



Goulburn Broken

# Regional Catchment Strategy

November 2003



GOULBURN  
BROKEN  
CATCHMENT  
MANAGEMENT  
AUTHORITY

## Summary

# What is a Regional Catchment Strategy?



*A Regional Catchment Strategy (RCS) is a blueprint for integrated natural resource management across a geographic area.*

This Goulburn Broken RCS will have a major influence over the investment decisions made by the Commonwealth and State governments and the community in natural resource management and sustainable regional development.

The RCS prioritises the actions and works that must occur to address these threats so that effort and funding can be directed where they are most needed.

A key element of the framework is the whole of catchment approach that promotes investment that offers benefits to the natural environment, the social fabric and the economy of the region.

Strong leadership and sound partnerships with government, other agencies and the community have led to Goulburn Broken Catchment being at the forefront of natural resource management in Australia. We have won national and international acclaim for the efforts of our community and agencies in dealing with issues such as salinity and waterway management. The Strategy aims to build on that success.



The RCS provides the context in which the Goulburn Broken catchment community will work with Commonwealth and State agencies, rural and urban water authorities, landholders, the broader community and local government to achieve its vision.

This document is a summary of the Goulburn Broken RCS 2003. Widespread consultation and input has resulted in a comprehensive document that is a revised and updated version of the original Goulburn Broken RCS completed in 1996.

The Goulburn Broken RCS 2003 features an updated vision and a reassessment of the catchment's natural assets and current and emerging threats such as salinity and declining water quality.

## Supporting sub-strategies and plans.

Regional Catchment Strategy 2003

Riverine Health Strategy	Salinity	Biodiversity	Pest plants and animals	Others:
<ul style="list-style-type: none"><li>• Water quality</li><li>• Floodplain</li><li>• Waterways</li><li>• Riparian and in-stream native flora and fauna</li><li>• Flows</li><li>• Recreation</li><li>• Wetlands</li></ul>	<ul style="list-style-type: none"><li>• Dryland</li><li>• Irrigation</li></ul>	<ul style="list-style-type: none"><li>• Biodiversity integration strategy</li><li>• Native vegetation strategy</li><li>• Threatened species and non-threatened flora and fauna</li><li>• Non-vascular plants</li><li>• Invertebrates</li></ul>	<ul style="list-style-type: none"><li>• Rabbits</li><li>• Weeds</li></ul>	<ul style="list-style-type: none"><li>• Climate change</li><li>• Soil health</li></ul>





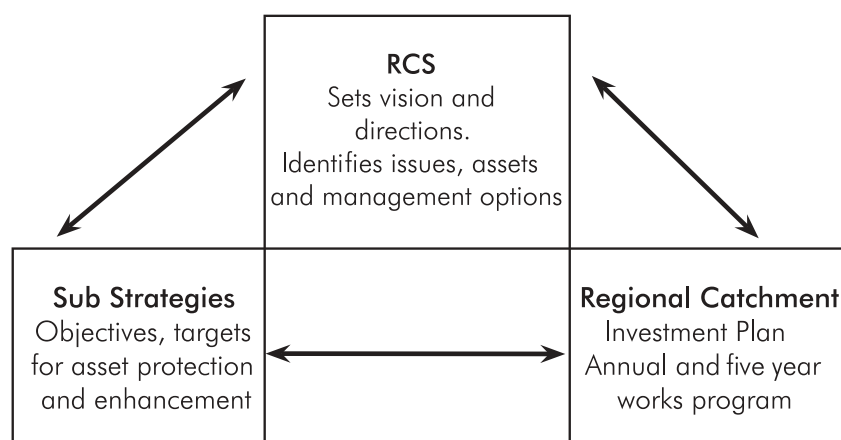
The RCS also draws together the key elements of a raft of sub-strategies and papers and recognises the fundamental role partnerships between agencies and the catchment community play in achieving environmental goals.

Much greater detail can be found in the supporting sub-strategies, action plans and technical papers. They are stand alone documents about either the threatening process, such as salinity and pest plants, the asset that we want to protect, such as rivers and biodiversity or innovative approaches to address multiple issues such as community engagement.

