management Plans contain references to smoke management, and the need for operational plans to consider the effects of smoke on nearby residences, and sensitive locations such as hospitals, aged care facilities, schools and tourist centres. These plans state that all burn plans must include measures to reduce the impact of smoke as far as practicable.

The impact of smoke resulting from wildfire is impossible to manage and may have significant implications for local and regional air quality. Given the weather conditions that are conducive to very high and extreme fire danger across the Central and Western Council areas, the occurrence of wildfire under these conditions will typically result in large quantities of smoke being blown for long distances downwind of the fire. This has the potential to severely impact on air quality within the region, affecting residents, tourists and businesses alike. The composition of smoke from an intense wildfire may be substantially different from that of a low intensity prescribed burn, and exposure may have implications for the health of persons with respiratory illness (DECC, 2006).

Agriculture

Some agricultural activities can impact on the atmosphere, including stubble burning, spray drift and dust caused by tillage. Stubble burning, believed to have returned nutrients to the soil following harvest of a crop, produces smoke and ash across large areas of land as well as releasing large amounts of carbon dioxide. This practice is becoming less favoured as conservation farming techniques promote retention of organic matter. Spray drift from application of herbicides and pesticides, including aerially applied sprays (crop dusting) is penalised under pollution regulation however it still occurs on a regular basis and affects both biodiversity and human health. Ploughing or tilling the soil in dry conditions causes dust, and in the recent dry climate dust storms have been recorded across the reporting area. Dust has significant human health impacts.

Commercial and Industrial Sources
Indicator – Number of Environment Protection Licences issued

Under the Protection of the Environment Operations Act 1997 (PoEO Act 1997),

attributed to Council's reticulated sewer system. The large number for Warrumbungle Shire Council relate to keeping animals such as horses in residential areas, and an incident at a local abattoir. Twenty five odour complaints from the region were received by the EPA Pollution Line in 2008-09.

Threat

General Air Pollution Sources

Indicator – Number of premises on the National Pollution Inventory

The National Pollutant Inventory (NPI) lists pollutant emissions from various industrial facility sources, and diffuse sources. Diffuse sources are from small facilities, transport and households.

As shown in the summary table (Table 6), the number of NPI industry pollution emitters in the region (for the same Councils) rose from 42 in 2006-07 to 49 in the last NPI reporting period (2007-08). This trend appears to be a direct result of industrial expansion in the larger centres such as Bathurst, Dubbo and Orange.

The number of diffuse polluters remained constant although this may be due to issues with reporting pollution sources regularly.

Solid Fuel Heaters and Backyard Burning

Domestic wood heating, industrial premises and diesel vehicles are the major sources of particulate pollution in urban areas (DECC, 2006). There is little data available relating to the number of wood heaters in use, although some Councils do have complaint records relating to wood smoke (see Figure 7).

Open burning is also a significant source of particle pollution. It is regulated by the Protection of the Environment Operations (Clean Air) Regulation 2002. The Regulation prohibits burning of certain articles and vegetation in urban areas and regulates conditions in which burning can be undertaken in rural areas. The burning of dead and dry vegetation in urban areas of the Central and Western region may be permitted in some circumstances, depending on the policies of the local Council and Rural Fire Service.

Fires

Bushfires emit large quantities of carbon dioxide, other gases, and also significant

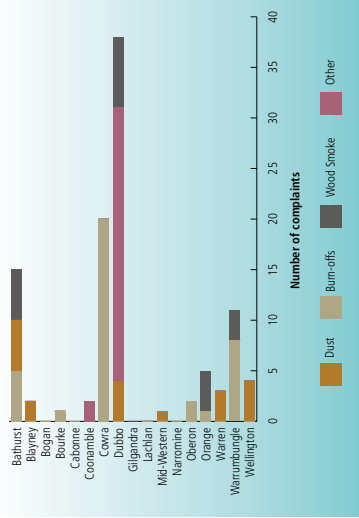


Figure 7 Types of air quality complaints to local Councils. Note that some of these could be the same as those sent to the local Councils.

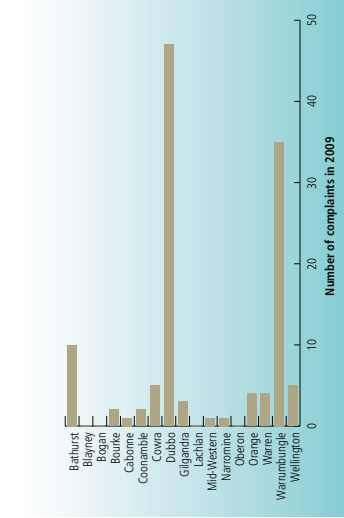
Odour Complaints

Indicator – Number of odour complaints

Some complaints can be related to odour from sources such as food outlets and factories. This is a new indicator as the 2007-08 data for odour complaints were included in air quality complaints.

The 17 participating local Councils reported that there were 120 odour complaints received in 2008-09 across the reporting region. Figure 8 shows the number of odour complaints reported by each Council. The large number of complaints received by Dubbo City Council were mostly

Figure 8 Number of odour complaints received by each local Council



industries over a certain threshold must be licensed to pollute air or water. There are currently 202 active Environment Protection Licences for premises across the reporting area, as issued by DECCW under the PoEO Act 1997. As shown in the summary table (Table 6), there were 158 active licences in 2007-08 thus indicating a worsening trend in the potential for air and water pollution. It also indicates ongoing vigilance of the State Government in managing emissions.

Many of these licences do not relate to air and a number are issued to Council's own operational facilities such as sewage treatment plants which may discharge to waterways. Smaller industries may also cause pollution, and the local Council has regulatory controls over these premises.

The National Pollution Inventory (see results above) also records emissions for 93 compounds, and is a National Environmental Protection Measure implemented by the national environment department. It includes point source and diffuse emissions, some reported directly by industrial sources and some estimated by the relevant State Government.

Response

Fires

While fires are regulated by both pollution and burning regulations, education plays a key role in the response of local Councils to this issue. DECCW has produced a woodsmoke resource kit for Council officers, targeting improvements in residential wood fire use to limit smoke. Council officers have powers under the PoEO Act 1997 to issue notices regarding smoky fires. Some Councils, such as Bathurst Regional, are also offering rebates to encourage householders to upgrade their older wood heaters to more efficient forms of heating such as gas.

Hazard reduction burns and limiting the impact of smoke from these is managed by Bushfire Risk Management Plans, developed by the local Bushfire Management Committee (BFMC). The BFMCs are comprised of local land managers including local Councils, DECCW, the Land and Property Management Authority (formerly the NSW Department of Lands) and the Rural Fire Service (RFS).

These plans now include assessment and management of environmental assets

(threatened and vulnerable species, significant flora and fauna), as well as human settlement (buildings, properties, houses), economic assets (such as primary production land, commercial forests or tourist destinations) and cultural assets (Aboriginal or non-Aboriginal heritage areas and sites). Education is also very important in reducing this impact, and the media is used in peak seasons to raise awareness of fire risks (advertising, radio announcements, television advertising, risk indicators).

Emission of Air Pollutants

The majority of emissions are regulated by the PoEO Act 1997, and while local Councils have some control over licensed premises in the LGA, many emission sources are managed by State regulation. For example, while motor vehicles continue to contribute a significant source of atmospheric emissions, fuel standards and vehicle technologies are set by various State and Federal guidelines.

Councils may also respond to air quality complaints and issue notices or warnings under the PoEO Act 1997. DECCW has acknowledged that further support is required for Councils to have a role in air quality management, particularly outside of the greater metropolitan area where data is not available from the Daily Regional Air Quality Index (apart from the recently installed Bathurst monitoring site). DECCW has developed education and support material for Council staff to assist with air quality issues, which is available at www.environment.nsw.gov.au/air/index.htm.

Many Councils are also attempting to reduce their own emissions from sources such as their motor vehicle fleet. For example, Dubbo City Council uses E10 in their passenger fleet and is trialing biodiesel in many of its heavy vehicle fleet.

Several Councils are also educating residents about ways to minimize air pollution. For example, Oberon Council provided homeowners with a pamphlet which outlines methods to reduce wood smoke.

Future challenges

Future challenges will include how to manage increased health problems, particularly respiratory if levels of dust and pollen increase due to drier conditions that may arise due to

climate change. Drier conditions could also cause an increase in bushfire events, in both frequency and severity, which will have a significant impact on air quality. An example of a recent fire that had regional air quality implications was the Goomoo Forest Fire in 2007 which burnt through 26,500 ha and lasted for 13 days, covering a large area of the region with smoke.

Following the 2009 Victorian bushfires, there has been significant pressure on the RFS to step up hazard reduction activities, risk assessments and targeting those areas identified as high risk. However, there is a need to consider the balance between safety and biodiversity protection. A challenge will be to incorporate biodiversity considerations into

fire management within local regulators. The challenge is to implement mitigation strategies to reduce the risk to these areas. Communities may not be receptive to taking individual action and other measures can have impacts on land and biodiversity.

Some hazard reduction activities around properties involve the removal of most vegetation, leading to increased erosion and sedimentation and loss of habitat. Increasing the amount of hazard reduction burning will also lead to an increase in the number of days where smoke may impact on local air quality.

A further challenge for Councils is the roll out of educational programs to increase awareness and encourage people to change practices and advise Council of local issues.

Case Study: Cabonne RFS Zone hazard reduction approach

An important hazard reduction approach has been developed in the Cabonne Zone of the RFS. This zone covers the fire districts of Orange, Blayney, Cabonne and Cowra. Following a significant fire event in Goobang National Park in 2001/2002, the local fire management committee reviewed its risk management plan. The Goobang Fire highlighted many shortcomings in the plan including a lack of practical on-ground fire management solutions, poor integration across land tenures and limited community support due to a lack of understanding and input during its formulation. Through the local Bush Fire Management Committee (Cabonolas BFMC) a new approach to risk planning was developed that aims to assist in solving these issues.

Two guiding principles have driven this process.

1. A landscape, tenure blind approach to risk management planning. For the first time the performance of agencies, landholders, brigades and the Cabonolas BFMC as a whole can be measured and assessed objectively, based on principles that meet community protection and ecological key performance indicators simultaneously.
2. A commitment to a change in the community consultation process. Traditionally agencies have interpreted

community participation as "informing" the public of a pre-determined decision. Cabonolas BFMC had taken the approach of "collaborating" with and "involving" the community in developing alternatives and identifying the agreed solution. It held 80 community meetings over an 18 month period, consulting with over 2500 people. This has led to greater levels of problem ownership by all participants and a more durable, workable solution between all parties.

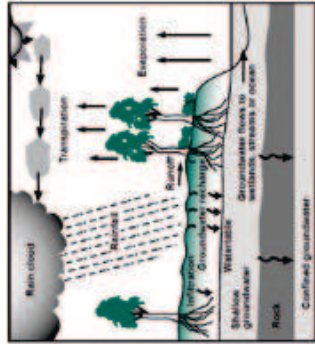
The Cabonolas Project has contributed significantly to the future direction of fire risk management planning and the lessons learnt from the application of this process have been included in the NSW Risk Management Planning Guidelines. From its approval in 2004/2005, the implementation of the plan has gained continual momentum resulting in record levels of hazard reduction being completed within the Cabonolas Zone in 2007/2008 and 2008/2009.

The Cabonolas Zone Risk Management Plan was audited at the end of its fourth year of implementation in 2008 and achieved the highest audit result achieved in NSW to date.

A 91.6% implementation across 805 strategies was recorded in the NSW RFS 2008 Annual Report.

This chapter reports on the quality of receiving waters and the consumption of potable water in the reporting region. Indicators have been selected to measure and gauge issues of water quality and water quantity. In this chapter 'water' refers to the rivers, aquatic habitats, creeks, wetlands, groundwater, dams, stormwater, potable water and the catchment activities which may impact upon them. Most Councils within the reporting area are their own water authority with the exception of some of the smaller councils such as Wellington, Blayney and Cabonne who are serviced by Central Tablelands Water.

Figure 9 The natural water cycle



Source: Waters and Rivers Commission, 1998

Water is essential for sustaining life. Water exists in our environment in many forms and is constantly moving as part of a dynamic system called the 'water cycle' (Figure 9). Water comes to land through rain, flowing over the surface of the earth, pooling in puddles or lakes, moving through creeks, streams and rivers and also sinking into soil (infiltration) and replenishing groundwater. Water from the soil is taken up by plants and used by them to grow. Water leaves plants in the biological process of transpiration and evaporates from soil, freshwater bodies and the ocean to return to the atmosphere, ready to make rain again.

Table 7 Summary table of indicator trends – Water Quantity

Issue	Indicator	2007-08	2008-09	Trend
Dam levels	Average dam levels	20.3%	23.4%	↑
	Area of irrigated Council managed parks, sportsgrounds, public open space	670 ha	583 ha	↓
Council water consumption	Treated water used by Council for irrigation	499 ML	501 ML	↔
	Untreated water used by Council for irrigation	211 ML	195 ML	↓
Water extraction	Actual volume extracted through surface water licences	232 GL*	129 GL	↓
	Annual consumption (Total from WTP)	26,620 ML	27,468 ML	↔
Retriculated filtered consumption	Annual metered supply	22,180 ML	22,708 ML	↔
	Average annual household use (kL/household)	303 kL	294 kL	↓
	Total number of serviced properties	59,088	62,614	↑

* data is for 2005-06

↑ improvement
 ↔ no or little change
 ↓ worsening trend

Note – the above trends are for data in 2007-08 and 2008-09 from the same sources. They should be read in terms of limitations outlined in the discussion below. Note also that there are some new indicators for 2008-09 for which no comparison could be made with 2007-08. Refer to Appendix for Councils included in trend data.

Waterways across the catchment are important for many reasons:

- They act as a 'barometer' for the whole environment. Most activities that occur on the land are ultimately reflected in the health of waterways
- They support a diverse range of ecosystems
- The vast majority of our streams and creeks ultimately enter, and impact upon, the integrity of internationally important wetlands such as the Macquarie Marshes
- Many waterways are in, or discharge into, drinking water catchments.

With the development of the Central West CMA's CAP (2007), there is greater responsibility as well as greater opportunity for local Councils, government agencies and the community to work collaboratively to look after our waterways.

Issue – Water quantity

Condition

The upper reaches of the Bogan and the Castlereagh Rivers are largely unregulated rivers and there are two main dams regulating flows in the Macquarie Valley. Windamere Dam on the Cudjogong River, upstream of Mudgee has a capacity of 368,000ML and Burrendong Dam located upstream of Wellington at the junction of the Macquarie and Cudjogong River has a capacity of 1,189,000ML (Central West CMA, 2007).

The Macquarie River has a regulated section between Burrendong Dam and Pillicawarrina in the Marshes which includes Bulgeraga, Duck and Gunningbar Creeks. Other water courses that are augmented by river regulation include the Ewenmar system, lower Bogan River, Marra, Crooked and Marthaguy Creeks and the lower Macquarie River (Central West CMA, 2007).

Table 8 Summary table of indicator trends – Water Quality

Issue	Indicator	2007-08	2008-09	Trend
Industrial/ Agricultural Pollution	Number of Erosion & Sediment Control complaints received by Council	29	27	↓
	Total volume of trade waste discharged to sewer	786 ML	676 ML	↓
	Percentage Effluent reuse by Councils	58 %	83 %	↑
Stormwater Pollution	Number of gross pollutant traps installed	27	35	↑
	Total catchment area of GPTs	2,181 ha	4,472 ha	↑
	Volumes of litter collected in GPTs	278 t	258 t	↓
Surface & Ground Water Quality	E.coli – Percentage samples exceeding ANZECC guidelines for irrigated crops and dairy	24%	37%	↑
	Total Nitrogen – Percentage samples exceeding ANZECC guidelines for algal growth	0%	2%	↑
	Total Phosphorus – Percentage samples exceeding ANZECC guidelines for algal growth	51%	67%	↑
Town Water Quality	Number of drinking water complaints	429	620	↑
	Number of instances drinking water guidelines not met	70	35	↓
Waste water treatment	Number of septic related complaints	11	18	↑

↑ improvement
 ↔ no or little change
 ↓ worsening trend

Note – the above trends are for data in 2007-08 and 2008-09 from the same sources. They should be read in terms of limitations outlined in the discussion below. Note also that there are some new indicators for 2008-09 for which no comparison could be made with 2007-08. Refer to Appendix for Councils included in trend data.



ABOVE Tiger Bay Wellands, Warren

- Continued demand for surface water and the lack of rainfall (drought) has placed significant pressure on not only town water supplies but also water licences and allocation for agriculture and industry. Many towns across the reporting areas had been on medium to high level water restrictions for a period of years, with some under emergency water controls due to low dam storage levels. Regulation of river flows can cause a range of impacts including:
 - Introducing barriers to fish (and other species) moving through the habitat
 - Reducing the peak and trough effect of rainfall and minor floods leaving areas without fresh water for longer periods
 - Changing seasonal variation
 - Reducing flows across the landscape
 - Reducing the amount of water in flood events, limiting the area affected, time affected and depth of water
 - Changing water temperatures through shallow water (usually warmer) or dam releases (usually colder)
 - Increased channelisation and isolation of rivers from the floodplains.
- All other streams within the catchment are unregulated with impacts on the natural flow regime largely a result of extractive demand and the construction of town water supply schemes. The level of impact within the catchment will vary according to extractive demand, available flow and groundwater levels.
- Within the Lachlan Catchment, the Lachlan River rises near Lake George and terminates in the Great Cumbung Swamp near Oxley, 1450 river kilometres to the west. There are an unusual number of effluent streams along its lower section including Willandra, Merrowie and Middle Creeks. These effluent streams flow intermittently from the Lachlan River,

delivering water as far as 160-180 kilometres west of the main channel. The Lachlan River itself is only intermittently connected to the Murrumbidgee River when both rivers are in flood. Major tributaries above the township of Forbes include the Abercrombie, Boorowa, Belubula and Crookwell Rivers. The Bland and Goobang Creeks flow into the Lachlan River upstream of Condobolin. The main dam regulating flows in the Lachlan River is Wyangala Dam which has a capacity of 1,220,000 ML (Lachlan CMA, 2007).

Almost half of the sub-catchments in the Lachlan Catchment have been identified as having high hydrologic stress and ten of these are considered to have high environmental values. In some areas of the catchment, river flow regulation, instream structures and requirements of water for 'beneficial uses' have altered flow regimes, resulting in both higher and lower flows than the natural state and consequently a reduction in wetland health, area and water quality (Lachlan CMA, 2006).

The Western Catchment is not a catchment in the traditional sense, as it encompasses a series of river systems. These include the Barwon-Darling, Culgoa, Paroo, Warrego, Narran, Bokhara, Birrie, Bulloo Overflow and part of the Bogan Rivers. Many of these rivers originate in Queensland with the Condamine-Balonne system contributing 20% and the Macintyre and Border Rivers contributing 35% of tributary flows entering the Barwon-Darling system. The Great Artesian Basin underlies much of the northern part of the Western Catchment area (Western CMA, 2007).

Groundwater is an important natural resource across the reporting region, and the volume of water stored in the pores and fractures of rocks below the water table vastly exceeds the volume of fresh surface water resources (Western CMA, 2007).

Indicator – Average dam levels

Dam storage levels indicate both the current rainfall and the pressures that water consumption place on water storages. Four dams in the region – Carcoar, Windamere, Wyangala and Burrendong – were used to indicate dam levels. As shown in the summary table (Table 7), average levels for these dams rose slightly from 20.3% capacity in 2007-08

to 23.4% in 2008-09. The low figures for both years indicate the extended drought across the region.

The fluctuations in dam levels throughout the reporting period should be noted in relation to these average figures. For example, in 2008-09, Windamere Dam was higher than the 2007-08 level, but fell over the summer to less than the 2007-08 level. The Lachlan River was particularly impacted by drought throughout the reporting period.

Water is essential for sustaining life. Water exists in our environment in many forms and is constantly moving as part of a dynamic system called the 'water cycle'

Threat Irrigation

Irrigation places significant pressure on water resources. While many irrigators have had little to no allocation over the past year, historically over allocation of water licences has seen additional stress placed on aquatic habitats such as the Macquarie Marshes despite the requirement for environmental flows.

Within the region however, irrigators in the tablelands have not been subject to the same reductions in water allocations as the slopes and plains. Studies for the Sustainable Rivers Audit, undertaken by the Murray Darling Basin Authority clearly indicated that the more regulated the river system, the more degraded the habitat. Weirs, dams and floodgates all affect fish movements, reduce water quality and impact on ecosystems. The demand for groundwater extraction, particularly for irrigation, is increasing and placing additional pressure on aquifers and ecosystems.

Indicator - Actual volume extracted through surface water licences

As shown in the summary table (Table 7), there was a decrease in the amount of surface water extracted from 232 GL in 2005-06 (the last available statistics) to 129 GL in 2008-09. This reflects the reduced allocations to irrigators as a result of drought conditions.

Reticulated Water Consumption

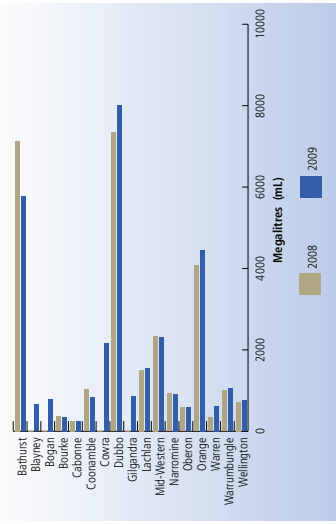
Reticulated water consumption is relatively small in comparison to that used for irrigation. In the region it accounts for about four percent of water consumption compared with 88 % used for irrigation and eight percent for stock and domestic use (Murray Darling Basin Committee, 2007). Nevertheless, with many towns and regional centres growing (see Introduction), there are increasing pressures on water used for town water supplies.

Indicator – Annual town water consumption

Household water use is an indicator of the pressure on water resources, particularly in times of declared drought. As shown in the summary table (Table 7), the annual town water consumption as measured from water treatment plants decreased slightly from 2007-08 to 2008-09 for the local Councils that reported in both years. This may have been in response to water restrictions and community water saving programs related to the drought in most areas or to other initiatives such as Mid-Western's tiered water charges.