The sub-strategies produced in the Goulburn Broken Catchment reflect the evolution of natural resource management. In many cases, these documents were pilots for Victoria and Australia and are well advanced in implementation. They include:

- Goulburn Broken Regional Catchment Strategy 1995;
- Shepparton Region Land and Water Management Plan 1990;
- Goulburn Broken Dryland Salinity Management Plan 1990;
- Goulburn Broken Water Quality Strategy 1996;
- Goulburn Broken Native Vegetation Management Strategy 2000;
- Goulburn Broken Weeds Action Plan 2000; and
- Goulburn Broken Rabbit Action Plan 2000.

### The RCS Planning Framework.



As well as these sub-strategies, three-year investment plans meet the needs of funding programs, and annual regional management plans contain even more detail about the work programs.

The figure above shows the links between these plans and strategies.

This brochure provides a summary of the key elements of the Goulburn Broken RCS. The detailed strategy and many of the supporting documents can be found on the Goulburn Broken CMA website [www.gbcma.vic.gov.au](http://www.gbcma.vic.gov.au). Copies of the strategy can also be obtained on CD Rom from the Goulburn Broken CMA offices at Shepparton (03) 58 222288 email [reception@gbcma.vic.gov.au](mailto:reception@gbcma.vic.gov.au).





## Learning from experience

Reviews undertaken as part of the RCS update showed good progress is being made with all Catchment programs, either through meeting targets or gaining a better understanding of the issues and challenges.

The Catchment community has a greater understanding of the value of natural assets and of the ecosystem services they contribute to the region's productive capacity. Natural assets are interconnected and degradation of any natural asset may degrade other natural assets. Biodiversity assets, in particular, are under threat from salinity and intensification of agriculture.

A significant feature of the Goulburn Broken Catchment's approach to natural resource management over the past five years has been stronger integration of land, water and biodiversity management.

In reviewing the RCS we found:

- The region has worked within the salt disposal, water cap and water quality limits set by the Murray Darling Basin Ministerial Council.
- The Shepparton Irrigation Region (SIR) Program has become strongly integrated and is largely on track to meet targets. Government-funding constraints remain the main barrier.
- The Dryland Program underwent a major

refocus in 1999/2000 after a number of years of below target performance. It has developed a multi-benefit approach to on-farm investments.

- The Water Quality Program is exceeding works targets within the irrigation area and overall has demonstrated a major reduction of phosphorus and nitrogen loads at key regional sites.
- Upgrading the region's sewerage treatment plants has reduced phosphorus loads from 50 tonnes a year in 1997 to 10 tonnes a year (2002). A further reduction to three tonnes a year is expected by 2004. This achievement is well in excess of the target of 80 per cent reduction by 2015 set by the Water Quality Strategy.
- A strategic approach to vegetation management and biodiversity protection has established the foundations for improved biodiversity outcomes. While these outcomes continue to be difficult to measure, regional policies such as the multiple benefits approach to grants ensure that biodiversity gains are made.



# The Vision

*The Goulburn Broken Catchment Management Authority, in consultation with partner agencies, local government and the community, has adopted the following vision for its new RCS:*

*A Catchment recognised locally, nationally and internationally for quality agricultural produce and where community values contribute to the benefits of abundant and well-maintained environmental assets used for tourism and recreational activities.*

*The environmental footprint of irrigation and dryland farming will be significantly reduced, with farmers occupying less land and using less water whilst managing their resources more sustainably. New opportunities will arise for increasing the ecosystem services provided by the land retired from agriculture and by improved environmental flows.*

*The region's economy will be robust, with much of the agricultural produce processed within the region, generating employment and wealth creation opportunities for a regional community actively engaging in natural resource management programs.*

The Goulburn Broken Catchment community recognises the importance of 'triple bottom line' accounting of investment in natural resource management. Actions that are promoted by the RCS and the sub-strategies often generate environmental, economic and social benefits.

In some cases, the actions might generate an economic or social benefit, but an environmental cost. It is important that these costs and benefits are made explicit so that investors and decision-makers can carefully consider the multiple benefits that can arise from investing in particular actions and the trade-offs that might be required.





# Our Catchment



*The Goulburn Broken Catchment is home to 189,500 people and covers 2.4 million ha or 10.5 per cent of Victoria. It is part of the Murray Darling Basin and comprises the Goulburn and Broken River catchments and part of the Murray Valley.*

The Goulburn Broken Catchment stretches from the Murray River in the north of Victoria through to the outskirts of Melbourne in the south taking in the cities and towns of Kyabram, Tatura, Mooroopna, Shepparton, Numurkah, Cobram, Yarrawonga, Euroa, Benalla, Mansfield, Alexandra, Yea, and Kilmore.

The dryland hills and plains through the middle of the Catchment support cropping, grazing, vineyards and horse studs, while irrigated dairy and horticultural enterprises and food processing industries predominate the Shepparton Irrigation Region (SIR).

The SIR community is ethnically diverse and includes a large population of Aboriginal people. It is regarded by many as the 'food bowl' of the Murray Darling Basin.

The mountainous upper catchment area is renowned for its beauty, history and recreational opportunities that draw increasingly large numbers of visitors and permanent residents to the region.



**Land use in the Goulburn Broken Catchment. Data derived from data generated by GIS Unit, NRE Tatura 1998 (from Draft Goulburn Broken Native Vegetation Management Strategy 1999).**

Land use type (land manager)	hectares
<b>Public land</b>	
State forest (forests management, commercial forests, NRE)	439,445
Victorian Plantations Corporation (VPC)	17,352
Gazetted Reserve	18,792
Public land and water frontage reserve (licensed by Land Victoria)	22,107
Proposed Gazetted Reserve	51,827
National ParkAct Reserve (Parks Victoria)	94,421
Proposed National ParksAct Reserve (Parks Victoria)	87
Alpine Resort Management Boards	5,049
Commonwealth Land (Ministry of Defence)	41,454
Freehold – vested with Government bodies	69
<b>Total public land</b>	<b>690,603</b>
<b>Private land</b>	
Intensive agriculture	270,655
General agriculture (dryland)	1,397,130
Urban / other private land	73,266
<b>Total private land</b>	<b>1,741,051</b>
<b>Total land</b>	<b>2,431,654</b>



The Catchment is one of the few non-coastal rural areas in Victoria that continues to grow. This growth is based on abundant natural assets, particularly water for irrigated agriculture. The Strategy's main purpose is to protect these assets. Their loss - and loss of the benefits for current and future generations - can often be irreversible. It is also critical that we take all feasible steps to restore degraded assets.

The Catchment is changing. Agricultural industries are becoming more efficient, with the level of production doubling every 10 years and land used for agriculture decreasing. The Catchment's agricultural output - estimated to be worth over \$1.3 billion a year- supports a regional economy that has an annual economic output of \$7.8 billion and employs about 77,000 people. We are using significantly less water, yet water is becoming increasingly scarce, with strong competition between environmental, agricultural, urban and recreational demands.

The trend to produce more from less land is expected to continue. Land is moving from agricultural use to rural living uses, particularly in the areas with easy access to Melbourne.

This strong performance is due to the region's abundant natural assets and the ecosystem services these assets generate. The way we manage our water, land and other natural assets is critical to the future sustainability of the region and its community.

The regional community's understanding of the importance of its biodiversity assets has grown significantly and there is an increased community expectation that those assets should be protected and rehabilitated from the effects of clearing, salinity, nutrients and pest plants and animals.

These assets are interconnected and, together, they support the region's social and economic assets. This interconnectedness means that a decline in the health of the soil asset, for example, can contribute to a decline in biodiversity and water quality.



# Our Natural Assets



## Water

The Goulburn Broken Catchment produces 11 per cent of the Murray Darling Basin stream flow from less than 2 per cent of the land area. It also imports water into the Catchment from the Murray River and exports water to nearby catchments for irrigation, urban and stock and domestic supply. The region contains Victoria's largest water supply catchment - Lake Eildon.



Within the Catchment, 803,000 Megalitres (ML) is used to support one of Australia's major irrigated agriculture regions, the SIR. The water is used to create agriculture products worth an estimated \$1 billion a year and, in turn, support a food processing sector generating \$1.7 billion a year in output.

The catchment covers part of two major groundwater basins - the Murray Basin and the Highlands Basin. Groundwater is an important resource for many towns and water users within the region and is a major contributor to flows in catchment streams.



In the SIR, more than 1,000 bores are licensed to pump over 45,000 ML a year.

Rivers within the Goulburn Broken Catchment are highly valued for tourism and recreation, environmental features, and as resources for social, agricultural and economic wealth.