Reticulated water consumption for 17 participating Councils in 2008-09 was 31,934 ML. Figure 10 provides a breakdown of water consumption across the region in 2008-09 compared with water use in 2007-08. For some centres water consumption has decreased whilst in a few LGAs such as Dubbo and Orange it has increased.

Figure 10 Annual water consumption across the LGAs



Indicator – Annual metered water supply

As shown in Table 7, the annual metered water supply has increased marginally across the region.

Indicator – Average annual household use

As shown in Table 7, the data for average annual water use per household across the reporting region shows a slight decrease in 2008-09 compared with 2007-08. Even though the population estimates for the region may have increased slightly in the past year (see Introduction), water consumption has dropped as shown by the indicators above.

Indicator – Total number of serviced properties

As shown in the summary table (Table 7), the number of properties serviced by town water has increased over the reporting years. This expansion of the reticulated systems will increase pressure on water supplies and thus is seen as a worsening trend for this indicator, unless more water sensitive urban design practices are adopted in new developments. The use of the NSW Government's BASIX requirements (including water tanks) for new houses and water sensitive urban design in new residential developments can be used as a counter to this trend through water consumption minimising actions.

Council Water Consumption

Due to the large number of services they provide, local Councils may be large users of water in comparison to businesses and households. Their efficient use of water is therefore critical to overall water consumption as well as their important role in educating and leading the community in water use minimisation.

Indicator – The area of irrigated Council managed parks, sportsground, public open space

As a potentially significant use of water, the area of irrigated Council facilities provide an indication of high water demand. As shown in the summary table (Table 7), there was a



decline in the total area of recreation facilities that were irrigated by the local Councils reporting in both years across the region.

For all 17 participating Councils in 2008-09, the area of Council facilities irrigated was 912 ha.

Indicator – Treated water used by Council for irrigation

Indicator – Untreated water used by Council for irrigation

As shown in the summary table (Table 7), the amount of treated water used for irrigation by the local Councils that reported in both years was almost the same in 2007-08 compared with 2008-09. On the other hand, there was a significant decrease in the amount of untreated water used by those local Councils reporting in both years.

For the 13 Councils that reported on these indicators in 2008-09, the amount of treated

water used for irrigation was 683 ML and the amount of untreated water used was 715 ML.

Climate Change and Drought

Climate change may have a significant impact on water resources and the current extended drought has been noted as a potential indicator of climate change. Climate change influences river regulation and water extraction which is having substantial effects on flow. Currently, as seasonal patterns change, flow variability has reduced and there are fewer large floods with long periods between inundations in the Macquarie Marshes (Central West CMA, 2007).

Various studies of stream flows in the Murray Darling Basin indicate that climate change is likely to reduce flows in the future with results of modelling studies specifically for rivers within the Central West Catchment indicating similar results (CSIRO, 2007a). Stream flows along the Macquarie River Catchment are projected to decline by

ABOVE Dubbo water treatment plant

11–30% upstream of Burrendong Dam and 14–37% downstream by 2030, reducing inflows to the dam and affecting future storage levels (CSIRO, 2007a).

Likewise with the Western and Lachlan Catchments, less water will be present in streams and rivers which will have downstream consequences for storages and water resources. The main concern within the Western Catchment is a reduction in flows along the Barwon-Darling river system, including its tributaries and associated floodplains and wetlands (Western CMA, 2007).

This catchment is also subjected to wider regional issues of water supply as much of the surface water flows in the Western Catchment originate in neighbouring catchments and/or states (CSIRO, 2007c). Existing limitations on surface water will place a greater pressure on groundwater resources associated with the underlying Great Artesian Basin as reduced run-off and rainfall will lead to less groundwater recharge and sustainable yields (CSIRO, 2007b).

Response
The Federal Government acknowledges that the health of the Murray Darling Basin is in decline. Available water is currently over-allocated, and this problem is likely to become worse as water availability declines due to climate change.

The Federal Government's Restoring the Balance in the Murray Darling Basin Program is an important component of Water for the Future – the Federal Government's \$12.9 billion national plan on water. Under *Water for the Future* the Government has committed \$3.1 billion over 10 years to purchase water in the Murray Darling Basin. The program will complement a range of other measures to achieve sustainable water management in the Basin.

Purchasing water to protect and restore river systems and wetlands in the Murray Darling Basin (including the reporting region) has been underway since 2007. During 2008-09, in the Macquarie-Bogan catchments, 53,365 ML of general security water entitlements was purchased from irrigators by the Federal Government.
A further 71,905 ML was purchased in the Lachlan catchment. No water was purchased

in the Castlereagh catchment (as this is largely an intermittent system).

Water management in NSW is largely regulated by the NSW State Government, particularly the use of groundwater and river extraction licences. The Department of Water and Energy (former) regulated licences for farm dams, bores and other extractions. For example, in the reporting area, direct water harvesting of rainfall by farm dams has been restricted to 10% of the runoff from a property before a water licence is required. This places limits on the ability of farm storages to trap runoff entering rivers, which may allow environmental flows to be maintained. There is also currently a hold on new stock and domestic bore licences for residents on town water, or on properties less than 12ha, due to the ongoing drought and lack of knowledge about groundwater systems.

Changes to State legislation commenced in 2004 and have culminated in new river regulations such as Water Sharing Plans. These plans include environmental flows to help maintain riparian health even when flows are low due to extraction and drought.

The local Councils and County Councils managing water currently have a strong role to play in education through the use of water restrictions and additional programs such as Orange City Council's recent Water Challenge, which saw both regular promotion of the daily per person usage of water in the city, and a competition between 10 families to reduce water use.

Many of the Councils are currently preparing Integrated Water Cycle Management Plans, which address a range of water policy issues such as stormwater management, recycling and reuse of water, demand management and water restrictions in a more holistic way than has occurred in the past. Through working groups, some Councils are sharing ideas and knowledge to increase understanding and cooperative projects across the LGAs. For example, the Bathurst Orange Dubbo (BOD) Alliance of Councils is working on common water restriction definitions. These projects are also seeking to address the impacts of climate change such as reduced water availability and more extreme storm flows.

Case Study – Blackmans Swamp Stormwater Harvesting

The Blackmans Swamp Creek Stormwater Harvesting project represents the first large scale, direct-to-potable stormwater harvesting project in NSW, if not Australia. Utilising Orange's stormwater system, the project is capable of providing between 1 300-2 100ML of additional water into the city's raw water supply each year, or up to 40% of the city's total water needs.

The basic concept of the Blackmans Swamp Creek Stormwater Harvesting Project involves capturing a portion of the high flows during storm event from the urban areas of Orange. The City makes up a large proportion of the impervious areas of Blackman's Swamp Creek Catchment. This water is then transferred into the nearby Suma Park Dam to augment the city's bulk water supply.

The 18 month, \$5 million project was initiated after several years of dry conditions saw the city's water storages dropping to previously un-encountered levels, with the lowest seen in August 2008 where storages were at 26.7%.

A strategic solution, rather than a quick fix option was selected which along with the stormwater harvesting scheme included a package of demand

management and systems operation procedure such as best practice pricing, water restrictions, education programs, water loss remediation strategies, working with high water users to reduce their water use and installing water efficient devices across the city. As a result, water usage dropped to less than 4390ML in 2008, 38% less than in 2002.

The public reaction to drinking harvested stormwater was also tested through a series of community consultations, including on-line surveys where the predominant response was not one of concern about water quality but of urging Council to get on with the work as soon as possible. It has been developed from idea to reality within a very short space of time while giving proper consideration to the necessary legislative, environmental and community consultation processes. The project demonstrates that with support, Local Government can use local resources to solve local problems.

The first release of harvested stormwater flows into Suma Park Dam on 21 April 2009



Future challenges

The Salinity and Water Quality Alliance is currently preparing a Water Sensitive Design Policy for adoption by its member Councils through the Planning Reform Process.

The Councils have recognised the need for such a policy and raised key issues to be addressed, identifying the need to: maximise the efficient use of every drop of water in a cost effective manner, minimise the impacts of urban salinity, improve the quality of stormwater discharged to receiving waters including the Macquarie River, Castlereagh River, Cudgegong River, Bogan River and their tributaries and the Macquarie Marshes, and reduce flooding and drainage impacts within and downstream of development sites – including Council activities.

As stressed above, a major challenge for Councils and communities is decreasing ground and surface water particularly in the light of climate change projections. The National Water Initiative and the Australian, State and Territory Governments have agreed that water users should bear the risk of such reductions in water availability. As a consequence, water users within the catchment may face future long term reductions in allocations and higher prices for water (CSIRO, 2007c).

Currently the Federal Government is buying back irrigation entitlements to provide more water for the environment. There will be future challenges as this program rolls out, particularly in relation to the impact of dairy

these buy backs on the economy and social dynamics of affected communities.

To maintain playing fields to a standard that is safe for public use in times of decreasing water availability - an important facet of ensuring the health and social fabric of the community - may require more Councils to bring online alternative water sources such as stormwater and grey-water.

Issue – Water quality

Condition

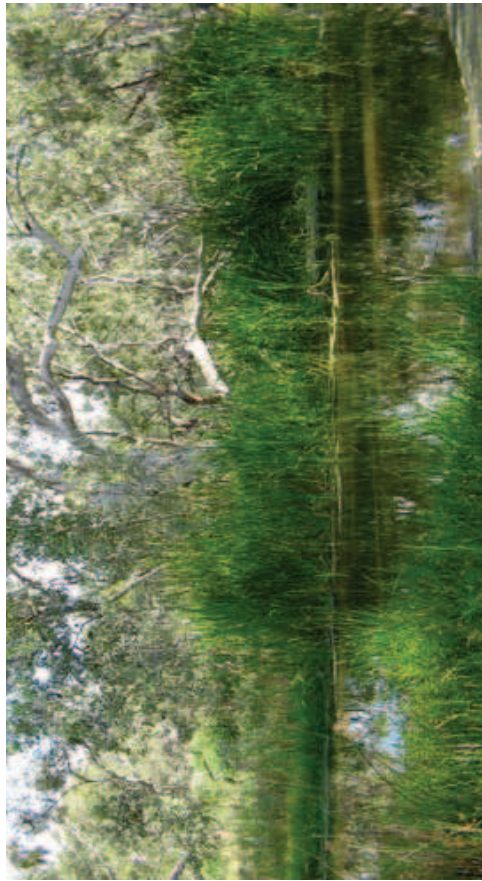
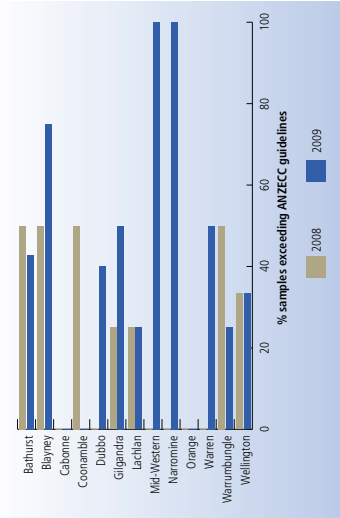
Surface water and groundwater quality
The degree and frequency of water quality problems varies enormously throughout the region. It is unlikely that any of the streams within the Central West Catchment do not at some time suffer quality issues that render it unable to be used for both consumptive and non-consumptive purposes (Central West CMA, 2007). It is often acknowledged that in most rural and regional areas, it is diffuse pollution, not point source pollution that has the greatest impact on water quality.

Indicator – E.coli - Percentage of samples exceeding ANZECC guidelines

E. coli is found in the intestines of animals, and does not originate from other environmental sources. For this reason, *E. coli* is a highly specific indicator of faecal contamination in drinking water. As shown in the summary table (Table 8), from the sites sampled in both 2007-08 and 2008-09, there was an increase in the percentage of samples that exceeded ANZECC water quality guidelines (and thus a worsening trend in this indicator). Note that the ANZECC guideline used here is for raw human food crops (e.g. lettuce) in direct contact with water or for watering of pasture/fodder for dairy animals with no withholding period.

Figure 11 shows the percentage exceedances of this ANZECC guideline from the reporting Councils. It shows that many of the streams in the region have high *E. coli* readings which have implications for drinking and recreation. The reasons for these exceedances could include stock watering close to and in streams, poorly treated sewage, and many unregulated septic systems.

Figure 11: E.coli – percentage of samples that exceed ANZECC water quality guidelines for irrigated crops and dairy



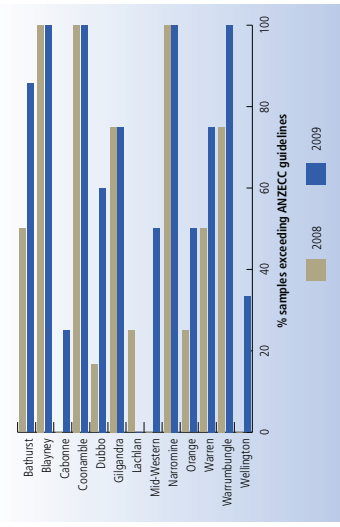
ABOVE Macquarie Marshes experienced in some parts of the region at the start of the reporting period.

Figure 12 provides details of the percentage of total phosphorus samples that exceeded the ANZECC water quality guideline for algal growth in 2008 and 2009 across the region.

Retriculated Water Quality

Indicator – Number of drinking water complaints

Figure 12 Total phosphorus – percentage of samples that exceeded ANZECC water quality guidelines



The nutrients nitrogen and phosphorus are essential for plant growth. High concentrations indicate potential for excessive weed and algal growth (including noxious blue-green algae).

Increased nutrient levels in streams originate from the discharge of raw and treated sewage effluent, from urban and rural runoff and from some industrial discharges. Urban stormwater contains animal faeces and garden fertilisers. The widespread and inefficient use of agricultural fertilisers and increasing stock access to creeks and rivers can result in high nutrient levels in rural runoff.

As shown in the summary table (Table 8), for those Councils reporting in both years, there was only a slight increase in the percentage of total nitrogen samples that exceeded the ANZECC water quality guidelines for algal growth.

On the other hand, there was a significant increase in the percentage of total phosphorus samples that exceeded the ANZECC water quality guidelines for algal growth. A possible cause of this is the impact of 'the first flush' of nutrients at the onset of a wetter time

premises are typically the highest contributors of point source pollution in the reporting area. The level of treatment of sewage will reduce the effect of the pollution, however most effluent will have some level of nitrogen and phosphorus. These can impact on the local ecosystem, including encouraging algal blooms such as blue-green algae. STP pollution may also peak during storm flows when overflows from drains and holding ponds may occur.

Agriculture can contribute significant nutrient loads as a diffuse source, through fertilisers, pesticides, sediment and manures. This can contribute nutrients such as nitrogen and phosphorus, pathogens, organic compounds (some toxic) and suspended solids to waterways. This can occur both from runoff across the landscape and also where stock have uncontrolled direct access to waterways. Urban areas may also contribute these pollutants particularly during storm flows, and add oils, grease, metals and further pathogens to the water.

Indicator – Erosion and sediment control complaints received by Council

One measure of the threat to waterways from sediment pollution is the number of erosion and sediment control complaints received by the local Councils. The complaints can range from sediment spilling out of construction sites to obvious plumes of sediment flowing into streams. As shown in the summary table (Table 8), the number of complaints dropped slightly for those Councils that reported in 2007-08 and 2008-09. The total number of complaints from all participating Councils in 2008-09 was 68.

Indicator – Load Based Licensing volume

The load-based licensing (LBL) scheme, sets limits on the pollutant loads emitted by holders of environment protection licences, and links licence fees to pollutant emissions. LBL is a powerful tool for controlling, reducing and preventing air and water pollution in NSW. As only one Council reported data for LBL in 2007-08, the trend for this indicator is questionable. In 2007-08, this Council had licences to emit a volume of 5,447kg pollutants, whereas this figure rose to 12,829kg in 2008-09.

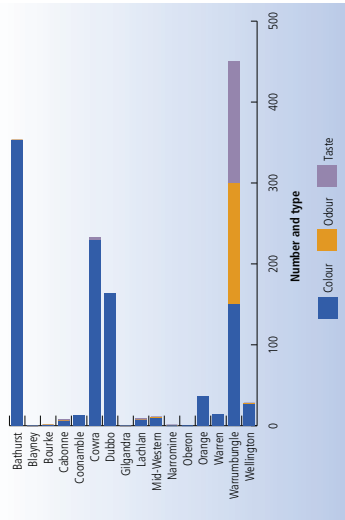


Figure 13 Type of drinking water complaints

The quality of drinking water is very important to the community, and the number of complaints made regarding water quality may indicate a decline in water quality or an increase in awareness and education.

As shown in the summary table (Table 8), the number of drinking water complaints (for those Councils reporting in both years) increased from 429 in 2007-08 to 620 in 2008-09.

The number of drinking water complaints across 16 participating Councils in 2008-09 was 1,321. A breakdown of the type of complaints is provided in Figure 13.

As shown in Figure 13, by far the most prevalent type of drinking water complaint was related to the colour of the water. Note that the high number of drinking water complaints registered by Warrumbungle Shire Council were most likely due to Mendocoran's water supply which has longstanding issues with quality. Council and the State Government have commissioned a new water filtration plant which is due to come online by end 2009 (see case study in this chapter).

Threat Pollution

Water quality is affected by both point source (premises) pollution and diffuse source pollution (run-off from a range of activities). Where there are no reuse programs in place, sewage treatment plants (STPs) and industrial

In 2008-09, 14 participating Councils had services in their LGAs producing a volume of pollutants of 112,453kg.

Indicator – Number of trade waste approvals

Indicator – Total volume of trade waste discharged to sewer.

Local Councils have a number of statutory responsibilities for the approval of liquid trade waste discharged to the sewerage system under the *Local Government Act 1993*. Liquid trade waste means all liquid waste other than sewage of a domestic nature. Liquid trade waste management is needed to:

1. Protect community assets, e.g. sewer mains, pumping stations and sewage treatment facilities from damage by trade waste
2. Protect the environment – some substances, such as metals or pesticides may pass through the treatment facility unchanged and accumulate in the environment. Other substances may adversely affect the biological processes and the quality of the treated effluent and biosolids.
3. Protect public and worker health and safety – people working in and around the sewerage system can be harmed if toxic substances are discharged into the sewer.

The total number of trade waste approvals in 2008-09 reported from 14 of the participating Councils was 392.

A new indicator was the total volume of trade waste discharged to the sewer.

Twelve Councils reported that 1,392 ML of trade waste was discharged to the sewer in 2008-09.

Salinity

Land use has a significant impact on the level of salinity in streams through removal of vegetation, irrigation and discharges of saline water. While geology and topography also affects salinity, land use is the primary factor that affects mobilisation of salts into waterways and through soils.

Salt generally degrades aquatic habitats as well as adversely impacting on soils and the crops and vegetation utilising those soils. Further discussion on these salinity impacts is in Land.

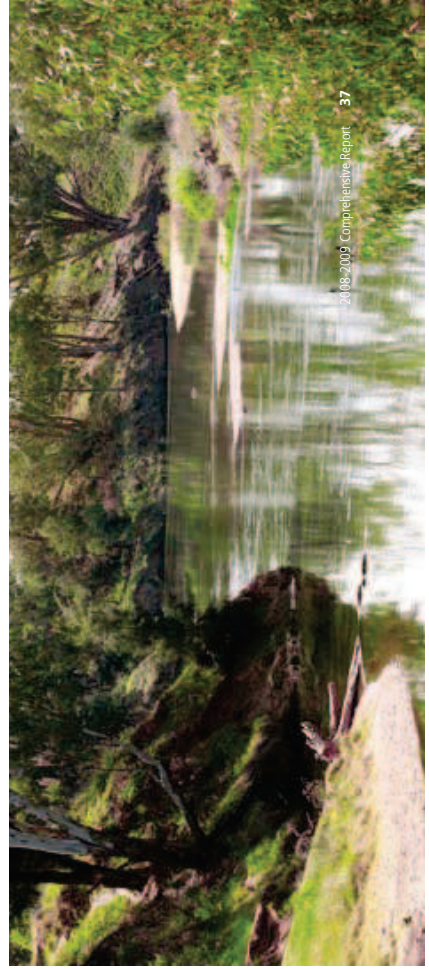
Due to the nature of the Macquarie River, most salt generated in the uplands and slopes is deposited back into the landscape through irrigation, floodplain entrapment or deposition within the wetlands and effluent systems of the western areas.

Some proportion of the salt is also discharged into the Barwon-Darling River system. Salinity in the Barwon-Darling is highly variable and can range from 200 EC units to more than 3,000 EC units, although the median is generally around 500 EC units (Western CMA, 2007).

The Bogan River is predicted to rise from approximately 700 EC units in 1998 to almost 2000 EC units in 2050. The Macquarie River is predicted to rise from 600 to 1700 EC units.

The World Health Organisation's recommended limit for safe drinking water is 800 EC units (CSIRO, 2007a). The Macquarie River at Warren averaged 392 EC units over a month toward the end of the reporting period.

below Macquarie River, Sandy Beach, Dubbo



The Murray Darling Basin Salinity Audit has predicted increases in average salinity levels over the next 50-100 years, particularly within all participating CMAs. The 'Salinity Audit of the Murray Darling Basin' (Humphries, 2000) identified the Lachlan Catchment as amongst the most "at risk" for serious salinity problems in the basin (Lachlan CMA, 2006).

Climate Change

The reduced quantity of water in streams and rivers has increased the stresses placed on these systems by discharges such as sewage effluent and trade waste. DECCW notes that 'Ongoing drought conditions occurring across much of NSW since 2003 have limited water availability. This has contributed to a decline in river health indicators such as macroinvertebrates across many areas of NSW. In the most recent assessments, only 22% of macroinvertebrate sample sites were considered to be in good condition, compared to 56% of sites reported in SoE 2003.' (NSW Government, 2005)

The impacts of climate change on water quantity such as lower flows and higher temperatures will also result in threats to water quality. These characteristics create a more favourable environment for potentially harmful algal blooms in water systems. Reported algal blooms in the Barwon-Darling river system have been relatively high over the past 15 years (CSIRO, 2007c).