The Catchment has more than 9,849 km of streams, with 8,157 km in the Goulburn Basin and 1,692 km in the Broken Basin. There are three declared Heritage Rivers (the Goulburn below Eildon, the Big and the Howqua). The Acheron, Yea and Murrindindi Rivers - all tributaries of the Goulburn River in the upper catchment - are considered "representative rivers".

About 30 per cent of the Catchment's streams are believed to be in good condition using measures such as volumes and flows, water quality and the health of aquatic life.

There are 1,818 wetlands in the Catchment covering an area of 82,181 ha. The Barmah - Millewa Forest is a Ramsar listed wetland.

The floodplains of the rivers and streams are also important assets. Flooding replenishes wetlands, transports food supplies and triggers stages in the life cycles of many plants and animals.

Floodplains provide natural flow paths and storage areas where floodwaters remain for slow release, reducing erosion from high energy flows. Nutrients, debris and sediment settle in the process, protecting waterways from high sediment and nutrient loads and contributing to floodplain productivity. Construction of levees for flood protection and conversion of floodplains to agriculture land has led to a decline in the benefits or "ecosystem services" provided by floodplains in the catchment.

## Goulburn Broken Catchment annual water resources.

Use within the Catchment	803,000+ ML
Murray Valley, from Murray River	200,000 ML
Exported to adjoining Catchment (For irrigation, stock and domestic)	565,000 ML
Average flows to Murray River	1,760,000 ML





## Soils

The health of the Catchment's soils is critical for the region's continued prosperity.

Most (41 per cent) soils on the lower slopes and floodplains are poorly drained, low in nutrients and often acidic. A further 15 per cent of catchment soils are poorly drained with dense subsoil clays of moderate to low fertility.

The remaining soil types occur mainly in the upper catchment. They have good drainage and are used for forestry or support native forests. These granite based soils are prone to acidity making them unsuitable for cropping and grazing without big inputs of lime.

### Soils of the Goulburn Broken Catchment Region.

Dominant soil orders	Land area (ha)	%
Calcarosols	1,407	0.1
Chromosols	352,545	14.8
Dermosols	510,732	21.5
Ferrosols	30,840	1.3
Hydrosols	7,904	0.3
Kandosols	211,000	8.9
Kurosols	97,671	4.1
Rudocols	18,054	0.8
Sodosols	983,808	40.8
Tenosols	72,120	3.0

## Biodiversity

The Catchment was once almost entirely covered in native vegetation, with forests in the south and open woodlands in the north. Native vegetation remains in the mountainous far south, where slopes are steepest, but clearing has been extensive in the valleys and plains. About 70 per cent or 1.7 million ha of native vegetation has been cleared since European settlement.

The biodiversity has evolved over millions of years. The diverse range of species and connections between them create the natural environment that underpins a range of ecosystem services. Science cannot predict the impact of the loss of species or the delivery of ecosystem services (one example is the benefit provided by worms breaking down fallen leaf litter and providing nutrients to soils). Therefore risks to biodiversity must be reduced by protection and enhancement.

Bioregions describe patterns of ecological characteristics in the landscape. Bioregions in the catchment include Victorian Riverina, Goldfields, Murray Fans, Northern Inland Slopes, Highlands-Northern Fall, Highlands-Southern Fall, Central Victorian Uplands and Victorian Alps.





### Native flora and fauna

Extensive clearing has occurred in bioregions suited to intensive agriculture, such as Victorian Riverina (97 per cent cleared) and Northern Inland Slopes (89 per cent cleared).

The remaining native vegetation includes 128 Ecological Vegetation Classes (EVCs), complexes and mosaics across eight bioregions. There are more than 2,105 species of plants (vascular and non vascular) of which 10 per cent are threatened in Victoria. Endangered EVCs (less than 10 per cent of original cover) and "vulnerable" (less than 15 per cent of original cover) are found mainly in the north of the catchment.

Most threatened species of flora are understorey -grasses, herbs and low shrubs.



The Catchment has 431 vertebrate species (species with a backbone) and an unknown (but very large) number of invertebrates. Invertebrates are often forgotten but play an extremely important role in the health of ecosystem services in the catchment.

Many species are just surviving below minimum threshold habitat levels and natural and human-induced events could lead to their extinction in the Catchment. For example, several ecologists believe that a landscape with less than 30 per cent native vegetation cover will have relatively rapid extinction of woodland bird species. Much of our Catchment is well below this level, so we can expect further species decline if nothing is done.