Increases in intensity and frequency of fire could also contaminate water catchments with sediment and ash and already existing salinity problems in the catchments may be exacerbated by changes in rainfall. Temperature and stream flows (CSIRO, 2007a). Less precipitation and decreases in runoff may also reduce the extent and function of freshwater wetlands within each of the catchments that provide habitat for birds and other wildlife and functions in providing clean water (CSIRO, 2007a and b).

Response

The NSW Diffuse Source Water Pollution Strategy provides a framework for coordinating efforts in reducing diffuse source water pollution across NSW. The Strategy promotes partnerships, provides a guide for investment, and provides a means to share information on

projects and their outcomes across the State. Developing and implementing this Strategy is a joint initiative by the State's natural resource managers (at State, regional and local government levels). It builds on, and supports, a range of existing diffuse source water pollution management actions. The main aim of the Strategy is to reduce diffuse source water pollution inputs into all NSW surface and ground water and contribute towards the community agreed NSW water quality objectives and state wide Natural Resource Management targets.

A Priority Action Plan has been developed as part of the NSW Diffuse Source Water Pollution Strategy. It identifies agreed projects that will be progressed across NSW (including the reporting region) to help improve management of priority diffuse source water pollution problems. It will be updated from time to time to incorporate new projects.

The Central West CMA has supported a water quality monitoring program across the Councils. Data is collected by Council officers on a six-monthly basis and provided to the CMA, which collates the data (note that this data is used in this report). This is also used by the Salinity and Water Quality Alliance, a working group of Councils across the catchment sharing knowledge, ideas and engaging in cooperative projects.

Indicator – Percentage effluent reuse by local Councils

Effluent discharge contributes nutrients and can deoxygenate receiving waters. Reuse of effluent not only reduces the impact of the demand for potable water and therefore the need for additional dam storages.

As shown in the summary table (Table 8), those Councils that reported effluent reuse schemes in 2007-08 had increased reuse of effluent in 2008-09. Of the reporting Councils, seven reused effluent during the reporting period.

Indicator – Number of gross pollutant traps installed

Indicator – Total catchment area of gross pollutant traps

Case Study – Urban Waterways Management

Bathurst's urban waterways have been under the microscope recently for the development of an Urban Waterways Management Plan. The plan is needed because of the growing pressures being exerted on the urban creeks of Bathurst, the degraded state of many creek reaches and the need to be strategic in approaching management and rehabilitation of these important natural resources.

1. Evaluate the present condition of each stream in terms of hydrological, morphological, physical and ecological characteristics to provide a baseline against which condition of the streams can be measured into the future.

2. Guide the future development, rehabilitation and/or restoration works for each of the main urban waterways within Bathurst City and ensure their integrated management in the long term. While primarily a tool to guide Council operations and activities, it has been developed with input from the community and recognises that responsible management of our waterways involves the community, private landholders, industry and land developers. The plan has been developed by CenWest Environmental Services and Bathurst Regional Council, with funding from the Central West CMA.

Raglan Creek, Bathurst



Case Study – Mendooran Water Supply Augmentation

Mendooran, located about 396 km west of Sydney in Warrumbungle Shire, has a population of approximately 400 and often the quality of its drinking water fails to meet current Australian Drinking Water Guidelines. The problems occur with respect to turbidity, colour, iron and manganese and the regular presence of coliforms and occasional presence of *E-coli* have led to a permanent boil alert for the drinking of town water. The existing system is deficient in supplying demand at times of peak usage, and daily average usage during dry periods.

On 26 June 2008, the NSW State Government offered Council a subsidy of \$1,691,684 towards the total estimated cost of \$3,396,955 for the augmentation of the Mendooran Water Supply, and a contract was awarded for the following works:

- Construction of a new river intake works and pump station
- Construction of a new one megalitre/day water treatment plant (WTP)
- Construction of rising mains from the pump station to the WTP, and from the WTP to the Cobra Street reservoir.

The aim of this work is to provide a water supply to the residents of Mendooran which complies with the Australian Drinking Water Guidelines and is able to meet average daily demands.

Site of the new Mendooran raw water pump station



Indicator – Volume of litter collected in gross pollutant traps

Litter collected in gross pollutant traps (GPTs) provide an indication of potential water quality impacts. Installation of GPTs is a Council response to litter impacts. These devices trap larger pollutants such as litter and coarser sediments in stormwater drains and outlets, but they do not trap smaller particles and heavy metals. While there are ongoing costs associated with maintenance and cleaning of these traps, there are significant benefits to aquatic ecosystems and the visual improvement of waterways: plays a significant role in community awareness of Council environmental programs.

As shown in the summary table (Table 8), there was an increase in the number of GPTs installed by those Councils that reported in both years. Fifty one GPTs were reported to have been installed by 15 Councils to date.

The total catchment area that drained to the GPTs also rose from 2,181 hectares

to 4,472 hectares thus being an improving trend by helping minimise litter movement to streams.

The volume of litter collected in the GPTs dropped in the reporting LGAs from 278 tonnes in 2007-08 to 258 in 2008-09. In 2008-09, the total amount of litter collected in GPTs from 11 councils that reported was 391 tonnes.

Salinity

It is acknowledged that the first response required to manage salinity impacts is data. Mapping projects have been undertaken by a range of State agencies; however, there is no single source of this information across large regions such as this reporting area. Responses to dryland and irrigation salinity sources are outlined in the Land chapter. Ongoing monitoring programs by State agencies also allow for increased knowledge and understanding of salinity processes.

The Dubbo City Council program is an example of a response to urban salinity and is outlined in the Land chapter.

Waste water treatment

There are a large number of septic systems being used across the region (estimated to be at least 20,000). If poorly maintained, septic systems can be a source of nutrients for local streams and potentially cause problems such as blue-green algae blooms and issues for public health.

Indicator – Septic related complaints

One way to gauge problems related to the management of septic systems is through the number of septic related complaints to Councils.

As shown in the summary table (Table 8), the number of septic related complaints increased for those Councils that reported in both years.

Some Councils in the region have strategies to monitor and educate users in the management of septic systems.

For example, Dubbo City Council, which has 3,000 on-site sewage systems in its area,

adopted an On-Site Sewage Management Strategy in 2006 which outlines a proposed education and monitoring program.

Drinking water quality

An example of a Council project to improve the supply of reticulated water is provided in the case study – Mendooran Water Supply Augmentation above.

Future challenges

Future challenges related to water quality in the region include:

- Stormwater harvesting
- Recycled water schemes
- Increases in power costs will increase cost of water
- Changes in industries/changes in agriculture.

Other potential challenges are the on-going community and business education around water resources, better data collection for such aspects as septic tank numbers and acquiring the funding to undertake these measures.

Biodiversity is essential to functioning ecosystems which maintain important processes on which all life depends. Biodiversity also has an intrinsic value and as such conservation of biodiversity is one of the primary principles of ecologically sustainable development (ESD) (Department of Climate Change, 2009). Biodiversity indicators have been selected to measure and gauge local and regional issues of noxious weeds and pests; Landcare and related activities and the condition of threatened species and ecological communities.

The planet has a wide range of organisms that live in complex interactions, both with the natural and built environments. All of the forms of life are connected in webs known as ecosystems which depend on other species and ecosystems for survival. These ecosystems are dynamic and change over time – both short term changes in response to events (such as populations reducing in a bushfire or drought) or long term changes such as evolution or climate change.

There are a wide variety of ecosystems across the reporting region, formed by interactions across a range of factors including soils, urban development, local climate, vegetation types, and disturbance by activities such as farming and water availability.

Biodiversity, as with land and air, provide important resources that we need to survive, such as oxygen and water cycles, growing foods and forests (timber) and even bacteria keeping the soil healthy. Most of these resources are at scales that we cannot see and may extend around the world (such as

water cycles) or be limited to a single place or event (such as regeneration after bushfires). The value of biodiversity extends beyond the catchment boundaries, providing national and international benefits.

Examples of biodiversity services and values include: biological control and pollination; record of natural history; food, medicines, timber and industrial products; seed dispersal and pollination; ornamental plants and breeding stock; eco-tourism; genetic diversity; carbon sinks and greenhouse gas absorption; nutrient cycling; filtration and storage; clean air and water; ecological services; water quality and flow eg. salinity control; stabilising processes eg. weather, climate, pest and biological control; healthy soils; nature-based recreation; visually pleasing aesthetics; health and lifestyle; science and education; spiritual and cultural; traditional owner values; cultural identity associated with key species and future resources (DECC, 2008).

Many species of plants and animals rely on specific habitats in order to survive. Once these habitats are lost or degraded through activities such as agriculture, development, weed invasion or inappropriate fire regimes, there is usually a significant effect on biodiversity. This may include loss of species or changes in species composition, such as vegetation communities.

Issue – Habitat loss

Condition

A recent study by Goldney, Kerle and Fleming (2007) examined the condition of flora and fauna in the Central West Catchment. As shown in the map of habitat types (Figure 14), there is diverse habitat across the region. In the east of the region there are mainly dry eucalypt forests, including Box-Gum Woodland,

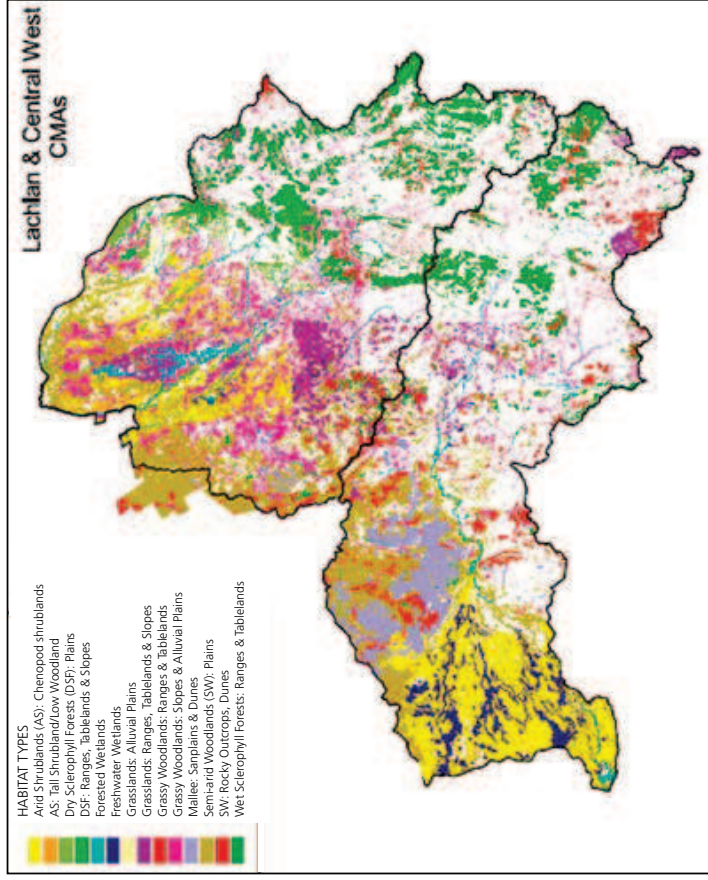


Figure 14 Map of habitat types in the Lachlan and Central West Catchments (Source: Goldney, Kerle and Fleming, 2007)

but these change to Poplar Box-White Cypress Woodlands and mallee in the west. This study estimates that there is only 38% of native vegetation/animal habitat remaining in the Central West Catchment but this is not evenly distributed – 62% has no remaining vegetation. The amount of remaining vegetation / habitat varies from six percent in the Tullamore area to 89% in the east. This does not reflect the condition of the remaining vegetation – some of the highly vegetated land in the west

Biological diversity, or biodiversity, is defined as: 'The variety of life forms, the different plants, animals and micro-organisms, the genes they contain, and the ecosystems they form. Biodiversity includes genetic diversity, species diversity and ecosystem diversity'

NSW Government, 2008

Table 9 Summary table of indicator trends - Biodiversity

Issue	Indicator	2007-08	2008-09	Trend
Habitat loss	Area of vegetation protected and rehabilitated through CMA incentive funding	25,694 ha	72,143 ha	+
Threatened species	Number of fish restocked	54,300	132,400	+
Invasive species	Number of threatened species	108	117	+
	Number of declared noxious weeds	112	112	0

- + improvement
- 0 no or little change
- worsening trend

Note – the above trends are for data in 2007-08 and 2008-09 from the same sources. They should be read in terms of limitations outlined in the discussion below. Note also that there are some new indicators for 2008-09 for which no comparison could be made with 2007-08. Refer to the Appendix for Councils included in trend data.



ABOVE Orange Ammer-down-Ploughmans Creek—long stem tubestock planting in May 2007

indicators about the health of the land, the study developed an indication of landscape condition across the catchment. The study found that the eastern half to two-thirds of the Central West Catchment is in poor condition and most of the remainder is in moderate condition.

Some areas have a high level of remnant vegetation but the condition of that vegetation, much of which is heavily grazed, reduces the condition value.

Indicator – Area of National Parks in the LGAs

Indicator – Area of State Forest in the LGAs

The area of land that is placed under protection, or reserved, may be considered an indicator of the amount of protected habitat available in the Council area. However many types of habitat are not well represented in the reserve system, as reserves tend to be on land that has low economic value rather than land that has representative (ecological) value.

In 2008-09, 711 ha was added to the National Park estate within the reporting region. Additions were made in Winburndale Nature Reserve, Durrigere and Yarrol Community Conservation Areas, and Borenore Karst Conservation Reserve.

The reserved land under State Forests includes both native forests and plantations. Although managed in a variety of different

ways across the region, they do provide larger areas of habitat in what is otherwise a highly cleared landscape.

As reported by 15 Councils in the region, the area under State Forest was 189,111 hectares in 2008-09. Unfortunately due to data gaps it is not possible to compare these figures with those for 2007-08.

Indicator - Proportion of Council reserves that are bushland/remnant vegetation

This is a new indicator and it measures the amount of habitat available in those reserves managed by local Councils. In 2008-09, there was an average of 53% of Council reserves that were bushland or remnant vegetation which also provide important habitat options for wildlife.

Threat

Land Clearing

The Central West region has undergone extensive clearing since settlement for agricultural purposes. The remnants of native vegetation that exist in small patches within reserves, state forests, or along the ridgeline and travelling stock routes are at significant risk of further fragmentation. The same threats facing vegetation such as drought, disease, clearing and land development, grazing and fire are also threatening native fauna species (BOD, 2007).

The removal of vegetation, whether individual trees or large scale (broad acre) land clearing on private property contributes to the changing character and viability of remnant vegetation and can dramatically affect the health of the landscape and local amenity. Information on the number or area of trees removed is not recorded by local Councils, however the CMAs have approved a number of clearing PVPs. Some land clearing is approved by Councils or the State Government under development applications, such as residential or industrial development (including mining). For example, Mid-Western Regional Council has several large mines which will continue clearing significant areas through approvals and expansions in the next few years.

Within the category of land clearing, other threats such as excessive firewood collection and inappropriate development and land use



ABOVE The Green Tree Frog is not endangered at the moment but faces an uncertain future due to habitat loss and pollution

also threaten native habitat. Areas that are used for agriculture can suffer through stock grazing on remnant vegetation and also a loss of connectivity through wildlife corridors as development expands and fences and other barriers are put in place.

Fire regimes

Bushfires, whether naturally occurring (lightning, weather events) or started by people, have a significant impact on biodiversity. This may be a negative or positive impact depending on the local species and community as they all have an optimal fire range. A too frequent fire regime may cause species and habitat loss as some native vegetation is not adapted to frequent fire. On the other hand, too infrequent fire can also have a negative impact on species as many native Australian trees and shrubs require fire to germinate. Inappropriate fire regimes also encourage the spread of noxious weeds that can quickly colonise land following a fire. These communities then out-compete native vegetation for space and resources.

All land managers in the central and western regions, including the Councils, have a responsibility under the *Rural Fires Act 1997*



to manage bush fire hazards on land under their care, control and management. This results in vegetative cover and density being reduced through prescribed burning and mechanical means. Such programs may be undertaken by Councils in co-operation with fire management agencies such as the NSW Rural Fire Service and DECCW.

Climate Change

Climate change will also place added pressure on biodiversity with the impacts of increasing drought and heat, more extreme weather conditions and declining water availability altering the natural environment. It will lead to changes in land use and prompt native and exotic species to move into new areas. Ecosystem services such as water filtration, soil quality and shelter will also be affected. Aquatic biodiversity, in particular, is continuing to suffer from the poor condition of rivers and floodplains in the catchments. Reductions in stream flows are likely to have a negative impact on aquatic biodiversity and wetland ecosystems such as the Macquarie Marshes and its associated waterbirds (CSIRO, 2007a).

A recent report into the effects of climate change on biodiversity has found that habitats are at significant risk from even moderate climate change and are already under stress from other threats such as those mentioned above (DCC, 2009). As well as a loss of

general habitat, other ecosystem functions that are expected to be affected include desynchronisation of migration and dispersal events, uncoupling of predator-prey and parasite-host relationships, interactions with new pathogens and invasives and changes in species distribution ranges (European Communities, 2008).

The geographic distribution of a species is often defined by its 'climate envelope,' reflecting species-specific tolerances to extremes of temperature and moisture (CSIRO, 2007a). The Purple Copper Butterfly which is found within the reporting region is at particularly high risk from climate change impacts. The species has a specific 'climate envelope' and only lives at elevations above 900m. As is, there is relatively little available habitat in the reporting region, but as temperatures increase and environmental gradients are altered, the small available habitat may not have a suitable climate to support the species in the future.

Response

Land clearing

There have been significant changes to native vegetation legislation at the State level, with the Native Vegetation Reforms addressing vegetation management from clearing approvals to PVPs. The outcome of these changes has been to reduce the number of clearing approvals over the past few years (NSW SOE, 2006).

No data on the amount of illegal clearing is available for the reporting period. Following the changes to legislation, the NSW Audit Office (2006) undertook an audit of compliance under the Act and concluded that 'approximately 74,000 ha of native vegetation were cleared in 2005, made up of 44,000 ha approved clearing and 30,000 ha illegal clearing. Most of the illegal clearing was on the previously uncleared western edge of farmland in the State... Most land clearing in NSW was done before regulation began in 1995. However farmers with uncleared land at that date were affected by the legislation. A minority of these have cleared illegally, particularly in western areas. Only a small number of prosecutions for illegal clearing have been undertaken under the Native Vegetation Conservation Act 1997 in the period 1998 to 2005.'

It is likely that this trend has continued as illegal clearing within the region including at Macquarie Marshes.

Councils also control clearing of vegetation in urban areas, where the Native Vegetation Act 2003 does not apply. Development consents allow for minor clearing for housing, business and industrial development as well as fire protection zones. This is regulated by environmental impact assessment requirements of legislation such as the Rural Fires Act 1997 and the Environmental Planning and Assessment Act 1979, which outline information addressing environmental impacts (Statements of Environmental Effects or Environmental Impact Assessments) to be provided with development applications and burning permits. Development consents may include conditions to mitigate land clearing impacts.

At the State level, the Biobanking Scheme, administered by DECCW, was introduced in 2008. This scheme allows for biodiversity offsets of clearing for development. As it was only introduced in 2008, no data on the area of vegetation affected is available for the reporting period. At this stage in the reporting region, although some landholders have expressed interest, no biobanking sites have been registered and no developers have shown interest in using biobanking as opposed to the current Assessment of Significance process.



ABOVE Molong Creek

Roadside vegetation management

In large sections of the region, especially those where broadacre farming is prevalent, roadside reserves and Travelling Stock Routes provide the only habitat corridors. The management of these reserves generally falls under the jurisdiction of the NSW Roads and Traffic Authority (main roads), local Councils (minor roads) and the Livestock Health and Pest Authorities (Travelling Stock Routes).

The management of these roadside verges is critical for the conservation of these remnant corridors and the fauna dependent on them. In 2006 and 2007, the NSW Roadside Environment Committee (REC), funded by a NSW Environmental Trust grant, supported Councils across NSW to develop Roadside Vegetation Management Plans (RVMPs) to better manage roadside verges under their jurisdiction.

RVMPs are firstly developed through assessment of the roadside vegetation, especially threatened species. The plan then identifies strategies to best manage the assessed vegetation and to further monitor and evaluate the impact of the strategies. The strategies in the plan could include those related to fire management, weed management, preservation of critical habitat and provision of clear zones for driver safety.

BELOW Revegetation of Raglan Creek, Bathurst



Local Councils in the region have

developed RVMPs, either as a result of the REC project or by their own volition. In 2008-09, according to REC records the following 13 local Councils in the region had RVMPs or studies:

- Bathurst Regional Council
- Blayney Shire Council
- Cabonne Council
- Cowra Shire Council
- Dubbo City Council
- Lachlan Shire Council
- Mid-Western Regional Council

- Narramine Shire Council
- Oberon Council
- Orange City Council
- Warren Shire Council
- Warrumbungle Shire Council
- Wellington Council

Rehabilitation

Rehabilitation projects have been developed by organisations including local Councils, Landcare groups and CMAs to help reduce the impact of land clearing on biodiversity. An example of a rehabilitation project is provided in the case study below.

Indicator – Habitat areas revegetated

This is a new indicator. Local Councils reported that 248 hectares of Council land were revegetated in 2008-09.

Indicator – Area of vegetation protected and rehabilitated through CIMA incentive funding

The Central West CMA reported that the area of vegetation protected and rehabilitated throughout its area rose from 25,694 hectares in 2007-08 to 97,837 hectares (an increase in 2008-09 of 72,143 hectares) as a result of its funding incentives for landholders.

Future challenges

The Native Vegetation Act aims to end broadscale clearing which impacts on environmental values. There is anecdotal evidence to suggest that pasture condition and soil stability have generally improved since the catastrophic declines of 1880-1940 (Western CMA, 2007). The Western Catchment has managed to retain the majority of its native vegetation and could provide a refuge for some species which have declined in the wheat/sheep belt of the Lachlan and Central West Catchments to the east. However, there are as yet no broadscale monitoring programs in place to assess biodiversity trends. Consequently it is difficult to determine the current trends of biodiversity decline/recovery as most changes take decades to become evident (Western CMA, 2007).

Recognition of the impact of external pressures on remnant vegetation has increased

awareness of the need to shift towards an approach which emphasises management and research of landscape function and the role of various abiotic and biotic elements in ecosystems processes at the landscape scale (Central West CMA, 2007). One of the future challenges is to develop a coordinated and strategic approach to management of the whole landscape. A key part of this will include strategies that relate to the retention, restoration, enhancement and revegetation of key areas to ensure improved outcomes are recognised through the current NSW Planning Reform Process and the review of Councils' Local Environment Plans.

Future challenges will also include education and awareness of the community and land managers regarding endangered species and how land management influences the spread and health of species. This includes the increasing pressure that the RFS is under to undertake excessive hazard reduction work in the wake of the Victorian bushfires. The community and land managers need to be educated in relation to the wider impacts of altering fire regimes, especially on threatened species that are most at risk.

The biggest step in overcoming these future challenges is the collection and maintenance of data of natural assets such as bushland and threatened species, and the recognition by Councils of these assets. In 2009, the CMA plans to roll out the Investment Framework for Environmental Resources (INFFER).

INFFER is a tool for planning and prioritising public investments in natural resources and the environment. It focuses on achieving outcomes cost effectively. It is relevant to projects where the aim is to protect or enhance specific identified natural resource assets. It is not intended for assessment of projects with a focus on general education, awareness raising, capacity building or research that is untargeted to specific assets.

However, these actions can be included in projects that aim to protect or enhance particular assets, and indeed may be crucial components of these projects.

INFFER specifies a series of requirements for asset identification including:

- That the asset be fundamentally biological/ecological in nature



ABOVE Once widespread, Barking Owls are now less common in mainland Australia and their conservation status varies from state to state

- That the asset be spatially delineated (single or multiple components can be drawn on a map)
- Recognition that asset identification is in part a social process that involves consideration of the ecological, social, cultural and economic values from a range of perspectives e.g. scientific experts and the community
- Differentiation between the asset itself and the spatial extent of threatening processes operating on the asset – the framework acknowledges that threats may operate proximate to the asset or at some distance.

INFFER does not treat ecological processes associated with landscapes or ecosystem services provided by nature as assets. It does however, recognise these concepts as important in the detailed analysis of projects. It also does not treat people or the community as an asset.

A future challenge will lie within the operation of this system as potential problems could arise if INFFER is the only way projects are assessed by various levels of government. An important facet of ecological asset projects is the involvement of the community in the asset identification process and the existence of capacity building projects.

Case Study – Putta Bucca Wetland Rehabilitation

Mid-Western Regional Council, the Central West CMA and the Cuddeogong Field Naturalists have joined forces to give Putta Bucca wetlands a facelift.

The area, which has been the location for the Mudgee Sewage Treatment Works Depot, will undergo site rehabilitation as the sewage depot is relocated to a different site. The project aims to enhance the natural biodiversity of the area by rehabilitating the riparian corridor along the Cuddeogong River which will improve water quality, increasing the visual amenity of the area, and developing a site specific working management plan. Other specific works will include willow and weed removal, feral animal control and revegetation.

Future on-ground works are likely to include additional rehabilitation works, walking tracks, boardwalks and bike paths, native fish protection programs, bird watching facilities and an interpretative centre.

Wetland rehabilitation work being undertaken in Putta Bucca Wetlands, Mudgee





ABOVE Box-Gum Woodlands, once covered some 10 million hectares of south-eastern Australia. They provide habitat for the Bush Stone-Curlew and the Squirrel Glider and they are an important source of food and habitat for three nationally threatened bird species (Regent Honeyeater, Superb and Swift Parrots).

Conservation Act 1995, and the *Environmental Protection and Biodiversity Conservation Act 1999*. As shown in the summary table (Table 9), in 2007-08 there were 108 threatened species listed in the Central West CMA area. This figure rose to 117 in 2008-09 thus showing a worsening trend for this indicator. The number of populations and EECs stayed constant.

In 2008-09, across the whole of the reporting region there were 126 threatened species, zero populations and eight endangered ecological communities listed on the State and Federal registers. Species and communities may be listed on both the State and Federal registers, such as the Box-Gum Woodland, if they are threatened at a national level.

A list of threatened species, populations and EECs for the LGAs in the region can be found at <http://www.threatenedspecies.environment.nsw.gov.au/index.aspx>.

Threat

Key Threatening Processes

A key threatening process is defined in the *Threatened Species Conservation Act 1995* as a process that threatens, or could threaten, the survival or evolutionary development of species, populations or ecological communities. Something can be a threatening process if it:

- Adversely affects two or more threatened species, populations or ecological communities
- Could cause species, populations or ecological communities that are not currently threatened to become threatened.

Key threatening processes in the region include:

- **Pest animals** – Introduced animal species can compete with, and prey upon, native animals. They can also damage native plants and degrade natural habitats
- **Weeds** – Weeds compete with native plants for resources such as light and nutrients and can aggressively invade areas, displacing native plants and animals
- **Diseases** – Exotic fungal infections, viruses and other pathogens can weaken and kill native species

- **Removal of dead wood and trees** – The removal of dead wood can have a range of environmental consequences such as loss of habitat (for animals that use hollows for shelter), disruption of ecosystem processes and soil erosion. The forests and woodlands of the Western Slopes and Tablelands are the ecological communities most threatened by wood removal as they contain popular firewood species
- **Habitat loss/change** – From large-scale land clearing to the gathering of bushrock for suburban gardens, humans have degraded many native environments across the State.

Climate Change

Climate change has the potential to impact on a wide range of habitats, species and populations. Many species have limited tolerances to changes in temperature and rainfall conditions, and even small changes in the climate may increase pressures on local ecosystems. In addition, while species and populations may normally be adaptive to some changes, the additional pressures of land clearing, weed invasion and other land use changes have reduced the ability of many species to adapt or migrate (AGO, 2003). The CSIRO has modelled climate change impacts for the catchments of NSW (on behalf of the NSW Greenhouse Office) and notes that for the Central West CMA area, it is likely that the climate will be warmer and drier with more extreme heat waves, winds and fires. Some increases in seasonal rainfall may occur. These changes would have significant impact on the catchment's plants and animals... and lead to possible invasion by pests and changes to the habitat' (CSIRO, 2007a).

Possible impacts on threatened species may include increased physiological stress, changes in fecundity (the ability to reproduce), changes in sex ratios in species whose temperature controls the sex of their offspring, and changes in competitive ability (European Communities, 2008).

Preliminary research suggests that temperate forests in Australia may increase in productivity with higher temperatures and increased concentrations of atmospheric carbon dioxide (CSIRO, 2007a). This has the

potential to boost certain EECs within the reporting region; however, these benefits may be offset by other climatic impacts such as decreased rainfall, increased bushfires, changes in pests and nutrient availability (CSIRO, 2007a).

Fire Regimes

Fire is also a useful tool in natural resource management as it may encourage some species to regenerate and remove some weed threats. Many ecological communities that occur in the region are adapted to the periodic occurrence of fire. Many species require fire to stimulate and facilitate life cycle processes. Each community will have optimal fire regime thresholds that are influenced by the species that occur within it. The sustainability of both the community and individual species and populations can be dramatically influenced by the intervals, season and intensity at which fire occurs in those environments. As such, high frequency fire is listed as a Key Threatening Process under the ACT.

Surface Water Runoff

Water runoff can transport pollution from sources such as sewage effluent, intensive agriculture (feedlots and irrigation) and

ABOVE A storm brewing over Tullamore. Extreme weather conditions are becoming more frequent due to climate change. The last two years have seen records tumbling for the hottest days and the length of heatwaves, particularly in the southern states. The hottest 14 years on record have occurred in the last 20 years



fertiliser runoff. The increase in impervious surfaces from roads, buildings and other development increases runoff and decreases infiltration. Runoff collects and concentrates, generating large volumes of water with a high velocity, which erodes exposed soil and carries it into streams along with weed seeds and nutrients. Elevated nutrient levels in water and soil generally favour the growth of weeds over native plants in remnant vegetation. This can encourage weed infestations, particularly along waterways, and make it harder for local species to compete and survive. Diversity of aquatic macro invertebrates in many streams is threatened by poor water quality and sediment derived from stormwater runoff.

Response

DECCW has prepared a Priorities Action Statement (PAS) to promote the recovery of threatened species and the abatement of key threatening processes in New South Wales.

The PAS identifies a number of broad strategies to help threatened plants and animals recover in New South Wales. Each of these strategies has more specific priority actions within them. They cover such things as:

- Surveys to clarify the distribution of a species (Bathurst is currently involved in surveys of the Purple Copper Butterfly)
- Weed and pest management programs
- Guidelines for threatened species issues in development assessments

- Research into factors influencing the survival of threatened species
- Community education programs to raise awareness of a species or threat in a particular area.

The PAS identifies 36 strategies. These are the main guiding tools for species recovery and threat abatement in NSW.

- Recovery strategies identify what is required to recover a threatened species
- Threat abatement strategies tackle the key threatening processes that are putting so many species on the brink of extinction.

A total of 750 priority actions have been identified to help recover threatened species and tackle threatening processes in the Central West Catchment Management Authority Region. These priority actions can be grouped into 25 recovery strategies and seven threat abatement strategies.

Of the 750 priority actions in this region, 737 are focused mainly on the recovery of threatened species, populations and ecological communities.

Indicator – Number of fish restocked

The NSW Department of Primary Industries, in conjunction with local Councils and recreational fishers, has restocked several streams in the region with native fish.

As shown in the summary table (Table 9), there has been a large increase in the number of fish restocked comparing 2007-08 with 2008-09. This would most likely be a mix of threatened and non-threatened native species.

Future challenges

The biggest challenge to Councils by far, is securing sufficient funding to undertake the research and on-going management of threatened species and EECs. The Federal Government is currently moving away from regional delivery of incentives which restricts the amount of work that can be undertaken collaboratively across a region. Enhancing the tools and educational capacity of land managers is also important, especially when taking into consideration the exacerbation of impacts from climate change.

Issue – Invasive species

Condition

A detailed study of pest animals recently reported that the primary pests in agricultural regions of NSW such as the Central Western region are feral pigs, feral goats, wild deer, foxes, rabbits and wild dogs/dingoes (DPI, 2007). Less than 0.3% of NSW is considered free from these species.

Indicator – Number of declared noxious weeds

The reporting area has 112 declared noxious weeds (DPI, 2009), and a significant number of environmental weeds present; however no reports on areas affected or number of environmental species are available at present.

This number is the same as for the previous reporting year 2007-08. Noxious weeds declared for the reporting Councils can be found by accessing the website: <http://www.dpi.nsw.gov.au/agriculture/pests-weeds/noxiousweed>

Indicator – Extent of noxious weeds

This is a new indicator. Eleven of the participating Councils reported that there were 2,649,102 hectares of noxious weeds across their LGAs in 2008-09.

Threat

Weeds

Weeds are plants whose growth and habit results in the loss of environmental, economic or social values. In the natural environment, weeds can out compete the native flora for resources including water, nutrients and sunlight, and can displace a range of species. Weeds vary in their impact upon the environment and are broadly grouped into two categories – environmental or noxious weeds.

Environmental weeds are those plants that have or may have established self-propagating populations in areas of native vegetation, outside of their natural range. Noxious weeds are those that are declared under the NSW Noxious Weeds Act 1993 and may be declared for the whole State or a local control area only. Noxious weeds must be controlled by the landholder.



ABOVE Dense Willow along the Macquarie River at Wellington, degrades the riparian corridor, reducing its habitat values. Rehabilitation works have since removed the willows and revegetated the banks, where necessary, with local native plants

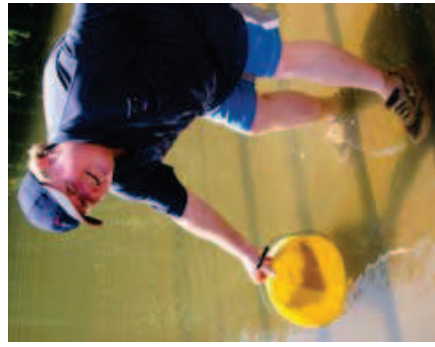
Of particular concern in the reporting area is willow infestation along water courses and drainage lines. Willows are declared as a weed of national significance due to their prevalence and ability to spread. Willows have significant impacts on riparian habitat including erosion, shading of water surfaces, increasing nutrients, supporting pest species and out competing native species. A number of willow control programs and projects have been implemented by the Councils and private landholders across the reporting area to try and reduce the impacts of this weed.

Invasive native scrub (woody weeds) is identified as a major concern in parts of the Western CMA. As a result of changes in fire regimes and increases in grazing, the scrub becomes the dominant vegetative type which incurs problems with other vegetation types competing for resources and secondary land degradation processes such as surface scouring and sheet erosion (Western CMA, 2007).

Feral and Pest Animals

Introduced species such as rabbits have been shown to have a significant impact on biodiversity through competition for resources or predation. Rabbits are responsible for concentrated overgrazing causing loss of groundcover; they also cause localised erosion through burrowing.

A key predator is the introduced European (red) fox. The fox has predatory character-



RIGHT Murray Cod fingerlings released in the Macquarie River at Narromine



istics of both cats and dogs and has, along with rabbits, been declared a key threatening process across NSW under the *NSW Threatened Species Conservation Act 1995* (TSC Act 1995). The fox is highly adaptable and is widespread in both rural and urban areas and preys on a wide range of fauna including mammals, birds, reptiles and turtles.

Other predators such as feral cats and dogs found throughout the reporting area create many problems for the natural environment. Cats hunt at all hours, especially at dusk and night. Their prey commonly consists of bats, possums, bandicoots, native rats and mice, birds, lizards and snakes. Cats also compete with native predators, such as the threatened Spotted-tailed Quoll and can carry bacteria and blood parasites which can be passed on to wildlife that have no resistance. Dogs also have a direct impact on threatened fauna by preying on and harassing wildlife and disturbing burrowing fauna. Dogs regularly urinate on trees to mark out territory, sending out warning signals to native animals to keep away, and faeces are very high in phosphorus, promoting growth of exotic weeds and being a health hazard. Wild dogs also interbreed with the native dingo, reducing the viability of the native species. Dogs are responsible for attacks on stock including sheep.

Other pests listed as Key Threatening Processes include pigs, deer and goats, and the

Below Rabbits have been declared a key threatening process across NSW.



impacts of these may range from the spread of weeds, vehicle accidents and competition for resources to the spread of livestock and exotic disease, and fence and crop damage. Pigs cause direct disturbance to habitat through wallowing and rooting and are widespread across NSW. They also prey on plants and animals and have contributed directly to the decline of several species of frogs and birds. While goats are also widespread, they are more prevalent in the western, more arid areas of the reporting area. Goats browse heavily on some species of native plants, including endangered and threatened species, compete with native threatened species and also cause erosion, particularly on steeper slopes.

Goats, rabbits, feral cats, feral pigs and foxes have been declared under the national *Environment Protection and Biodiversity Conservation Act 1999* and a national threat abatement strategy for each has been developed and implemented.

Response

Weeds

Noxious weed control is the responsibility of the local control authority. In many cases this is the local Council, however, there are also two County Councils in the reporting area, Upper Macquarie (Bathurst, Blayney, Lithgow and Oberon) and Castlereagh Macquarie (Coonamble, Gilgandra, Walgett, Warren, Warrumbungle). These provide weed control services, mainly along roadsides, for the Councils and employ weeds officers to undertake the works, funded by rates from the member Councils. In addition, committees and other land managers work to share information and planning, such as Macquarie Valley Weeds Advisory Committee and the Lachlan Valley Noxious Plants Advisory Committee. These committees work to ensure collaborative efforts on key weed species and also provide an information channel to State bodies such as the NSW Noxious Weeds Advisory Committee.

Councils also undertake programs to control environmental weeds and work to educate the community in the importance of such control. For example, many Councils support WeedBusters Week activities, a

national program to focus community education and involvement in weed management. The NSW Department of Primary Industries also promotes school education programs such as Weed Warriors and Weed Attack, aimed at introducing students to weed science as part of the curriculum (DPI, 2008).

Pests

The Livestock Health and Pest Authorities (LHPAs) carry out annual pest animal programs including wild dog and fox baiting, plague locust control, rabbit control and various other programs in conjunction with private landholders. Councils may support or cooperate with these programs and promote them through education. For example, Bourke Shire has an eradication program across its reserves; Cabonne Shire targets rabbit control and Dubbo City undertakes starting control in the city and fox baiting across its reserves. Councils also use a range of planning tools to better manage pest species. These include Local Environmental Plans, Development Control Plans and use of a range of State Environmental Planning Policies (SEPPs) such as SEPP 44 (Koala Habitat).

Future challenges

The Western Catchment, including Bourke LGA, has identified that a future challenge in the management of land resources is to mitigate the spread of scrub and maintain and rehabilitate native pasture vegetation communities (Western CMA, 2007). Invasive native scrub (in a rangeland context) is often not well understood and there appears to be a common misconception that as the species are native, then the problem is only a management issue for graziers.

The reality is that invasive native scrub is a symptom of long term rangeland management that has implications for biodiversity and landscape stability, as much as economic production (Western CMA, 2007).

Other future challenges for invasive species are similar to those previously mentioned in biodiversity, including a lack of funding, a shift away from regional delivery of funding incentives, the capacity of Councils to carry out mitigation works and the exacerbated effects of climate change.

Case Study - The Central West Green Team

The Central West Green Team is a project of the Salinity and Water Quality Alliance which undertakes environmental projects in LGAs within the Central West Catchment, to achieve on ground results and real improvements in the health of a number of key natural areas. The Green Team, which is made up of four skilled Natural Resource Management (NRM) specialists, have a wide variety of skills including bush regeneration, weed removal, plant and animal identification, revegetation and riparian restoration.

The team work alongside Council staff and the community, to undertake projects that include the removal of large woody weeds, such as Willows and Box Thorn, the restoration and protection of native vegetation along the river banks of the Macquarie, Castlereagh, Cuddegon and Bogan Rivers as well as the creation of constructed wetlands to capture stormwater and improve water quality in the greater river and wetland system. This not only improves water quality but also provides habitat for many species of native birds, marsupials, insects and native fish. Additionally, many of the projects improve the aesthetics and amenity of the local area. Key project outcomes are listed in Table 10.

The Central West Green Team take to the water.



Table 10 Key Project Outcomes from the Green Team

Action	Outcome
Number of willows treated	5,539 Willows
Area of weed treated	84 hectares
Area prepared for constructed wetlands	9 hectares
Area of land regenerated and/or revegetated	51 hectares
Length of riparian area rehabilitated	37 kilometres
Number of plants used for revegetation	26,077 plants
Number of volunteers engaged	263 volunteers
Number of volunteer hours	1,647
Number of staff involved	32

This chapter reports on human settlement issues including development, cultural heritage and noise. Improving, maintaining and balancing the diverse social, economic and environmental characteristics of the region are crucial in attaining a good quality of life for the community as a whole. Generally, local Councils have this responsibility, with some regulation and guidance from the State and Federal governments.

Local Councils are responsible for urban planning, infrastructure, some aspects of environmental and heritage restoration and protection and conservation of resources, provision of community facilities, and community services. This wide range of responsibilities requires sound information on which to make decisions.

Cultural heritage incorporates both Indigenous and non-Indigenous heritage. Aboriginal heritage sites including occupational, ceremonial and midden sites can be found on public and private land where disturbances and development has been limited. Non-Aboriginal heritage refers to use of the

land since European settlement. Heritage sites include old commercial/industrial, iconic architecture and military heritage still present in the reporting region.

Heritage indicators have been selected to gauge the management of both Aboriginal and non-Aboriginal heritage in the reporting region and within individual Council areas.

Table 11 Summary table of indicator trends – Human Settlement

Issue	Indicator	2007-08	2008-09	Trend
Population and Settlement Patterns	Number of development consents and building approvals	4,080	3,789	↓
	Listed Aboriginal sites	263	263	↔
Non-Aboriginal Heritage	Number of heritage items on National Trust Register	923*	927	↑
Noise Pollution	Industrial noise complaints received by Council	17	16	↔
	Urban noise complaints received by Council	164	723	↑

* data is for 2006

- ↑ improvement
- ↔ no or little change
- ↓ worsening trend

Note – the above trends are for data in 2007-08 and 2008-09 from the same sources. They should be read in terms of limitations outlined in the discussion below. Note also that there are some new indicators for 2008-09 for which no comparison could be made with 2007-08. Refer to the Appendix for Councils included in trend data.



Noise pollution encompasses both sound and vibration and is defined in the PoEO Act 1997 as:

'The emission of offensive noise, which means noise that by reason of its level, nature, character or quality, or the time at which it is made, or by any other circumstances, is harmful (or likely to be harmful) to or interferes unreasonably (or is likely to interfere unreasonably) with the comfort or repose of a person outside the premises from which the noise is emitted.' PoEO Act 1997

Issue – Population and settlement patterns

Condition

As a population grows, the demands for infrastructure such as housing, energy, water, transport and waste disposal also increases. Supplying this infrastructure results in land use changes that can have negative impacts on the environment. Increasing the density of existing urban areas ('brownfield' development) can have advantages over new 'greenfield' sites, with economies of scale, lower impacts on

surrounding native vegetation and agricultural lands and increased access to facilities such as recreation areas. It is important for Councils to ensure responsible and appropriate decisions are made relating to land use, in accordance with Local Environmental Plans (LEPs), rural/urban strategies and State Environmental Planning Policies (SEPPs). A significant potential impact is from the urban fringe, where housing and associated infrastructure cannot only affect the land but also other land uses such as agriculture. This area is also known as 'peri-urban', and is often typified by conflict over land use where the zones interface.

Indicator – Landuse conflict complaints

This is a new indicator. One way to measure the impact of changing landuse patterns and Council zonings is through complaints about landuse matters to Council.

Fifteen of the participating Councils reported that there were 67 landuse conflict complaints received in 2008-09.

Threat

Changing populations

Changing population will have an impact on the planning and provision of infrastructure and services in local Council areas. For example, as a population ages there will be a greater need for retirement homes and possibly 'rural residential' properties on the outskirts of towns.