With the extensive clearing of native vegetation and fragmentation of habitat, populations of fauna (and flora) are often isolated which limits gene flow. The ability of species to adapt to new conditions, such as changing climate, is severely reduced if the gene pool is limited.

Fish and other aquatic species have been prevented from migrating because of structures on rivers and streams such as weirs, which has dramatically affected fish populations. The removal of many barriers in recent years is expected to have a positive effect on fish populations.

Predation by introduced species such as cats and foxes poses a threat for many species including the Brolga and Bush Stone-curlew.

# Threats to the Catchment's Assets

*Salinity, decline in the quality of water, soils and ecosystems, flooding, and pest plants and animals are major threats to the Catchment's natural resource, economic and social assets.*

## Salinity

Salinity is the biggest threat to the Catchment's natural assets.

The Catchment community is almost halfway through delivering the irrigation and dryland salinity plans and progress has been excellent. In irrigation areas, we are largely on track but face major challenges over the next five years in dealing with salt disposal and addressing those areas where land protection options are limited.

In dryland areas we now appreciate the challenge is even greater than first thought and we are re-adjusting our programs to conform to the expectations of the Murray Darling Basin Ministerial Council. Over the next five years we will improve our understanding of trade-offs required between protection of regional assets from salinity impacts and the Ministerial Council's aspiration for protection of downstream assets.

Attempts are being made to set extremely refined targets based on sub-catchments or ends of valleys across the Murray Darling Basin. In this way, the Murray Darling Basin Ministerial Council is establishing salinity targets for all the catchments that make up the Murray Darling Basin.

The Ministerial Council uses Morgan in South Australia as the benchmark for salinity levels in the Murray River. To maintain future salinity levels at or below the World Health Organization standard for salinity (800 EC), the Goulburn Broken Catchment needs to manage the projected increase in salt loads coming from the dryland areas. There is ongoing discussion about the appropriateness and feasibility of the targets set for our Catchment and the trade-offs required within the catchment to meet these targets.

Salinity and waterlogging issues are even more pressing for irrigation areas. About 20 per cent of the Catchment is irrigated, with most of this falling into the SIR. In 2001, 23.5 per cent of the SIR was underlain by watertable within two metres of the surface (this varies from year to year depending on the seasonal conditions).

The rise was very rapid until 1995, when a peak of 47 per cent was reached, with the watertable levels predicted for the year 2000 surpassed. A combination of dry seasons and progress with the salinity works program led to the reduction.







Without active management, 65 per cent of the SIR will have a high watertable by 2020 and there will be severe land salinisation, resulting in significant loss to the region's economic assets and irreversible degradation of most major wetlands.

At the farm scale, irrigation can cause wetlands and remnant vegetation to undergo changed wetting and drying cycles that significantly degrade them. Algal blooms in some wetlands are increasing as a result of increased nutrient levels. Land forming can also directly affect these features.

### Water quality

In addition to salt, the Catchment generates 360 tonnes of phosphorus and 2,854 of nitrogen each year. Of this, about 290 tonnes of phosphorus and 1,950 tonnes of nitrogen leave the Catchment via waterways. We contribute 33 per cent of the Murray River water flow above the Murrumbidgee, but nearly 60 per cent of the turbidity.



Because of the nutrient and chemical loads, the risk of algal blooms is high and they occur frequently in and downstream of the Catchment. The increased nutrient loads also affect many native species.

Major sources of nutrients include irrigation drainage, sewage treatment plants, sediment mobilisation, urban stormwater and intensive animal industries such as fish farms. Commonly used pesticides in intensive horticulture within the SIR have been found in surface drainage water.

Studies of shallow well sites in the Tongala and Kyabram districts of the SIR have shown contamination of groundwater with herbicides.

### Changed flow patterns

Harvesting, storing and delivering water for urban and agriculture use has altered the flow patterns of our rivers and creeks, often by reversing the season's when high and low flows would naturally occur. This has impacted on plants and animals that exist in and around waterways through changes to watering patterns and temperatures and the quality of water.

Culverts, regulators and on-stream water storages can cause reduced river flows, increased nutrient levels and increased sedimentation. Release of cold water from major storages benefits trout farming at the expense of native fish.

### Degradation of biodiversity

Much of the remaining vegetation on private land is of poor quality (limited diversity, lack of understorey, lack of ground litter etc). The number of hollow bearing trees (fauna habitat) has been reduced in parallel with drop in native vegetation.