Indicator – Population change

As shown in Figure 15 and in the Land chapter, the LGAs in the region have experienced a general slight rise in population over the past years. The need for land to be used for residential and industrial

ABOVE Talbragar Street, Dubbo

As a population grows, the demands for infrastructure increases. Supplying this infrastructure results in land use changes that can have negative impacts on the environment.

ageing population as discussed above will have certain social needs that all have changing environmental impacts.

Figure 16 shows the change in the median age of populations in each LGA in the reporting region and demonstrates that the populations in all the LGAs in the reporting region are ageing as the median ages for each have increased from 2001-2006.

In 2008, Centroc with the Western Research Institute (WRI) produced a report on population projections for its member Councils showing:

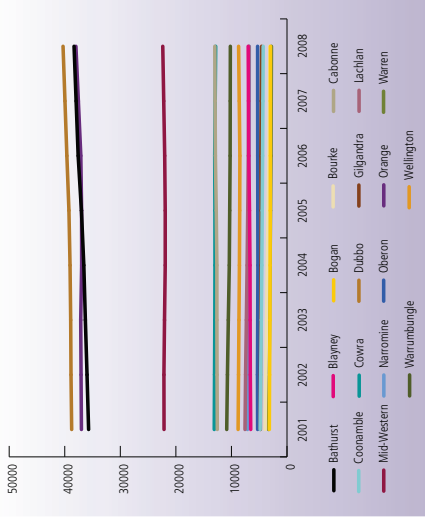
- Population projections on an LGA-by-LGA basis for the 16 Centroc member councils over the next 25 years based on research that has industry credibility
- Commentary on population projections into the future
- Projections that utilise data provided by Centroc on developments in the Centroc region
- Assessment and commentary on population projections from NSW Department of Planning (DoP).

Information supplied by the member Councils regarding future major developments was used to generate estimates of employment and the associated population impact under three scenarios namely:

Scenario A – 100% of new mining, health-related and high technology jobs are assumed to be filled by people migrating into the LGA. 50% of other new jobs are assumed to be filled by people migrating into the LGA with the balance being filled by the existing workforce.

Scenario B – 50% of new mining, health-related and high technology jobs are assumed to be filled by people migrating into the LGA. 25% of other new jobs are assumed to be filled by people migrating into the LGA with the balance being filled by the existing workforce.

Scenario C – 10% of new mining, health-related and high technology jobs are assumed to be filled by people migrating into the LGA. 5% of other new jobs are assumed to be filled by people migrating into the LGA with the balance being filled by the existing workforce (WRI, 2008).

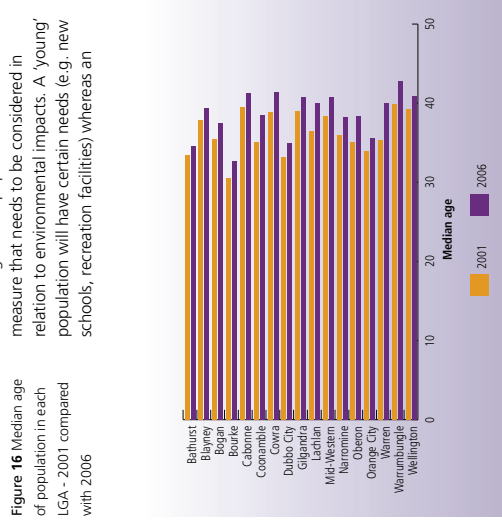


Source: Australian Bureau of Statistics

Figure 15 Population development, as urbanisation increases, places pressures on stormwater systems and waste infrastructure such as landfills, which in turn puts additional stress on the environment.

Indicator – Median age

Median age of the population is another measure that needs to be considered in relation to environmental impacts. A 'young' population will have certain needs (e.g. new schools, recreation facilities) whereas an



Source: Australian Bureau of Statistics

Table 12 shows the predicted population for the Centroc region under the different scenarios. The mid-range scenario suggests an average annual growth of 0.91% between 2011 and 2021 or an average growth of 0.54% per annum between 2011 and 2031 (WRI, 2008).

The predictions, however, are based on historical data and are only estimates so the further into the future they are made, the less reliable. It is also worth noting that the predictions made in the report vary significantly to those made by the ABS, most notably in the LGAs of Cabonne and Blayney where they are underestimated and Lachlan and Wellington where they are overestimated. Overall, the data presented in the report tends to be consistently slightly higher than the ABS estimated resident population.

Development

Key areas where environmental impacts of development may occur include residential, mining/heavy industry and rural/residential developments.

In the reporting region, a particular pressure is that of the rural small holding, where existing agricultural land is sub-divided to meet demand for smaller hectare residential lots in an otherwise rural landscape, reducing the available areas of primary production and therefore increasing pressure on agricultural land.

This also requires provision of services such as waste collection and infrastructure such as water (tank or town), sewer/septic and roads. The interface between these areas may also cause noise and other complaints such as odour and air pollution.

Indicator – Extent of new road construction

Indicator – Extent of road upgrades

These are new indicators and can be used to gauge the extent of development experienced across the region.

In 2008-09, 15 of the participating Councils reported that there was 46 km of new road construction (local Council roads) and reported that 1,635 km of local Council roads had been upgraded.

Table 12 Projected population for the Centroc region

	2011	2016	2021	2026	2031
DoP Projections (2005)	206,610	209,180	212,230	215,230	217,680
WRI Scenario A	215,691	235,630	249,944	253,106	254,720
WRI Scenario B	211,189	222,752	231,254	233,844	235,389
WRI Scenario C	207,584	212,444	216,287	218,414	219,886

Indicator – Number of development consents and building approvals

The number, type and location of development applications can provide some information on the potential level of development impacts on both the built and natural environment. While the number of development applications lodged with Councils do fluctuate with economic cycles and other factors such as the size of population and presence of industries; as a general trend they reflect the likely levels of development impacts on the LGA. As shown in the summary table (Table 11), there was a decrease in the number of development consents and building approvals from 2007-08 to 2008-09 for the 14 local councils that reported in each year (thus the improvement trend for the environment).

Fifteen of the Councils reported that there were 3,909 development consents and building approvals given in 2008-09. Figure

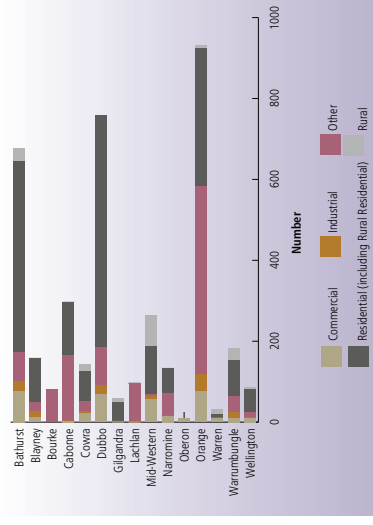


Figure 17 Types of development consents and building approvals across the region in 2008-09



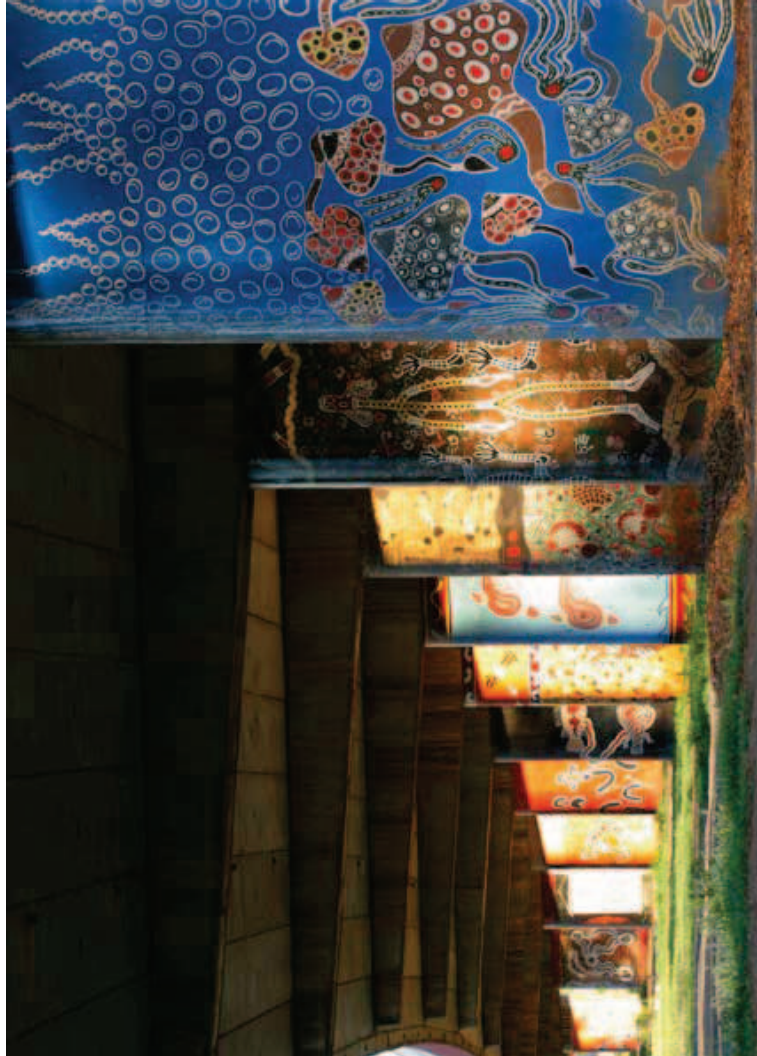
17 shows that most of these consents and approvals were for residential premises.

Response

There are a suite of planning tools that Councils in the reporting region are using to ensure that development is sensitive to the environment. State Environmental Planning Policies (SEPPs) deal with issues significant to the State and people of New South Wales. They are formulated by the Minister for Planning and may be exhibited in draft form for public comment before being gazetted as a legal document.

LEPs guide planning decisions for LGAs. Through zoning and development controls, LEPs allow Councils to manage the ways in which land is used. LEPs are the primary planning tool to shape the future of

BELOW Aboriginal artwork on road pylons



communities and also oversee the estimated \$20 billion worth of local development that is determined each year.

On 31 March 2006, the NSW Government gazetted a standard instrument for preparing new LEPs, also known as the LEP template. These plans across NSW will now use the same planning language, making it easier for communities to understand what is proposed for their local area. Councils are able to include localised planning objectives and provisions specific to their area, as well as determine zoning, additional land uses, heritage items, and development standards such as height and minimum lot sizes.

Future challenges

Councils across the region have been provided with Environmentally Sensitive Area mapping

to guide future developments away from important natural areas. The challenge for Councils will be to ensure that the information in the maps is recognised, reviewed and updated to include new areas as they are discovered and to ensure the sensitive areas are properly protected.

ESD principles are essential in managing and improving services and facilities within urban centres and should include attributes such as protection of the environment, culture, community involvement, facility access, employment opportunities and human health and safety.

The greatest challenges in achieving ESD in the region include conservation of biodiversity on private and public land, and pressures on water resources where often any development is seen as good development. The challenge here is maintaining a balance between keeping towns and villages alive and being able to do it sustainably. Awareness of the issues surrounding ESD and the education of its principles to land managers and the wider community is a vital step in overcoming this future challenge.

Issue - Management of Aboriginal heritage

Condition

The major Aboriginal groups in the Central West Catchment are the Wiradjuri, Kawambarai, Weilwan and Wongaibon. Small groups include the Dharuk, Darkinung and the Gamilaroi which has traditional lands that extend into the boundaries of the Central West Catchment (Central West CMA, 2007).

The Western Catchment includes the Aboriginal language groups of Ngemba, Wilyali, Nawalgu, Ngiyampaa, Gurnu, Barandji, Garanggaba, Baranbinya, Walywan, Yuwalari, Murrarari, Wanywalgu, Wadigali, Wangkumara, Malyangaba, Bandjigali, Yawaalaraay, Gamilararay and Baikinji (Western CMA, 2007).

The Lachlan catchment is comprised of 13 Local Aboriginal Lands Councils and eight different Aboriginal nations including Wiradjuri, Ngunawal, Wongaibon, Yitha Yitha, Dharug, Madi Madi, Gundungurra and Barindji (Lachlan CMA, 2007).

The land has great significance to the Aboriginal people for the role it plays in social and political relations and the cultural construction and transmission of knowledge, as well as its spiritual values. In NSW, the inland rivers and surrounding areas that supported the largest Aboriginal communities, had the most innovative societies and were the most active traders of material goods and intellectual property (Central West CMA, 2007).

Until recently, Aboriginal objects (sites) were narrowly defined. However, there is an increasing move to record locations that are important to Aboriginal people, recognising linkages to the post-European settlement period and the importance of contemporary places to them.

A current list of Indigenous sites in the reporting region on the State Heritage Register indicates there are 27 recognised sites. However, many 'intangible' sites and places which have high sensitivity and significance to Aboriginal communities may not be recorded with Government.

- Some of the sites include:
- Alectown Area
- Burdenda Carved Trees
- Burra Bee Dee Reserve
- Euromedah Carved Trees
- Haddon Rig Carved Trees
- Kiriibilli Carved Trees
- Louisiana Carved Tree
- Nagundie Archaeological Area
- Narramine Carved Trees
- New Oakleigh Carved Trees
- Stockyard Park Carved Trees
- Tara Cave Area
- Terramungamine Reserve
- The Springs Carved Trees
- Warren Carved and Scarred Trees
- Waterloo Carved Trees
- Yuranigh's Grave.

Indicator – Number of Aboriginal sites on AHIMS register

The Aboriginal Heritage Information Management System (AHIMS) register of Aboriginal sites is managed by DECCW and includes those sites listed above. There were 263 sites registered on AHIMS from across the reporting region in 2008-09 (no change from the 2007-08 figure).

Threat

Restrictions

Restrictions on Aboriginal people to practise their rituals and ceremonies have a significant impact on Aboriginal heritage. This may include loss of access to significant sites or places or lack of ability to carry out ceremonies and cultural activities.

Site Degradation

Environmental impacts from fire, natural weathering and salinity can result in detrimental physical impacts on heritage places and items and may cause permanent loss or damage. Likewise, vandalism and wilful destruction or ignorance of location/significance can also result in permanent damage or loss.

Development

This includes physical and aesthetic impacts from road works and road realignment, land clearing, unsympathetic alterations and additions and adjacent development. Further impacts may occur from increased demand for tourism and recreation, particularly affecting natural area heritage.

Changes to land ownership can also affect heritage, as new landowners may not recognise heritage significance, and may also change land use affecting heritage. For example, clearing of land for cropping will impact on sites of significance or change the local character of a place.

Lack of Knowledge, Appreciation and Recognition

We have lost a great deal of knowledge about Aboriginal heritage, and this may cause a lack of appreciation and recognition of the importance of heritage items and places. There is often a reluctance to acknowledge potential heritage sites as it is felt this may impact on future land use.

Inadequate Resources

Communities and Councils face a limit in the resources available to protect, identify and maintain heritage. This may include an inability to respond to threats to heritage items or to conduct heritage assessments. It can also cause neglect, whether known or unknown. Many of these pressures are difficult to

quantify in a general sense across the region, as they may affect some heritage sites more than others.

Response

Key responses include the listing of places and items with heritage values, legislative and planning controls to protect them, and partnership programs to support the involvement of Aboriginal and other communities in heritage conservation and management.

DECCW has also released draft guidelines and proposed amendments to the *National Parks and Wildlife Act, 1974* that will strengthen prosecutions for disturbance or destruction of Aboriginal heritage sites. The suggested penalties now include a maximum penalty for a knowing offence of \$550,000 for an individual or \$1.1 million for a corporation and the maximum penalty for a strict liability offence is \$110,000 for an individual or \$220,000 for a corporation.

The Central West CMA has a funded Cultural Heritage program which seeks to improve management and knowledge of Aboriginal heritage. The Aboriginal Reference Group (ARG), comprised of community members across the catchment, has already undertaken the following projects:

- Undertaken natural resource management training
- Prepared a schedule of fees for conducting cultural heritage assessment on private property
- Undertaken cultural heritage assessments as part of a riparian improvement project
- Assisted with development of the Cultural Heritage Incentive program, providing funding for landholders to identify, protect and preserve values and sites on their properties.

Thirty three projects were funded under this incentive in the last financial year. Nine were for non-Indigenous projects and nine were for a project, jointly funded by DECCW for cultural heritage mapping.

The final fifteen went to private landholders to manage cultural heritage on their property, which was a great outcome for the region and a much desired aim of the incentive program.

Case Study: Wellington Working Farms Project

For several years, Wellington Council has supported the concept of developing a working farm on the outskirts of Wellington where youths are able to experience training and working on a real farm. The University of New South Wales operates a property adjacent to Wellington on the Macquarie River and in 2006 it was decided to partner with Wellington Council in developing the concept of the Working Farm with emphasis on training for school students and youth at risk.

Council formed a Section 355 Committee with representatives from several organisations and community groups which now include UNSW, Wellington High Schools, Barnardos, Department of Juvenile Justice, Burnside, Gallangabang Aboriginal Corporation, Conservation Agriculture and No-Till Farming Association (CANFA), Central West Catchment Management Authority (CWCMA), STIPA Native Grass Association, TAFE, and Community Representatives.

The NSW State Government provided funding to develop a Strategic Management Plan in 2008. To date, Wellington High School has commenced activities on the farm as part of its agricultural studies curriculum. Several hectares of crop were planted this year using donated farming equipment from Chesterfield Australia. The state of the art tractor included GPS steering and the students enjoyed driving the tractor. Burnside and Barnardos have also commenced utilising the farm facilities to allow

youth at risk to experience outdoor time activities.

The Minister for Juvenile Justice has recently provided additional funding to investigate the feasibility of utilising the farm for court diversion activities.

One of the first tasks of the Committee was to carry out a cultural heritage survey to identify sensitive sites particularly for the traditional owners in the Aboriginal

Community. Gallangabang Aboriginal Corporation compiled this survey in 2008.

The Committee is also liaising with the Wellington Working Party which represents all Aboriginal Groups in the Council Area. The Nanima Village is an immediate neighbour of the farm and cooperation in this area is vital.

The University has received significant funding in order to establish a Groundwater Research and Training Centre on the farm. This project will involve drilling several bores in order to study groundwater systems. Furthermore, UNSW were successful in obtaining a grant for a Box-Gum Woodland Stewardship Program which will involve the reforestation of a 65 hectare area of the farm. Community involvement in this project will be encouraged.

Best practice grazing management and rehabilitation of an area of the Macquarie River riparian zone are also among planned projects.

Working Farms is a work in progress and still in its early stages of development but has potential to provide a meaningful contribution to the Wellington Community and the region as a whole.

The Wellington Working Farms site with Director Technical Services Owen Johns, The Hon Graham West MP and Councillor Tom Knowles (left to right)





The State Government also has Indigenous land use agreements which allow for Native Title claimants and the land users to agree to management of the land prior to resolution of a Native Title claim. This may include development activity, access agreements, extinguishment of native title and compensation. The National Native Title Tribunal keeps a register of current agreements, and while there are eight in NSW (340 nationally), none are within the reporting area.

Local Councils in the region reported that they had liaised with Aboriginal communities over several planning issues in 2008-09. They also reported that eight Development Control Plans and rural strategies included actions related to the maintenance of Indigenous heritage.

The Lachlan CMA has endorsed and assisted with the establishment of the Lachlan Regional Aboriginal Reference Group. The group has engaged communities from throughout the catchment and includes members from each of the Aboriginal nations and Local Aboriginal Lands Councils. The Lachlan Regional Aboriginal Reference Group operates in a consultative capacity by providing information and recommendations to the LCMA board on Aboriginal cultural heritage in NRM (Lachlan CMA, 2006).

Future challenges

As noted in the Threats section, education and awareness is a key to developing a greater sense of understanding and appreciation of Aboriginal heritage. Indigenous community involvement in projects, including the opportunity for volunteering, creates and improves the sense of community for the area and is a key principle of the sustainability of Aboriginal heritage.

Securing additional funding and resources for mapping and identification work on both Council and privately owned land is another

challenge but it is recognised that the biggest step is getting many landholders to stop regarding heritage items as a threat to their properties and future land use.

The CMAs recognise the connection Aboriginal people have with the landscape including land, water, vegetation and biodiversity, and endeavour to have Aboriginal communities contribute to future NRM planning for the catchments.

Issue – Management of non-Aboriginal heritage

Condition

Local heritage items

Indicator – Number of heritage sites on the National Heritage List and NSW Heritage Inventory

The National Heritage List records places that are of outstanding heritage value to the nation. The State Heritage Inventory comprises all

Table 13: Number of heritage items and places listed on the National Heritage List and NSW heritage inventory

Council	Number of heritage items and places
Bathurst	274
Blyney	141
Bogan	7
Bourke	40
Cabonne	60
Coonamble	11
Cowra	20
Dubbo	207
Gilgandra	2
Lachlan	46
Mid-western	493
Narramine	27
Oberon	43
Orange	128
Warren	5
Warumbungle	41
Wellington	73
Total for the region	1,618

Heritage is... 'Places, objects, customs and cultures that have aesthetic, natural, historic or social significance or other special values for present and future generations'

NSW Department of Heritage, 2008

items and places listed on NSW statutory registers, including the State Heritage Register and heritage schedules related to LEFPs. Note that some heritage places are listed on both national and State heritage registers.

Table 13 provides a list of heritage items and places included on both lists. A total of 1,618 items and places were listed in 2008-09 across the reporting region.

Indicator – Number of heritage items on National Trust Register

The National Trust of Australia is a community-based organisation with independently constituted trusts in each State and Territory. The National Trust Register is not the same as the National and State registers described above. As such it provides another indicator related to heritage across the reporting area.

As shown in the summary table (Table 11), there was an increase in the number of heritage sites listed on the National Trust Register from 2006 to 2008.

Threat Development

Many of the same aspects of development such as land clearing, unsympathetic alterations and changes to land ownership, that threaten Aboriginal heritage also threaten non-Aboriginal heritage.

Lack of Knowledge, Appreciation and Recognition

Non-Aboriginal heritage has not undergone the same level of depletion that Aboriginal heritage has, however the same problems still exist with a lack of appreciation and recognition of the importance of heritage items and places.

Similar to Aboriginal heritage there is often a reluctance to acknowledge potential heritage sites as it is felt this may impact on future land use, although this is slowly improving as developers and property owners realise the aesthetic and economic value in owning, maintaining or utilising a heritage listed property or site.

Below The historic Hawilah Church, Hawilah, Mudgee Region





Case Study – Warrumbungle Shire Community Halls

Warrumbungle Shire's draft LEP Heritage Schedule includes the maintenance of 13 halls in the region that range from magnificent Inter-War Free Classical and Inter-War Mediterranean style buildings to rustic halls constructed with timber frames and corrugated iron cladding.

The buildings owned by Council and various local organisations are an important part of the community's cultural heritage and reflect various building styles and community development over a period of more than 100 years as applied across a diverse landscape.

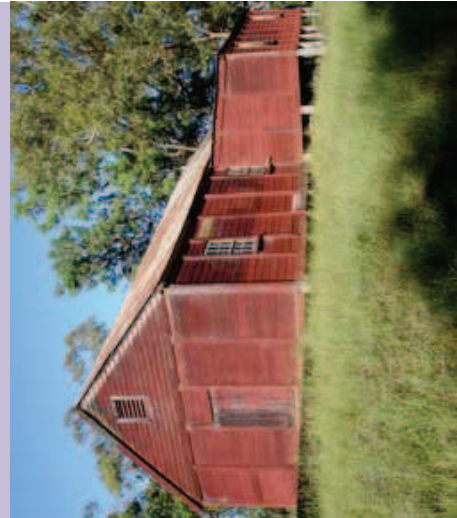
The effective management of these halls which include historic community halls, memorial halls, Mechanics' Institutes and Schools of Art, aims to encourage the community to be actively involved in the conservation and promotion of cultural heritage and ensures that Council can be seen taking leadership in the responsible management of the community's heritage assets.

Conservation and restoration works for a number of the buildings have been implemented in accordance with the guidance set down in conservation documents.

A 'Work For the Dole' Team is currently undertaking such works on the Purliewaugh Mechanics Institute. Community organisations managing smaller halls have been provided with simple Conservation Action Plans that set out the requirements for effectively managing the buildings.

This program has created opportunities for positive dialogue between Council and the community in relation to heritage management and has led to positive outcomes in the ongoing care of our precious community halls.

The Warrumbungle School of Arts



Site Degradation

Environmental impacts from fire, natural weathering and salinity can result in detrimental physical impacts on heritage places and items and may cause permanent loss or damage. Likewise, vandalism and wilful destruction or ignorance of locators/significance can also result in permanent damage or loss.

Inadequate Resources

Communities and Councils face a limit in the resources available to protect, identify and maintain heritage. This may include an inability to respond to threats to heritage items or to conduct heritage assessments. It can also cause neglect, whether known or unknown. Many of these pressures are difficult to quantify in a general sense across the region, as they may affect some heritage sites more than others.

Response

Development
In order to list sites, heritage studies need to be conducted to determine the location, significance and value of the site or item. Many Councils in the reporting area have heritage officers appointed to coordinate studies and listing of sites, as well as providing advice on individual development impacts. These officers also identify key areas that require protection and seek funding for rehabilitation projects to improve long term management of the place. Councils also have the authority to

implement Development Control Plans (DCPs) which apply to areas or sites and provide an additional level of protection for those areas. These are often applied to heritage towns and villages.

For example, Blayney Shire Council implemented a DCP for the historic village of Millthorpe. This DCP requires new buildings to reflect the look and character of the village (including materials, roof lines and colours). LEPs can also be used to provide statutory protection. For example, Mid-Western Regional Council has listed heritage conservation zones in Gulgong (also a National Trust listed town), Mudgee, Rylstone and Hargraves. The LEP provides some statutory protection to complement listing on Local, State or Federal registers.

Indicator – Heritage buildings on statutory heritages lists that were demolished/destroyed

Indicator – Actions to protect non-Aboriginal heritage items

Indicator – Heritage buildings on statutory heritage lists that are renovated or improved

These are new indicators introduced in 2008-09 and provide a gauge of the level of protection through management of non-Aboriginal heritage items. Sixteen of the 17 Councils reported on all these indicators.

Councils reported that two heritage buildings across the region had been destroyed or demolished in the reporting period. They reported that 22 actions (e.g. management plans) had been prepared in 2008-09 to protect non-Aboriginal heritage items. Sixty eight heritage buildings on statutory lists were renovated or improved during the year.

Community education

Councils have also undertaken community education programs to increase the community's awareness of the significance of a site or place. This includes interpretive signage on historic buildings or placing heritage orders on a site or item. Warren Shire Council has recently acquired funding for a Community Based Heritage Study which is commencing from late 2009.

Future challenges

As with Aboriginal heritage, community involvement on projects, including the opportunity for volunteering, creates and improves the sense of community for the area and is a key principle of the sustainability of heritage. However, securing funding for ongoing maintenance, restoration and improvement can often be difficult. Many of the properties that are heritage listed are under no obligation to be maintained and can often quickly fall into disrepair.



Issue – Noise pollution

Condition

Health Impacts

Noise is a type of pollution that has direct physiological and psychological effects on people. Noise can have a range of impacts from minor annoyance to more serious damage to hearing.

Some researchers now believe that deafness in elderly people is not just a process of ageing but can be largely attributed to long-term exposure to loud noise. When this occurs, irreversible physiological changes to the hearing mechanism of the ear can result. In less severe cases noise can lead to anxiety, sleeplessness, emotional stress and neighbourhood disputes. Noise can cause impacts on sensitive land uses including residential areas, schools, hospitals and parks.

Environmental Impacts

Noise also affects the habitat of some native fauna species. This may include impacts on breeding cycles and a reduction in the number of species in a locality (moving to avoid noise). Some types of fauna are more susceptible to noise and vibration than others. For example reptiles that rely on vibration as a primary sense will avoid areas of particular noise wave

Above Barking dogs are often a source of noise complaints

Human Settlement

patterns or vibrations as they disrupt the ability to hunt and avoid predation.

Indicator – Industrial noise complaints received by Council

As shown in Table 11, there was little change in the number of industrial noise complaints received by the local Councils that reported in both 2007-08 and 2008-09. Sixteen of the participating Councils reported that there were 69 industrial noise complaints received in 2008-09.

Indicator – Urban noise complaints by Council

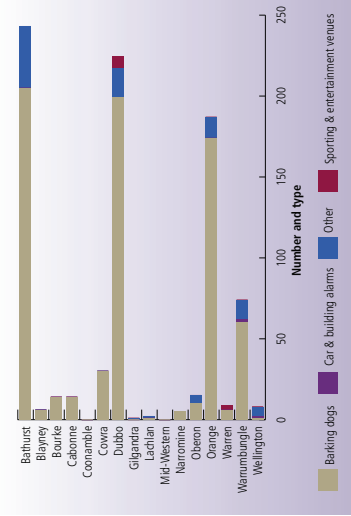
As shown in Table 11 from those Councils reporting in both years there was a large increase in the number of urban noise complaints from 164 in 2007-08 to 723 in 2008-09. This may reflect trends in increasing urbanisation, however, as it is a relatively large increase in complaints, another possible explanation is that better reporting and data collection mechanisms for this indicator have been put in place.

As shown in Figure 18 most of the complaints relate to barking dogs. The total number of urban noise complaints from all participating Councils in 2008-09 was 656.

Threat Increasing Urbanisation

Increasing urbanisation leads to increases in urban and rural noise including traffic noise

Figure 18 Type of urban noise complaints received by Councils



and associated noise from increased housing density, intermittent and intrusive noises include the 'screeching' of brakes, the use of engine brakes on heavy vehicles, agricultural machinery, industrial noise and acceleration noise at traffic lights. Rail movements also provide intermittent noise, with many villages and towns located on the rail lines. Noise from barking dogs in residential areas is a concern to the community and is the most common type of noise complaint to Councils in the reporting region (see Figure 18). Domestic air conditioners and music, which are not always on and therefore intermittent, are another source of noise that may have a psychological impact on the residents of an area.

Industrial Noise

Complaints concerning the noise from machinery on commercial and industrial premises are occasionally made to Council or the DECCW Environment Reporting Line. Complaints are more frequent in cases where commercial operations are situated close to residences such as small neighbourhood shopping centres using external refrigeration equipment, or where agricultural activity takes place close to residential houses. Some industries may also have the capacity to operate on a much larger scale and therefore may have long reaching impacts. Noise from agricultural activities and heavy industries such as mining also has the potential to cause significant impacts across a broader landscape. The opening of a new mine in Mid-Western Regional Council area has seen noise impacts increasing significantly in a previously quiet rural village area. Although there were no reported noise complaints to Council, there were 323 complaints reported to the DECCW during the reporting year.

Response

The PoEO Act, makes DECCW the appropriate regulatory authority and therefore responsible for regulating noise from activities scheduled under the PoEO Act and for premises occupied by public authorities. Local Councils are largely responsible for the management of noise in relation to non-scheduled activities, with local police also involved in neighbourhood noise matters. NSW Maritime enforces noise controls for marine vessels.

Premises conducting scheduled activities are required to hold an Environment Protection Licence through which DECCW can apply appropriate noise control conditions. Councils can control noise through conditions determined by Council as part of development consent, issued under the planning legislation, and through Notices or Directions issued under the PoEO Act. The PoEO (Noise Control) Regulation 2008 commenced on 1 March 2008 and addresses common noisy activities that occur in residential situations. It limits the time of day that noisy equipment (such as lawn mowers, stereos and leaf blowers) are permitted to be heard in neighbouring residences. It also has provisions regarding motor vehicles (including noise limits) and addresses noise from marine vessels.

Most Council-regulated potentially noisy activities are not the subject of specific limits or controls. It is an offence under the PoEO Act when noise is emitted from premises because of the occupier's failure to maintain or operate a plant.

Noise Control Notices or Noise Abatement Directions may also require emissions to be reduced or cease in certain circumstances (for example, if offensive noise is being emitted from certain premises). It is an offence not to comply with the Notice or Direction. Nuisance dogs and cats are covered by the *Companion Animals Act 1998* administered by the Minister for Local Government.

Transportation noise is handled by various agencies, with aircraft noise exclusively a Commonwealth Government responsibility, with the exception of aircraft on the ground at private or local Council-operated airports. Rail noise and noise from the construction of freeways and tollways is generally regulated by licences issued by DECCW. Noise from general traffic on roads is managed by the Roads and Traffic Authority (RTA) and councils. Noise from individual vehicles is regulated by the RTA, police and DECCW. The maximum penalty for noise offences under the PoEO Act is \$60,000 for corporations and \$30,000 for individuals, plus daily penalties for continuing offences.

The Noise Guide for Local Government aims to provide practical advice to Council officers in the day-to-day management of local noise problems and the interpretation of existing policy and legislation.



ABOVE Industrial noise is another common form of complaint

The Guide focuses on how to assess and manage the noise issues dealt with by Council officers, such as neighbour-to-neighbour problems and those resulting from commercial or industrial premises.

Importantly, the Guide is also aimed at planners. It outlines planning considerations that can have a significant bearing on prevention of future noise problems. The Guide is advisory in nature and Council officers are encouraged to use it to develop their procedures and policies to deal with noise issues relevant to local circumstances.

Future challenges

As industrialisation and urbanisation continue, especially in regional centres, there will be a challenge to minimise intrusive and offensive noise. Of particular concern will be issues relating to barking dogs and to closer living through medium and high density housing. The interface between residential and industry may cause future noise problems.

Another challenge is to ensure LEPs take into account noise issues when land is rezoned, by providing adequate buffers between primary production, rural small holdings and residential land zones.

Waste is caused by the disposal of products at the perceived end of their life, or simply when the user has no further need for them. Waste management has increased rapidly in terms of the issues and activities that are now being undertaken by local Councils to reduce the impact of pollution on the environment.

Significant work has been undertaken within the region through NetWaste, a voluntary regional waste group sponsored by the Department of Environment, Climate Change and Water (DECCW).

Through NetWaste, economies of scale are achieved for member Councils through regional contracts and projects. However, Councils are also actively improving their waste management practices on an individual scale, such as converting small landfills to

transfer stations and ongoing training of operational staff. There are 28 member Councils in NetWaste, with all Councils partaking in this report being members of the group, along with a number of other surrounding Councils.

Issue – Waste generation and pollution

Condition

Solid Waste

Solid waste generated within the reporting area originates from the following general sources:

- Municipal: comprises general household waste and garden organics (including waste from the Councils' kerbside collections and waste taken directly to landfills by residents)
- Construction and Demolition: includes waste from construction and demolition activities generally associated with development
- Commercial and Industrial: includes waste from commercial activities in the area including businesses and restaurants.

This waste requires transport, recycling and/or disposal which uses significant energy, as well as creating potential pollutants in the form of air and water pollution and greenhouse gas emissions such as methane. Noise pollution may also occur at some landfills or from the transport of waste.

Indicator – Average total waste generated per person per annum

Indicator – Total waste collected at rural tips and transfer stations

Indicator – Total waste received at primary landfill

Indicator – Average cost of waste service per person per annum

Table 14 Summary table of indicator trends – Waste

Issue	Indicator	2007-08	2008-09	Trend
Waste Generation	Average total waste generated per person per annum	1,072 t	1,102 t	+
	Total waste collected at rural tips & transfer stations (excluding recyclables)	5,971 t	8,164 t	+
	Total waste received at primary landfill	225,769 t	199,213 t	-
	Average cost of waste service per person per annum	\$177	\$190	+
Reduce	Number of drums collected in DrumMaster collections	98,822	88,551	-
	Amount of office paper used by Councils (A4 reams)	26,969	19,893	-
Recycle	Number of recycling services available	60	72	+
	Volume of material recycled	15,834 t	21,044 t	+
Littering and illegal dumping	Annual volume of litter collected by streetsweeper	1,417 t	1,359 t	-
	Number of illegal waste disposal complaints to Council	306	337	+
	Number of Clean Up Australia sites	83	98	+

- improvement
- no or little change
- worsening trend

Note – the above trends are for data in 2007-08 and 2008-09 from the same sources. They should be read in terms of limitations outlined in the discussion below. Note also that there are some new indicators for 2008-09 for which no comparison could be made with 2007-08. Refer to the Appendix for Councils included in trend data.

Total waste indicates consumption patterns and the pressures placed on rural tips and primary landfills.

As shown in the summary table (Table 14), there was a slight increase in the average total waste generated per person for 2008-09 compared with 2007-08 (for the nine Councils that reported in both years). From the 14 Councils that reported, the average total waste generated per person for 2008-09 was 0.935 tonnes. As shown in the summary table (Table 14), for those Councils reporting in both years, there was a large increase in the volume of total waste (excluding recyclables) taken to rural tips and transfer stations. The total volume received at rural tips and transfer stations from all Councils across the region in 2008-09 was 11,598 tonnes.

There was a significant decrease in the volume of total waste received at primary landfills of the Councils that reported in both years. The total volume of waste received at primary landfills across the region in 2008-09 was 215,837 tonnes. A breakdown of the total waste received at primary landfills by LGA is provided in Figure 19. Comparing the figures for 2007-08 with 2008-09, there

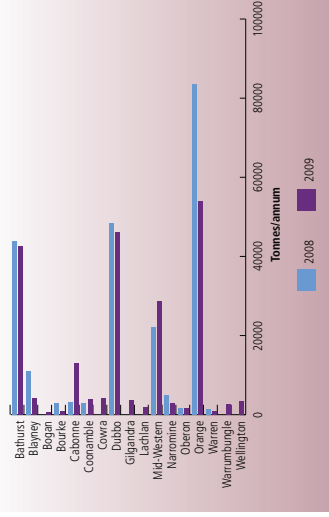


Figure 19 Total waste received at primary landfill by LGA

was an increase in the average cost of waste services to people across the region. From the 16 Councils that reported in 2008-09, the average cost of waste service to each person per year in the reporting region was \$197.

Hazardous Chemicals

Hazardous chemicals include common household and agricultural materials such as pesticides, herbicides, paints, cleaning



below illegal dumping at Macquarie River, Bathurst

products, oils, car batteries and pharmaceuticals. Chemicals have the potential to cause significant local or regional impacts on both human health and the environment. There are currently limited disposal options available in the region, however irresponsible disposal of such chemicals can cause acute and devastating impacts upon the natural environment, particularly contamination of aquatic systems, land and ingestion by animals.

Some Councils hold Household Hazardous Chemical Collections for residents, with a regional campaign coordinated through NetWaste proposed to be undertaken in the latter part of 2009. Councils in the region are also active participants in the DrumMuster program, which provides a collection service for agricultural chemical containers on an ongoing basis throughout the catchment.

Indicator – Number of farm chemical drums collected through DrumMuster collections

As shown in the summary table (Table 14), the number of drums collected through the DrumMuster program has dropped in the LGAs that reported in both years. It is difficult to draw assumptions for the reasons for the decline, however possible contributing factors may be seasonal influences, which means less chemical is used and physical drums requiring collection. It could also be due to the fact that farmers had already previously disposed of any stored surplus of drums and are now disposing of drums as they currently use the contents.

Liquid Waste

There are currently a significant number of domestic and commercial premises throughout the reporting area that rely on a septic tank arrangement for their effluent disposal. These premises are located where, due to the unavailability of sewer mains, or for other site-specific reasons, a normal sewerage service cannot be provided. These often occur in small villages, remote communities and on farms. Trade wastes are those liquid wastes produced by industry which are discharged to sewer and may contain a range of pollutants that require treatment prior to discharge. This action is licensed under the PoEO Act 1997

and Councils have a role in monitoring and compliance of these discharges.

Waste Management Facilities

The various sources and types of waste mentioned above are the reason Councils operate landfills and waste management facilities. Treating waste and burying waste in landfill has the potential to impact on native vegetation and other aspects of the environment. Waste management facilities can result in environmental impacts such as noise, odours, windblown litter, methane gas emissions, groundwater contamination, and erosion, sedimentation and weed infestation of adjacent waterways. Closed landfill sites can pose similar environmental risks and land instability. There are both operating landfills and closed landfills across the reporting Councils.

Littering

One of the most obvious forms of pollution is litter. Apart from being unsightly and taking a long time to breakdown, litter can be washed into waterways through stormwater systems where it poses a risk to aquatic life.

Indicator – Amount of litter collected by Council streetsweepers

From the Councils that reported in both years there was a reduction in the volume of litter collected by Council streetsweepers (see summary table for details). However, this could also be a result of a lack of record keeping throughout the year. The total volume of litter collected by streetsweepers from the 15 Councils that reported in 2008-09 was 1,359 tonnes.

Illegal dumping

Indicator – Number of illegal waste disposal complaints to Councils

The number of complaints about rubbish dumping does not reflect the frequency of incidents, nor the impact of illegal dumping. However, it does indicate community awareness of illegal dumping and the potential impact that it may have on the environment. As shown in the summary table (Table 14), the number of illegal dumping complaints

increased from those Councils reporting in both years. From 15 Councils that reported in 2008-09 there was a total of 364 complaints received.

Threat

Population and consumerism

Ever-accelerating human consumption of natural resources lies at the root of many of our global environmental problems. Current consumption patterns stress limited natural resources, contribute to global warming, and create wasteful and even toxic by-products that affect the quality of life and the health of communities around the world. Add global population growth to the mix, and it becomes increasingly clear how the health of the ecosystems we depend on for survival are being compromised.

The Australia Institute's Waste/!

Consumption Report supports claims that not only is waste generation at all time highs but wasteful consumption is of significant concern. That is, significant percentages of all goods purchased by Australians are not actually utilised or consumed and end up as waste. It is expected this trend will significantly undermine the increased recycling effort undertaken by the government, community and business sectors in NSW and nationally.

Climate Change

As Australia grapples with its response to climate change, there is a major concern with waste placed in landfill sites. Every tonne of degradable waste dumped in Australia's landfill sites today will still be a greenhouse gas liability in 2050.

The reason is that waste materials with degradable organic carbon, including food, paper, garden and wood wastes decompose and emit gas when buried in landfill. This landfill gas contains methane, which has a global warming potential 25 times that of carbon dioxide.

Indicator – Greenhouse gas emissions from landfill

This is a new indicator. It was estimated that 129,934 t CO₂e of greenhouse gas emissions were emitted from landfills of twelve of the Councils from the region in 2008-09.

Response

Case Study – Emissions from Landfill Assessment

The regional collaboration of NetWaste recently coordinated a project to investigate the greenhouse gas emissions being produced from Council landfills within the region in response to the Federal Government National Greenhouse and Energy Reporting (NGER) and the Carbon Pollution Reduction Scheme (CPRS). The reporting requirements are established under NGERs and the first reports for registered entities are due on 31 October, 2009. It is anticipated that waste facilities over certain thresholds will have both reporting and carbon permit implications.

Hyder Consulting were engaged to undertake the project, with eleven of the Councils that are reporting in this Regional SoE report participating in the modelling project. The project involved modelling the greenhouse gas emissions from the nominated landfills using a model consistent with the Intergovernmental Panel on Climate Change (IPCC) First Order Decay Model. This model uses an equation to determine methane emissions released per year by calculating emissions generated in the current inventory year from the waste deposited in previous years. With the accuracy of the modelling the project identified a range of issues such as climatic influences with individual Councils pursuing further investigation as required.

An important outcome of the project has been reinforcement of the importance for Councils to divert organics from landfill – the largest contributor to the generation of methane, to compost – instead with regional options being pursued through NetWaste.

Waste management at landfill





ABOVE A Bin Your Butts campaign bin

legacy of landfill, up to 85 per cent of Australia's carbon budget in 2050 will be accounted for by waste and therefore unavailable for future wealth creating activities. Even with existing measures such as the capture of landfill gas emissions, waste could be a disproportionately large component of Australia's national emissions in the future. This means that other sectors could have to exceed their emissions reduction targets in order for the nation to meet its global greenhouse obligations. The project undertaken by NetWaste (see Case Study) is a step towards addressing this future challenge.