Ninety eight per cent of the remaining patches of vegetation are less than 1 ha in size with "threatened" EVCs the most fragmented. While the declines in extent of native vegetation have largely stabilised, small incremental losses are still occurring.

Replanting, direct seeding and grazing control programs over the past decade will see increases in native vegetation of the next few years.



### Weed invasion

The catchment has 70 species of declared noxious weeds and a number of emerging environmental and agricultural weeds. Weeds have a major impact on the quality of remnant vegetation.

There is no legislation or mechanism for managing of emerging environmental and agricultural weeds that are not declared noxious weeds in the catchment. If there is a need for a control program for a non-declared species, agencies will be limited in the regulatory support they can provide.

Of particular concern in irrigated areas of the Catchment are the emerging aquatic and pasture weeds for which there are currently limited control options.

### Pest animals

Pest animals are a major threat to our assets, not only in terms of direct impact, but also because they limit the impact of actions designed to address other threats.

Rabbits, foxes and wild dogs are the key pest animal threats in the region. Rabbits threaten high value remnant vegetation, limiting regeneration and promoting invasion of exotic weed species. High rabbit numbers also cause serious erosion problems in the upper Catchment. Foxes and wild dogs have a big impact on livestock and native fauna and contribute to the spread of noxious weeds. The impact of foxes and wild dogs preying on livestock can be significant for farming families.

Native animals such as cockatoos, kangaroos and noisy miners can also become pests in our highly modified environment.

### Drought

Although drought is a natural process, it can place plants and animals at greater risk, especially where the populations of these species are below threshold levels and habitat and migration routes have been reduced.

### Climate change

The Catchment is expected to undergo a significant change in climate because of increased concentrations of greenhouse gases in the atmosphere.

Climate change will provide conditions that favor the survival and spread of pest species, increase the likelihood of fire, and directly affect the physiology of most plant and animal species.

Greenhouse gases are having an impact on Australia's weather patterns. Work by CSIRO\* predicts that by 2030, annual average temperatures will be 0.4 to 2.0°C higher over most areas of Australia. By 2070, this could be 1.0 to 6.0°C. The number of winter days below 0°C will decrease from the present average of 15 days to 6-13 days in 2030 and 0-9 days by 2070. Rainfall averages are likely to remain constant, but changes in variability are likely to occur with more frequent intense rainfall.

Species will need to adapt to changing environmental conditions or migrate to other areas. This particularly impacts on species with a limited ability to adapt. For example, the Mountain Pygmy Possum is confined to alpine areas, which will be severely reduced with global warming. It is estimated that this species will be lost with only 1°C of global warming.





Many eucalypt species will be threatened in native forests as rainfall reduces and temperatures increase. Wetland and riverine environments affected by reduced environmental flows will be under further pressure due to a decrease in rainfall.

Irrigated production systems in the catchment are conducive to high levels of greenhouse gas emissions, particularly nitrous oxide from irrigated pastures and methane from grazing cows. Abatement of these emissions is important, particularly in the face of intensification of irrigated production.

### Acidification and erosion

Soil acidification could be a sleeping giant in the Catchment threatening the sustainability and productivity of agricultural soils in the catchment. While soil acidification is a natural process, agricultural practices have accelerated the rate of acidification of soils.



Soil pH decline has been highest in red duplex soils that have been cropped and grazed intensively. Acid levels have changed little on yellow duplex and friable earths subject to permanent pasture production. The major impacts from declining soil pH are likely to include:

- Increased nitrate contamination of groundwater and the potential for reduced water quality;
- Reduced farm yields, leading to reduced farm income and regional export earnings;
- Reduced options for agriculture; and
- Reduced vegetation cover, leading to accelerated runoff and erosion.

Erosion is a naturally occurring process that has been accelerated by human intervention. Soil particles are lost when soil without vegetation cover is exposed to wind and rainfall. This causes a general decline in the productive capacity of the soil and the movement of soil particles to waterways.





# Priorities for Action

*In developing the RCS, key issues emerged as high priorities for consideration, and action.*

## Emerging water markets and demand for environmental water

Water markets and water reform programs are, and will continue to be, major drivers of land use change.