Issue – Waste treatment and disposal

Condition

Avoiding the creation of waste is generally seen as the best strategy for dealing with the problems it creates. Key responses to deal with waste include reducing the volume of waste reaching landfills, minimising the environmental impacts of waste facilities, and encouraging the development of new waste treatment and recycling facilities.

Reducing waste disposal

Indicator – Office paper used by Councils

As relatively large employers and community leaders, local Councils can be used as one indicator of changing office practices and increased awareness to minimise the use of office paper. As shown in the summary table (Table 14), the Councils that reported in both years drastically reduced their use of office paper – a reduction of 7,076 reams. The total number of A4 reams used by 16 reporting Councils was 27,648 A4 reams in 2008-09.

Centroc has produced a Council sustainability calendar which includes the use of double-sided printing as a method of paper use reduction.

Threat

Packaging

The increasing use of packaging by producers, particularly in the last 30 years, means that consumers are left with waste that may, if they do not recycle, end up in landfill.

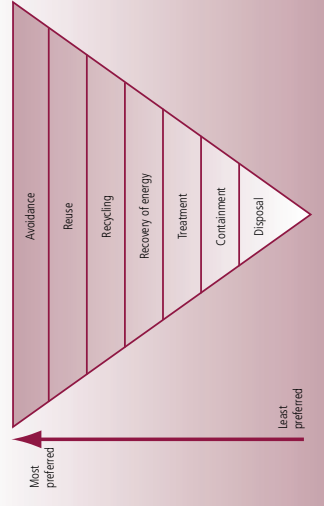
Australians generate more than 32 million tonnes of waste each year (Hyder, 2006). From this study, 42% is construction and demolition waste, 29% is commercial and industrial waste and 29% is municipal or household waste. Total packaging waste generated in Australia is just over 4.2 million tonnes (National Packaging Covenant Annual Report, 2005-06) from commercial, industrial and household sources. However, according to NetWaste, in the reporting region municipal solid waste fluctuated from 51-80% of total waste and 18-25% was commercial and demolition waste. Packaging waste generated represents around 13% of the total waste stream within Australia, with beverage packaging comprising less than three percent.

Lack of awareness

Lack of awareness of the hierarchy shown in Figure 20 can be a major hurdle in minimising the amount of waste going to landfill. Ongoing education programs and other initiatives are required to raise awareness levels and encourage behaviours related to the top layers of the hierarchy.

Response

Figure 20 outlines the hierarchy of avoid, reuse and recycle as a method of improving sustain-



Source: DSE, Victoria

Figure 20 Waste Hierarchy

ability. The first step is to reduce the amount of waste you need to dispose of or recycle by avoiding it in the first place. The second step is to reuse any materials before discarding or recycling. The third step is to recycle any material that you can so it can be transformed into another useable material.

Only after the first three steps are completed, should any leftover waste be disposed of to landfill.

Education of local communities is an important part of waste management



Case Study – Kerbside Recycling Rollout in Mid-Western LGA

Mid-Western Regional Council has rolled out blue-top paper and cardboard waste recycling bins for residents of Charbon, Clandulla, Gulgong, Rylstone and Kandos, as a first step in a sweeping recycling change for the region.

This was a first ever kerbside recycling pick-up for these residents who prior to this, had to take all of their recycling to the Kandos Waste Transfer Station.

The recycling program is being staged to spread the cost and allow the region to grow into the processing of additional recyclable material. The next step in the process is the roll-out of yellow top bins for plastic and glass which is expected within a year.

Mid-Western Regional Council recycling rollout

This is based on a study by Centroc. Note that Bathurst Regional Council also had emissions of 30,400 tonnes in 2008-09.

Future challenges

As shown in the summary table (Table 14), there is a worsening trend for the reporting region in generating waste. If, as expected the region's population grows (see Human Settlement chapter), there will be a future challenge to stem this trend through a range of initiatives including education and improved recycling services.

Another challenge relates to greenhouse gas emissions from landfills. Put simply, if action is not taken to stop the greenhouse

upgraded kerbside domestic recycling in the city allowing residents to separate recyclables from waste in the home and have these collected from the house. The majority of Councils provide recycling collection points in smaller villages and localities to encourage recycling, however the viability of offering such services is greatly affected by volumes of material and distance from major centres.

Through NetWaste, Dubbo City, Wellington and Narramine Shire Councils are currently investigating the possibility of introducing a kerbside recycling service in their communities.

Indicator – Number of recycling services available in each LGA

As shown in the summary table (Table 14), for those Councils reporting in both years, the number of recycling services available increased from 60 to 72. Note that this trend should be tempered with the fact that kerbside collections have ceased in Narramine and Warren. The total number of recycling services across the whole region in 2008-09 was 89. This is the number of collection services across the region and gives some indication of the availability of these services to residents.

Indicator – Volume of material recycled

As shown in the summary table (Table 14) the volume of material recycled increased across the Councils that reported in both years. This positive trend could have been due to the work of NetWaste and the Councils in raising recycling awareness in the community and the increase in the recycling services available. From 16 local Councils, the total volume of waste recycled was 26,047 tonnes in 2008-09. Note that Orange has a number of recycling contracts with surrounding LGAs.

A breakdown of the type of materials recycled in 2008-09 is provided in Figure 21. This shows a large proportion of the material recycled is paper and cardboard. Other items that can be collected by kerbside recycling services include aluminium, steel and some plastics. Note that some Councils have not differentiated the type of recyclables in Figure 21. Education programs are an integral component of waste reduction and recycling. NetWaste implements several education

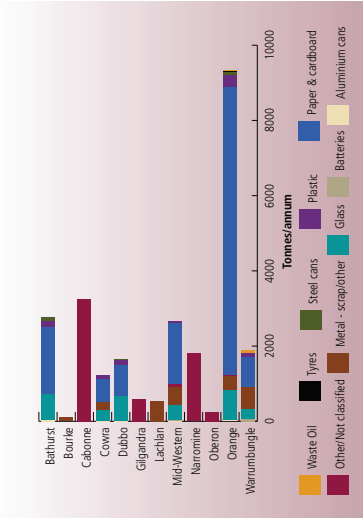


Figure 21 Type of materials recycled throughout the region, to promote the importance of avoiding the creation of waste in the first place, through activities such as purchasing items in bulk as opposed to single serve items and composting food scraps at home. It is however, equally important that appropriate services are in place to manage waste that is generated in the region such as kerbside recycling services and efficient waste management facilities.

Many Councils such as Mid-Western, Orange and Blayney have had kerbside recycling programs in place for some years. Bathurst Regional Council has recently



BELOW Recycled showerheads for collection

Case Study – Waste 2 Art

Every year the Waste 2 Art Exhibition is coordinated by NetWaste throughout the region to encourage the concept of Reduce, Reuse and Recycle, whilst changing attitudes about “rubbish” and what we throw away. The number of entries has continued to grow every year with artworks of very high standards.

Ten of the Councils reporting through the Regional SOE participated in the recent exhibition held in

Gilgandra in May 2009. Over 150 artworks were received with the overall winner being Helen Standen from Parkes, whose work is shown below.

Winning entry in 2009 Waste 2 Art competition: “Just hanging’ waitin’ for a breeze”, constructed out of scrap metal, wire and an old clothesline



Case Study – Groundswell Organics

In 2007, several Councils including Lachlan, the Wiradjuri Condobolin Aboriginal Corporation, the Palerang Agricultural Society, Bettergrow Pty Ltd and the South East office of the DECCW Sustainability Programs Division were granted \$1.96 million from the NSW Environment Trust to prove the wider economic viability of the “City to Soil” project. With organic making up 40-70% of urban waste going to landfill made up of organic material, the project was designed to show that high quality organic waste from urban communities can be collected, composted and used in agriculture with positive economic and environmental results for farmers. The project Groundswell, born from this, is a three year project which aims to rebuild the rural-urban relationship by returning organic material from urban communities to farmland.

Communities such as Condobolin were provided with City to Soil wheeler bins, MaxAir Kitchen Top Bins and Biobags to collect their food scrap and garden waste. Prizes were also awarded to those households who kept their waste free of uncompostable items. An online blogsite was also set up to post photos and media releases and keep the community up to date with the progression of the project.

The first batch of compost to be processed from the project was produced in early 2009 and will be used for a variety of purposes such as community gardens, farms and also sold back to the community and commercial nurseries.

The feedback from the original *City to Soil* trial in 2004 showed that when people knew their *City to Soil* collection was going to farmers, they happily separate out their kitchen and garden waste, and keep their *City to Soil* collection free from contaminants and things that don't compost.

More information can be found on the project blogsite: <http://www.groundswellproject.blogspot.com/>

Lachlan City to Soil compost



programs across the Councils and employs an Environmental Learning Advisor to design and implement programs targeting specific issues.

A number of regional waste management programs are also implemented across the region through NetWaste, such as the e-waste recycling program, to improve collection and recycling of electronic waste such as computers. Eleven of the Councils reporting through the Regional SoE offered a collection service to their communities, with Bathurst Regional Council now offering an ongoing service to residents for the full range of e-waste material such as televisions, DVDs, power tools. Annual collection campaigns will continue to be held throughout the region. However NetWaste is currently waiting on the outcome of a decision regarding an Extended Producer Responsibility (EPR) scheme for e-waste in the latter part of 2009.

While there have been no large new landfills built over the reporting year, many Councils are improving the technologies at the local landfill to minimise the impacts of those sites. For example, methane gas collection has been implemented at larger landfills servicing the larger cities within the reporting area such as Orange and Bathurst.

Smaller Councils who do not have the population base to support high cost technology are also making changes, such as establishing Recovery Shops. Bourke and Gilgandra are two examples of where this has happened, with these facilities providing an opportunity for people to drop-off items that they no longer want, but are still in working order and available for other people to purchase. It is a great way to reuse items and reduce the amount of waste going to landfill.

Recycling technologies are also continually improving, and collaborations such as NetWaste are able to assist Councils to utilise these as outlined in the Gilgandra Shire Council Fluorescent Tube Recycling program.

Community involvement in waste activities includes participation in Clean Up Australia Day. In 2008-09, fourteen of the participating Councils reported that there were 584 people involved in community activities such as Clean Up Australia Day. These Councils report that 14 tonnes of rubbish were removed through these activities. The activities not only provide the community with the ability to make an impact on their local environment but also play

an important role in educating people about the impacts of litter.

NetWaste has developed regional and sub-regional waste management plans which work towards provision of services across several Councils to ensure continuity and access to resources in more remote areas. Further details of these plans are found at the NetWaste website, www.netwaste.org.au.

To attempt to reduce the impact of packaging, the National Packaging Covenant was established in 1999. The Covenant is a voluntary initiative, by Government and industry, to reduce the environmental effects of packaging on the environment. It is designed to minimise the environmental impacts arising from the disposal of used packaging, conserve resources through better design and production processes and facilitate the re-use and recycling of used packaging materials. The Covenant establishes a framework for the effective life cycle management of consumer packaging and paper products that will be delivered through a collaborative approach. It aims to achieve, with the help of all participants, a recycling target of 65% for packaging and no further increases in packaging waste disposed to landfill by the end of 2010.

Companies, government agencies and Industry Associations sign the Covenant and commit to certain responsibilities which contribute to achieve the Covenant Performance Goals and KPI's. Anyone involved in the packaging supply chain is invited to sign the Covenant.

All signatories to the Covenant recognise that a co-operative approach between industry and all spheres of government is essential to achieve national consistency in the lifecycle management of packaging and paper and the implementation of sustainable kerbside collection systems.

The NSW Government is a signatory to the Covenant as well as 700 companies, many of which sell their goods within the reporting region.

Future challenges

Councils provide a range of waste collection services to the community. The level of services will depend on demand from, and potential cost to, the community, resources and facilities available, and the presence of



cooperative contacts with other Councils, through NetWaste.

A future challenge has arisen as a result of the closure of the CDEP recycling programs due to several towns in the reporting region being classified as not being “remote”. CDEP was the main recycling provider for many towns such as Narromine, Nyngan and Warren, so there is a need for new recycling services to be provided in all areas across the region.

Additionally, there has been a drop in the monetary value of recycled material, making economic sustainability of recycling harder to achieve especially for smaller Councils.

ABOVE Clean-up Australia Day, Bathurst

Towards Sustainability

Sustainability is a relatively new, yet extremely important, emerging issue that is particularly relevant to local Councils in the face of climate change. In the best definition for local Councils, sustainability can be seen as meeting the needs of the present without compromising the ability of future generations to meet their needs. It is essential that it operates across the three spheres of the community; environmental, social and economic, and combine with governance, in a quadruple bottom line approach. Environmental sustainability can be defined as conserving natural resources so that the ecological processes upon which we depend are maintained both now and in the future. This Regional SoE report provides a platform for measuring sustainability initiatives across the region, while also providing a snapshot of current and future trends.

Climate change and greenhouse gas emissions will play a significant role in the future, as Councils are already faced with growing community concern and awareness of this issue as well as with increasing energy costs. Legislation is also predicted to be a big driver, particularly for those Councils that will be

impacted by National Greenhouse and Energy Reporting System (NGERS) and the Carbon Pollution Reduction Scheme (CPRS). Local authorities, which play a key role in leading by example, need a sound understanding of sustainability so they are able to reduce environmental impacts and associated costs and improve the quality of life for their local communities.

Key sustainability issues for all Councils include:

- Adapting to and mitigating the effects of climate change
- Sustainable waste and resource management
- Sustainable procurement
- Ensuring land use planning and development controls deliver sustainable development locally
- Sustainable energy generation.

Community involvement is also a key component of sustainability. Councils regularly seek the input and involvement of their local communities by formal and informal means. Formal means include Council committees, surveys, responses to development applications and other documents on public exhibition. Informal means are participation rates in education programs and workshops, discussions with Council staff and responses in local media. The CMAs also gain regular community feedback by similar means.

- improvement
- no or little change
- worsening trend

Note – the above trends are for data in 2007-08 and 2008-09 from the same sources. They should be read in terms of limitations outlined in the discussion below. Note also that there are some new indicators for 2008-09 for which no comparison could be made with 2007-08. Refer to the Appendix for Councils included in trend data.



Issue – Sustainable practices

Condition Households

Households are responsible for a significant proportion of the resources we consume each year in NSW. As a result, the decisions we make about sustainability in the home can make a real difference to our environmental impacts around the State.

- Australians are among the highest water users in the world. Household water use accounts for 70% of Sydney's total water consumption. Nationwide, households are the second largest user of mains water after agriculture
- The average home today contains more chemicals than were found in a typical

chemistry lab a century ago and more than 300 manufactured chemicals have been found in human bodies

- Australians are the second highest waste producers in the world. We throw away 3.3 million tonnes of food a year - the equivalent of a quarter of the nations food supply
- The average Australian household also spends \$1500 on energy bills each year. 90% of that energy comes from fossil fuels such as coal, which creates greenhouse gas pollution and causes global warming and climate change.

(Source: DECCW website)

More data is required on the sustainability levels of households across the reporting region.

ABOVE Farmer Michael Inwood from the Bathurst region, with support from the Central West CMA to encourage on-farm innovation, has retrofitted a commercially available vehicle, by replacing a petrol engine with a solar powered electric motor. Michael is shown here with his retrofitted ute, undertaking minimum till practice, using a purpose-built disc seeder

Table 15 Summary table of indicator trends - Sustainability

Issue	Indicator	2007-08	2008-09	Trend
Climate Change mitigation	Annual electricity consumption for Council facilities	51,997 MWh	47,061 MWh	+
	Number of Council owned facilities consuming electricity	873	864	+
	Annual gas consumption for Council facilities	7,952,959 MJ	9,510,895 MJ	+
	Number of Council operated facilities consuming gas	89	82	+
Council facilities consuming 'greenpower'/renewable energy	Total fuel consumption of Council's heavy vehicle fleet	3,794 ML	3,875 ML	-
	Council facilities consuming 'greenpower'/renewable energy	12	143	+



Agriculture

There are numerous definitions of sustainable agriculture. One that embraces environmental, economic and social aspects is that found in the Wollondilly Shire Council LEP: 'Sustainable Agricultural is the use of land for agriculture, which can be maintained and managed so that the land remains environmentally sustainable (that is, environmental pollution and land degradation arising from the use is minimised); socially sustainable (that is, land use conflict and loss of amenity of the surrounding area arising from the use is minimised); and economically sustainable (that is, there is a capability of making a net farm profit from the use)'.

There are several ways that landholders in the reporting region can make agriculture more sustainable. A well managed perennial pasture has deeper roots and can survive on poorer

seasons by utilising soil moisture at greater depth than one based on annual species. Provided adequate ground cover is maintained, the potential for various forms of soil degradation (rising water tables, salinity and soil acidification) are also reduced. Perennial pastures can also limit nutrient run-off into streams, be more competitive against weed invasion, increase soil carbon and improve soil structure, pasture composition and fertility.

Perennial pastures have the potential to sustainably support high levels of livestock production, provided they are well managed and well matched to soils, aspect, topography, climate and livestock enterprise (Central West CMA, 2008a).

It is also important that there be a future emphasis on "no till" practices and more cap and pipe projects in artesian areas.

BELOW Sustainable agriculture will play a significant role in mitigating and adapting to climate change

Indicator – Number of certified organic producers

This is a new indicator. Organic farming can be sustainable and thus can provide an indicator of the move towards sustainable agriculture in the region.

This is a new indicator. There were 42 certified organic producers in the region in 2008-09.

Threat

Awareness and acceptance

Although it has been embraced by governments worldwide since the Rio Summit of 1992, awareness and acceptance of the need to move towards sustainability can be a major barrier. Sustainability is a long-term goal and individuals and communities can find it difficult to move towards more sustainable practices particularly when faced with shorter-term external pressures such as drought and global financial downturns.

Response Sustainable agriculture

Indicator – Extent of sustainable farming initiatives undertaken with CMA funding

This is a new indicator. The Central West CMA reports that as a result of its incentive funding sustainable farming initiatives have been undertaken across 324,818 hectares of the region.

Council sustainability

Three of the local Councils reported that they had sustainability plans. Four Councils said they integrated sustainability into their project objectives. Four Councils reported that they incorporated sustainability into Council plans and instruments.

Case Study – The Great Compost Cook Off

Centroc has partnered with local vineyards to promote the benefits of composting across the region. The project began with a vineyard from Mudgee being asked to trial making compost and write a report on its experiences.

It has now grown into a full scale competition between vineyards from Mudgee, Orange, Cowra and Bathurst competing to make the best compost. Green waste from Councils had to be used as a primary ingredient and the trial compost report from Mudgee was provided to all participating.

Vegetables were then grown in the compost by local community gardeners and schools and formed the basis of a regional cook-off with chefs as part of an annual Compost Ball which celebrates compost and local produce. The final step in the program has been the distribution of "Grow your own Compost" kits provided to home gardeners and wine makes with information on starting a compost heap or worm farm.

The aim of the project is to raise the profile of composting, and clean green vineyards, as well as promote the region as clean and green and deliver a successful and fun, co-operative regional project that will position the region for further funding.

Regional Collaborations

The development of regional collaborations is one way to move towards sustainability.

NetWaste is a regional collaboration between Central and Orana Regional Organisations of Councils and sponsored by DECCW. NetWaste is focused on waste and resource management projects, including regional contracts, education programs, knowledge sharing and waste planning at both regional and sub-regional levels. NetWaste has undertaken projects such as DrumMuster, "Butt It Then Bin It", Community Sharps Management, Household Chemical Waste Collection, Used Oil Recovery, Waste to Art and E-Waste Recycling. NetWaste coordinates workshops for Councils, the community, business and schools, promoting waste reduction and recycling.

Centroc is comprised of 16 member Councils, and has undertaken a range of projects to help with regional coordination of knowledge and resources across the Councils. This includes training programs, group contracts and coordinating funding for collaborative projects. The Councils covered by this report under Centroc are Bathurst, Blayney, Cabonne, Cowra, Lachlan, Orange, Oberon and Wellington.





BOD Alliance: The larger Councils of Bathurst, Orange and Dubbo have formed an alliance to improve cooperative sharing of knowledge, resources and projects across the three Council areas. One of the first projects for the Alliance has been the development of the BOD Environmental Sustainability Action Plan, which includes six management action plans in the areas of water, salinity, biodiversity, energy, waste and pollution.

The Central West Salinity and Water Quality Alliance (Alliance) represents a group of thirteen Councils in the Central West that work collaboratively to address water quality and salinity issues using a whole-of-catchment approach. The goal of the Alliance is to achieve real on ground Natural Resource Management (NRM) outcomes, while developing policy within Local Government to ensure that NRM relevant issues are addressed. The Alliance also builds on the capacity of Councils and the Community to understand the importance of managing and improving their environment.

The Central West and Lachlan Local Government Reference Groups establish formal and constructive relationships between the councils and the Catchment Management Authorities to enhance and promote strategic and sustainable natural resource management (NRM) across the Central West and Lachlan Catchments. The Reference Groups recognise the importance of Local Government in the management of natural resources, as a planner, manager and local community leader. This collaboration ensures that there is a strategic and long-term approach to NRM through cooperative planning and on-ground action.

Lower Macquarie Water Utilities Alliance represents a group of six Councils, within the Central West and Western Catchment Areas, who are committed to providing a unified approach to the sustainable delivery of water supply and sewerage services, and to achieve and maintain gazetted Best Practice for Water Utilities.

Future challenges

A future challenge will be the capacity of Councils to listen to and interpret community aspirations in creating sustainability policies, as well as securing funding for ongoing community education, rebates and programs.

As noted above, another challenge will be the development of sustainability indicators for households, businesses, farms and Councils in the region. There will also be a challenge for Councils and their communities in developing and implementing sustainability strategies within the Integrated Planning and Reporting Framework (see Introduction).

Issue – Climate change

Condition

CSIRO recently provided evidence to show that climate change is occurring in Australia.

- Average temperatures in Australia rose 0.9°C from 1910 to 2004. There have been more heatwaves and fewer frosts
- Since 1950, annual rainfall has declined on the eastern seaboard and in the south of the continent, but increased in the northwest
- Since 1973, droughts have become more intense, and extreme rainfall events have increased in the northeast and southwest (CSIRO, 2007a).