Transfer of water entitlement has presented the opportunity to better match water and land use to land capacity. The water market is driving the increase in water productivity (\$/ML), but further effort is needed to ensure that environmental benefits are maximised.

## Water savings

The need for water savings to meet the Snowy River commitments, and the increased interest in establishing environmental flows for the Murray River as well as the region's rivers and streams will put pressure on our water assets.

Water savings will come from major infrastructure projects such as pipelining of irrigation supply systems or from better use of storages such as Lake Mokoan.

Savings will also come from a more environmentally sensitive and productive use of available water resources both in irrigation and rain-fed production systems. To mitigate the adverse environmental impacts of inefficient use of water requires a better understanding of where particular

land uses should best be located in the Catchment, and the development of appropriate practices to better manage water in both irrigated and dryland contexts.

In particular, recharge rates under particular land uses and irrigation practices need to be quantified.

## Land use, commodity prices and demographic change

Land use patterns are changing within the region, driven by factors such as water markets, commodity prices, and demographics. A new 'mosaic' of land use pattern is emerging that is likely to see:

- An intensive agricultural zone with a smaller ecological footprint - 'double the production from half the land'.
- An increased 'conservation' zone where the land previously used for traditional agriculture is managed for nature conservation and ecosystem services.
- Rural living areas where land, particularly near urban centres, is converted to hobby farms and smaller farms where the main household income is from activities other than agriculture and which may offer additional conservation.





The RCS considers how our natural resource investment influences this mosaic and how we can use this change to increase the value of our biodiversity assets. Progress in achieving implementation targets in the dryland area is constrained by commodity prices. However, the demographics and land use changes will allow landscape change options to be explored.

### Salt disposal constraints

The irrigation area recognises the need to maximise the benefits of limited salt disposal credits available to the region and has investigated other options for salt disposal. Options include: conjunctive water use, serial biological concentration and evaporation basins. The community has some acceptance of conjunctive water use, but there is a less acceptance of serial biological concentration options because they require a higher level of management, have high infrastructure costs and are marginally profitable.



Further work is needed on maximising the use of salt credits and developing opportunities for works that would generate further salt credits.

Drainage diversion remains an important part of managing salt exports but, as drainage flows decrease (because of increased water use efficiency), the salinity concentration will increase, which will reduce the water quality for diverters.

### Restoring the floodplain

Historical settlement patterns have resulted in conversion of floodplains to agricultural land. As well as losing the important ecosystem services provided by floodplains, many of these developments cannot be economically protected from flood damage. The Lower Goulburn River Floodplain is one such area. The 156 km stretch of the Goulburn River between Shepparton and Kanyapella is flanked by a system of levees built prior to 1900. During a large flood the levees cannot contain the water flowing down the Lower Goulburn.

Despite controlled releases at Loch Garry and elsewhere, in floods equal to or greater than approximately a 10-year Annual Recurrence Interval, water spills over and through the levees onto the surrounding floodplains to both the north and south of the river. In addition, the high levels of nutrient and salinity loads carried into the Murray by the Goulburn River floodwaters pose an environmental problem.

In the past, damaged levees were repaired using Natural Disaster Funds, but such funding is unlikely to be available in the future unless the community is willing to put in place strategies to minimise flood damage. The Lower Goulburn Floodplain Rehabilitation Project seeks to resolve the flooding problem by rehabilitation of the floodplain so that it operates in a more natural fashion. It will require the development of a leveed floodway of about 10,500 ha with a possible buy back of up to 9,700 ha from the relevant landholders. Overall this Project will deliver substantial environmental and economic outcomes.





### Priority area projects

Where geographic areas can be identified as major contributors to the threatening process, they will receive priority attention. For example, the South West Goulburn has been identified as a potential major source of salt in the Goulburn River and, ultimately, the Murray River. This area also has severely depleted native biodiversity. A major research investigation program combined with enhanced community participation processes will be undertaken in the South West Goulburn over the next five years.

### Market-based approaches

Price signals have proven effective in increasing water use efficiency in irrigation areas. The development of Environmental Management Systems (EMS) provides an opportunity for markets to directly influence land management practices. EMS provides a mechanism for consumers to express preference for goods that are produced in a clean and green manner. The Goulburn Broken CMA will work in partnership with the Victorian Farmers Federation (VFF), industry groups and agencies to develop an appropriate EMS for the region.