The CSIRO report also predicted that in NSW by the year 2030:

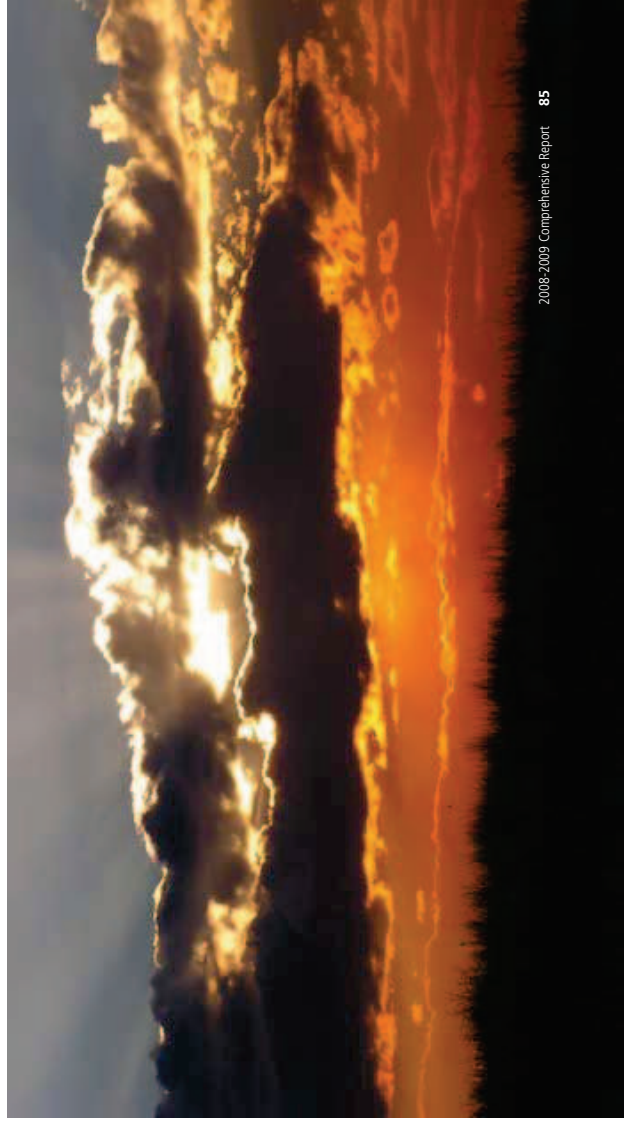
- It is likely to become warmer than it was in around 1990
- There will be more hot days over 35°C and fewer frost days below 0°C
- Annual rainfall is likely to decline
- Rainfall runoff and stream flows will be reduced
- Droughts are likely to become more severe
- The risk of bushfires is likely to increase
- Extreme rainfall may become more intense in central and southeast NSW.

Although climate change is a global problem, it will have very different effects on a local scale. Councils must be ready to find ways to adapt to the unavoidable impacts to infrastructure, biodiversity and the community. Some of the key threats that the region may experience includes; a rise in annual temperatures and occurrence of heatwaves, increase in bushfire and storm activity and reductions in precipitation.

From the BOD Alliance's Environmental Sustainability Action Plan (2007), some of the predicted local impacts from increased temperature and evaporation include:

- Increased risk of fires leading to severe damage to vegetation and quality of water supplies
 - Increased evaporation reducing water supplies and water quality through, for example, blooms of blue-green algae from increase nutrient concentrations
 - Drier soil leading to less vegetation and an increase in turbid run-off following rainfall events
 - Changes in distribution of plant and animal species resulting in less biodiversity
 - Putrescible waste rotting more rapidly and requiring more servicing
 - Outdoor venues requiring more shade
 - Heatwaves resulting in dehydration and heat stress, particularly among vulnerable sections of the community such as the elderly and the very young
 - Outdoor sporting events needing to be rescheduled
 - More expense involved in keeping buildings cool
 - Changes to working hours and provision of heat-protective clothing for outdoor staff
 - More strain on emergency services such as fire fighting
 - A need to reassess risks to Council
 - Increases in demand for energy and water, increasing greenhouse gas emissions and placing stresses on energy and emergency water infrastructure.
- Some of the predicted local impacts from changes to storm activity and rainfall include:
- Increased erosion leading to pest and weed invasion
 - Increased chance of contaminants and pollutant being carried by stormwater
 - Erosion of watercourses leading to poor water quality for aquatic species and drinking water supplies
 - Increased flooding of roads leading to washouts
 - Increased damage to utilities including water supply, sewers and communications
 - Increased erosion leading to poor aesthetics and recreational amenity
 - Increased overflow of stormwater channels leading to flooding of private property
 - Increased safety risks from flash flooding and flying debris
 - Storm damage leading to problems and delays in the supply of goods
 - Increased maintenance costs from damage to public buildings from wind, hail.
 - Damage to vineyards, crops and other aspects of the landscape leading to less tourism and significant impacts on agriculture

below Sunset over the Central West



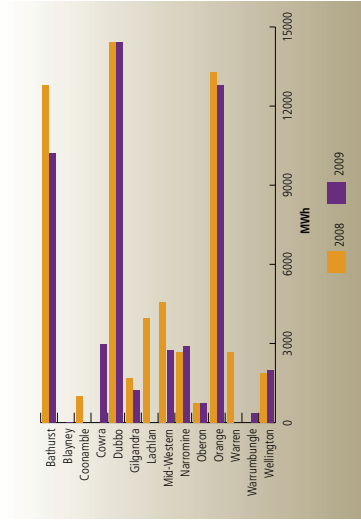


Figure 22 Electricity consumption for Council facilities

- Need for buildings designed and built to appropriate standards to reduce liability
- Provision of increased resources for emergency response
- A need to reassess the risks to Council.

Threats
Energy Consumption

Indicator – Annual electricity consumption for Council facilities

Indicator – Number of Council owned facilities using electricity

As one of the highest source of greenhouse gases that Councils have a direct impact on, electricity consumption is an area for priority action. Note that the region is a large producer of black coal and there is a heavy reliance on coal for electricity.

As shown in the summary table (Table 15), the amount of electricity consumed by those Councils that reported in both years increased from 2007-08 to 2008-09. This worsening trend happened even though the number of Council-owned facilities using electricity declined.

The total amount of electricity consumed at facilities run by the 11 reporting Councils in 2008-09 was 53,327 MWh.

A break-down of the electricity used in its facilities by reporting Councils is provided in Figure 22.

Indicator – Annual gas consumption for Council facilities

Indicator – Number of Council owned facilities consuming gas

As with electricity, the use of gas provides an indication of contributions made by Councils to greenhouse gas emissions. As natural gas generally has a lower carbon footprint, changes to the number of premises using electricity or gas could give potential greenhouse emission reductions.

As shown in the summary table (Table 15), there was an increase in the use of gas at the facilities of those Councils that reported in both years. Also, there was a decline in the number of facilities using gas from those Councils that reported in both years.

In 2008-09, the total amount of gas consumed by 10 reporting councils was 19,689,755 Megajoules.

Indicator – Total fuel consumption of Council's heavy vehicle fleet

As with electricity and gas consumption, heavy vehicle fleet fuel use is a significant source of greenhouse gas emissions.

As shown in the summary table (Table 15) there was little change in the amount of fuel consumed for heavy vehicles by Councils that reported in both years. In 2008-09, 13 Councils in the region reported that they use 4,649 ML of fuel.

Increases in extreme events and weather
Increases in the intensity of rainfall events could increase both flash flooding and the strains on water infrastructure such as sewerage and drainage systems, particularly in population centres.

For example, climate change may double flood-related damages in population centres of NSW (CSIRO, 2007a).

Regardless of changes in such extremes, higher temperatures and lower average rainfall is likely to lead to increased pressure on urban water and energy supplies, unless moderated by demand management measures (CSIRO, 2007a).

Response

Climate Change Mitigation

Several Councils across the region are implementing actions to reduce greenhouse gas

Case Study – Roof Full of Rebates

Dubbo City Council, in a bid to educate the community about environmental issues and how to adapt to pressures such as climate change and the financial crisis, have installed a 3kW photovoltaic (PV) system on the roof of the Macquarie Regional Library.

With its high patronage from all sectors of the community, the central location of the library provides an ideal opportunity to demonstrate renewable energy technologies and energy efficient practices.

Completed in 2009, the 22m² roof generates approximately 6570 kWh per annum with an estimated cost savings of \$1077 per year and a reduction of 6.5 tonnes of CO₂ per year.

The installation was accompanied by an education program about solar energy and current household rebates. Council also ran a successful rebate program for residents encouraging them to install PV systems on their homes.

Solar panels on Macquarie Regional Library – Dubbo Branch

emissions. For example, Bathurst Regional Council has recently established an internal Climate Change Committee, reflecting growing community concern regarding reducing energy consumption and greenhouse emissions through efficiency. Work has focused on energy efficiency such as building and street lighting reviews, landfill gas capture and purchase of green energy for Council assets (BOD, 2007).

Dubbo City Council has addressed many areas of concern through the Cities for Climate Protection Program, achieving all five milestones in the program and achieving recognition of completing extension activities. The milestones Dubbo Council has successfully completed include:

- **Milestone 1:** Establish an inventory and forecast for key sources of greenhouse emissions for Council and community
- **Milestone 2:** Set goals to effectively reduce greenhouse gas emissions

- **Milestone 3:** Develop and adopt a local greenhouse action plan to achieve emission reductions
- **Milestone 4:** Implement greenhouse gas action plan and quantify benefits
- **Milestone 5:** Monitor and review action plan and highlight the effective work done in reducing emissions and saving money
- **CCP Plus:** Advanced greenhouse reduction initiatives through a suite of actions such as advancing action projects, organisational reviews and planning and review.

This has allowed Council to set targets for greenhouse gas emission reduction for both Councils own activities and also for the community (BOD, 2007). The current corporate goal is a reduction of 35% per capita on 1998 levels by 2010 – equivalent to 25.5% reduction. The community goal is reduction of 20% per capita on 1998 levels by 2010 – equivalent to 8.5% reduction.





Indicator – Council facilities using Greenpower/renewable energy

The conversion to Greenpower is one way that Councils can reduce greenhouse gas emissions at their facilities. As shown in the summary table (Table 15), there was an increase in the number of facilities using Greenpower from 12 in 2007-08 to 143 in 2008-09 by the Councils that reported in both years (140 of these facilities are in Orange City).

Climate Change Adaptation

The NSW Government's Climate Change Impacts and Adaptation Research Program is supporting a project with DECCW to research the likely impacts of climate change on inland aquatic ecosystems of outstanding biodiversity value.

BELOW Roadside Remnant Box-Gum Woodland White Rock Road Bathurst

Most of the research for this project is being undertaken in the Macquarie Marshes (CSIRO, 2007a).

The Central West CMA is also leading a research project in conjunction with the Australia National University and the CSIRO to develop an integrated catchment model for the Macquarie River.

This model will be used as a decision support system to assist in making informed managed decisions about catchment management in response to climate change (CSIRO, 2007a).

Future challenges

Sustainability needs to be incorporated into the core business mechanisms for all sections of Council, not just the environmental

team. This should include a climate change management approach to cover adapting to and mitigating the future impacts of climate change.

Councils are a major consumer of energy so reducing greenhouse gas (GHG) emissions is one of the key steps to mitigating climate change. Councils can reduce the carbon footprint of their LGA by focusing on cutting emissions within the Council corporate and also educating the community on how to cut their own emissions.

One of the key sources of greenhouse gas emissions is the decomposition of organic waste in landfill. Future Council activity, together with their local community, within this area can achieve rapid and significant reductions in emissions.

As far as roles are concerned, Council can be:

- a provider where the strategic objective falls within its area of responsibility
- a facilitator where help can be given to others
- an advocate by speaking up on behalf of the community.

A major future challenge, for industry and other organisations across the region will be responding to the introduction of the CPRS (at the time of writing it was unsure of the form the CPRS will take).

Another future challenge will be for communities across the region to adapt to the possible climate change scenarios described above.



Australian Bureau of Statistics (2009) Population and Community Profile Census data 2006 and population projections 2008. Available at www.abs.gov.au

Australian Greenhouse Office (2003). Climate Change – An Australian Guide to the Science and Potential Impacts (edited by Barrie Pittock). Available from www.climatechange.gov.au/science/guide

The Australian Institute (2005). Wasteful Consumption in Australia, Clive Hamilton, Richard Denniss, David Baker. Discussion Paper No 77.

BOD Alliance (2007) Environmental Sustainability and Action Plan, prepared for Bathurst, Orange and Dubbo Alliance of Councils, 2007. Ecolens.

Bureau of Meteorology (2009) Rainfall and Temperature Data. Available at www.bom.gov.au

Central West Catchment Management Authority (2008a) Catchment Information. Available from www.cw.cma.nsw.gov.au

Central West Catchment Management Authority (2008b) Annual Report for 2007-2008. Available from www.cw.cma.nsw.gov.au

Central West Catchment Management Authority (2007) Central West Catchment Action Plan 2006-2016

CSIRO (2007a) Climate Change in the Central West Catchment. Prepared by CSIRO for the NSW Government. Available at www.environment.nsw.gov.au/climate/change

CSIRO (2007b) Climate Change in the Lachlan Catchment. Prepared by CSIRO for the NSW Government. Available at www.environment.nsw.gov.au/climate/change

CSIRO (2007c) Climate Change in the Western Catchment. Prepared by CSIRO for the NSW Government. Available at www.environment.nsw.gov.au/climate/change

Department of Climate Change, Australia's Biodiversity and Climate Change: A strategic assessment of the vulnerability of Australia's biodiversity to climate change. Available at: <http://www.climatechange.gov.au/impacts/pubs/biodiversity-vulnerability-assessment.pdf>

Department of Environment and Climate Change (2008). What is Biodiversity? Available from www.environment.nsw.gov.au

Department of Environment and Climate Change (2006). State of the Environment. Available from www.environment.nsw.gov.au/soe2006

Department of Environment, Climate Change and Water (2009) Environmental Issues: Air quality. Available at <http://www.environment.nsw.gov.au/air/index.htm>

Department of Primary Industries (2009) Pests and Weeds Management: Noxious weeds declaration database. Available at: <http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/noxweed>

Department of Primary Industries (2008). Weed Information for Schools. Available at www.dpi.nsw.gov.au

Department of Primary Industries (2007). Pest Animal Survey. Available at www.dpi.nsw.gov.au

DLG, 1999, Environment Guidelines, State of the Environment Reporting for Local Government. Promoting Ecologically Sustainable Development

Department of Infrastructure, Planning and Natural Resources (2005) Costs of Urban Salinity. Local Government Salinity Initiative.

Department of Sustainability and Environment (2009) Available at: <http://www.dse.vic.gov.au/dse/index.htm>

European Communities (2008) The economics of ecosystems and biodiversity – an interim report, Available at http://www.ufz.de/data/economics_ecosystems_biodiversity8717.pdf

Goldney, D., Kerle, A and Fleming, M (2007) Threatening Processes – Status of vertebrate fauna and their habitats.

Humphries, E.J., (2000). Report Summary Salinity Risk Assessment of the Central West Catchment. A joint initiative of the Central West Catchment Management Committee, the Department of Land and Water Conservation and the Natural Heritage Trust, Central West Catchment Management Committee

Hyder (2006) Waste and Recycling in Australia, National Packaging Covenant Annual Report 2005-06

Lachlan Catchment Management Authority (2008). The Catchment. Available from www.lachlan.cma.nsw.gov.au

Lachlan Catchment Management Authority (2007) Annual Report 2006-2007. Available from www.lachlan.cma.nsw.gov.au

Lachlan Catchment Management Authority (2006) Lachlan Catchment Action Plan. Available at www.lachlan.cma.nsw.gov.au

Murray Darling Basin Ministerial Council (1999) The Murray Darling Basin Salinity Audit: A 100 year perspective. CSIRO Land and Water Division

NSW Government (2005). Catchment Management Authorities: An Overview. Available from www.cma.nsw.gov.au

NSW Government (2006) NSW State of the Environment Report 2006. Department of Environment, Climate Change and Water.

NSW Audit Office (2006) Regulating the Clearing of Native Vegetation. Available from www.audit.nsw.gov.au

Regional State of the Environment Report, Greater Central West Region of NSW, 2007-2008 Supplementary Report, Ecolens

Royal Society (2001) The role of land carbon sinks in mitigating global climate change. Policy document 10/01, July 2001, UK.

Waters and Rivers Commission, (1998) Water Facts 7, Government of Western Australia Available at http://www.amfrnm.sa.gov.au/Portals/1/Caring/Useful_Factsheets/wf_07_watercycle.pdf

Western Catchment Management Authority (2008) Our Catchment. Available from www.western.cma.nsw.gov.au

Western Catchment Management Authority, (2007) Western Catchment Action Plan 2006-2016. Available from www.western.cma.nsw.gov.au

Western Research Institute (2008) Centroc Population Projections

Appendix – Data contributed by Councils

Issue	Sub-Issue	Indicator	Unit of Measure	Bathurst	Blayney	Bogan	Bourke	Cabonne	Coonamble	Cowra	Dubbo	Gilgandra	Lachlan	Mid-Western	Narromine	Oberon	Orange	Warren	Warrumbungle	Wellington			
LAND	Land Degradation	Contaminated land sites	Number																				
		Contaminated land sites - potentially contaminated sites	Number																				
		Contaminated sites rehabilitated	Number																				
		Erosion affected land rehabilitated	Location & sq km																				
		Salinity affected land rehabilitated	Location & sq km																				
AIR	Air Pollution	Air quality complaints to Council	Number of complaints																				
		Air quality complaints to EPA Pollution Line	Number of complaints																				
		Industrial Pollution	No. of facilities reporting																				
		Odour	Number																				
		Urban Air Pollution	Number																				
WATER	Water Quantity	Council Water Consumption	Hectares (Ha)																				
		Treated water used by Council for irrigation	Megalitres																				
		Untreated water used by Council for irrigation	Megalitres																				
		Surface & Ground Water Extraction	Actual volume extracted through surface water licences	Gigalitres (GL)																			
		Town Water Consumption	Annual consumption (Total from WTP)	Megalitres																			
			Annual metered supply	Megalitres																			
			Average annual household use	Kilolitres per household																			
			Total number of serviced properties	Raw number																			
		Water Quality	Erosion & Sediment Control	Erosion & Sediment Control complaints received by Council	Total volume of pollutants																		
			Load Based Licencing	Load Based Licencing volume	Number in last year																		
	No. of trade waste approvals		Total volume of trade waste discharged to sewer	ML																			
	% Effluent reuse & location of reuse		% Effluent reuse & location of reuse																				
	No. of participants involved in stormwater education programs		No. of participants involved in stormwater education programs	Number of participants																			
	Number of gross pollutant traps installed		Number of gross pollutant traps installed	Total number of GPTs currently installed																			
	Total catchment area of GPTs		Total catchment area of GPTs	Hectares																			
	Volume of litter collected in GPTs		Volume of litter collected in GPTs	Tonnes																			
	E.coli		E.coli	% samples exceeding ANZECC guideline																			
	BIODIVERSITY		Habitat Loss	Area of National Parks in LGA	Hectares																		
		Area of State Forest in LGA		Hectares																			
		Proportion of Council reserves that is bushland/remnant vegetation		Hectares																			
Habitat areas revegetated		Hectares																					
Noxious weeds extent		Fish restocking activities		Number & list of species																			

Appendix – Data contributed by Councils

Issue	Sub-Issue	Indicator	Unit of Measure	Wellington	Warrumbungle	Warren	Orange	Oberon	Narromine	Mid-Western	Lachlan	Gilgandra	Dubbo	Cowra	Coonamble	Cabonne	Bourke	Bogan	Blayney	Bathurst		
HUMAN SETTLEMENT Population & Settlement Patterns	Urban/Industrial Expansion	Landuse conflict complaints	Number	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
		New road construction	km	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Industrial Noise	Number of development consents and building approvals		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		Road upgrades		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Noise Pollution	Noise complaints received by Council		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		Urban noise		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Management of Non-Aboriginal Heritage	Identification	Locally listed heritage items	Number and type	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	Construction & Development	Heritage buildings on statutory heritage lists that are demolished/degraded per year	Number	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	Management	Actions to protect non-aboriginal heritage (including management plans)	Number	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
WASTE	Waste Generation & Disposal	Heritage buildings on statutory heritage lists that are renovated/improved per year	Number	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
		Average total waste generated per person	Tonnes/annum (Compare to national average)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		Total waste collected at rural tips & transfer stations (exc recyclables)	Tonnes/annum	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		Total waste received at primary landfill	Tonnes/annum	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		Value of waste service per annum	\$ per household	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		Emissions from landfill	t CO2e	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Waste Pollution	Hazardous/Liquid Waste	Drum/muster collections	No. drums &/or tonnes	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		Reduce	Office paper used by Council	Number	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		Recycle	Recycling services available in each LGA inc private collections	Number	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		Littering	Annual Volume of litter collected by streetsweeper	Tonnes	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			Community waste activities e.g. Clean Up Australia Day etc.	No. of attendees at events/ no. sites registered i	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		Illegal dumping	Illegal waste disposal complaints to Council	Number & tonnes	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
TOWARD SUSTAINABILITY	Sustainable Practices	Certified organic producers	Number	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
		Council sustainability plan?	Yes/No	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Climate Change	Sustainability outcomes integrated into project objectives?	Yes/No	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		Mitigation	Sustainability incorporated into Council plans/instruments?	Yes/No	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Sustainable Agriculture	Climate Change adaptation/mitigation in Council plans/instruments?	Yes/No	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		Council plan focused on Climate Change adaptation/mitigation?	Yes/No	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Sustainable Communities	Council projects with Climate Change adaptation/mitigation objectives?	Yes/No	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		Annual electricity consumption for Council facilities	MWh	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Sustainable Energy	Annual gas consumption for Council facilities	Gigajoules	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		No. of Council owned facilities consuming electricity	Number	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Sustainable Transport	No. of Council owned facilities consuming gas	Number	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
		Total fuel consumption of Council's heavy vehicle fleet	Total Kilolitres per annum	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

● Denotes those Councils that were compared in the trend analysis for these indicators