Market-based approaches rely on a strong understanding and ability to quantify the relationship between the works and the natural resource management outcome of those works. To improve this understanding the region will explore other market-based mechanisms such as:

- Using 'auction' systems to reveal the price landholders are willing to accept for delivering natural resource management benefits. The principles could be expanded to cover plantation investments by the private sector where an incentive could be offered reflecting the multiple natural resource benefits provided by the plantation.
- Developing 'annuities' as a way of funding management actions that span a number of years.

### Pursuing multiple benefits

It is not always possible to identify specific locations or actions to deal with broad threats such as declining water quality. These threats often require many landholders to undertake works across sub-catchments. The Goulburn Broken CMA has developed environmental management incentives that see the size of the grant offered to a landholder linked to the benefits generated by the works on his property.

### Improved regulatory framework

Where the threat to a natural asset can be clearly identified and attributed to individuals, consideration needs to be given to supporting recommended management actions with regulation. The management of dairy shed effluent in the irrigation region is one area where an increased regulatory effort is needed. The Goulburn Broken CMA will work with its Implementation Committees, Murray Dairy, the United Dairyfarmers of Victoria (UDV) and the Environment Protection Authority (EPA) to develop an appropriate program to take the region to 100 per cent compliance with EPA guidelines.







Pest management is another area where regulation is considered essential. In the Goulburn Broken catchment, the Catchment and Land Protection Act 1994 is enforced where individual land managers fail to adequately manage pests on their land, compromising the co-ordinated efforts of the greater community. This approach underpins the Goulburn Broken Region Weed Action Plan and the Goulburn Broken Rabbit Management Action Plan.

### Focus on natural assets and ecosystem services

Our experience with developing an ecosystem services approach to natural resource management fits in well with the growing focus on an assets management approach.

The ecosystem services approach provides a framework for making management decisions that are truly holistic. We are at the leading edge of developing and implementing this framework.

### Enhancing community engagement

The region has robust community participation structures and processes that have grown out of grass roots concern about salinity issues in the early 1980s.

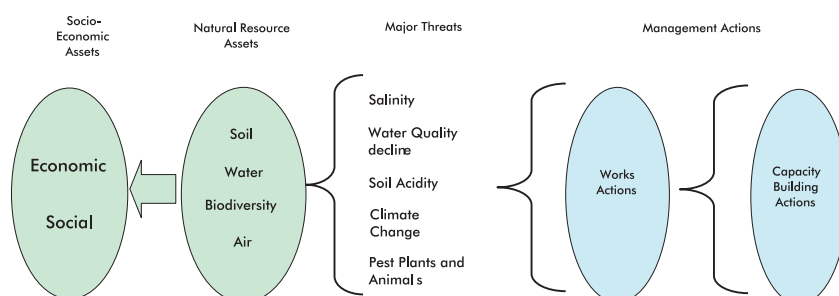
We will explore new ways of engaging the community in addressing the substantial issues facing the catchment. There will be a renewed effort to engage and involve Aboriginal people in natural resource management. Of particular interest is the use 'Deliberative Forums' that bring together a cross-section of the community to review the best available technical evidence about a particular issue and to promote public debate on the processes for dealing with that issue.

### Capacity building

Catchment management presents a series of complex and inter-related challenges. Our overall goals are often in conflict, for example economic development can have environmental costs. The way we do business in natural resource management is as important as the works we are trying to achieve. Integrated catchment management recognises that actions to address one resource management issue may interact positively and negatively with actions to address another resource management issue. The processes that we put in place must enable trade-offs to be identified and addressed. Biodiversity Risk Mitigation Protocols are an example of processes that aim to identify and clarify potential trade offs.

The GB CMA's values and best practices outline how this will occur. They emphasise the central role of the community and the need to ensure its members are appropriately engaged. The practices also cover important actions such as monitoring, evaluation, and research and development. Landcare and Local Area Planning (LAP) will continue to be a major tool for achieving community engagement drawing on local solutions to local issues.

**Assets, threats and actions framework.**  
**Works/Actions target both past and present causes that impact on natural assets.**



# Our Targets

The targets and major actions of the region's natural resource management programs summarised in this section are derived from the detailed sub-strategies and action plans that underpin the RCS (see Table 9.1). These documents are located on the Goulburn Broken CMA's website [www.gbcma.vic.gov.au](http://www.gbcma.vic.gov.au).

The targets and actions comprise:

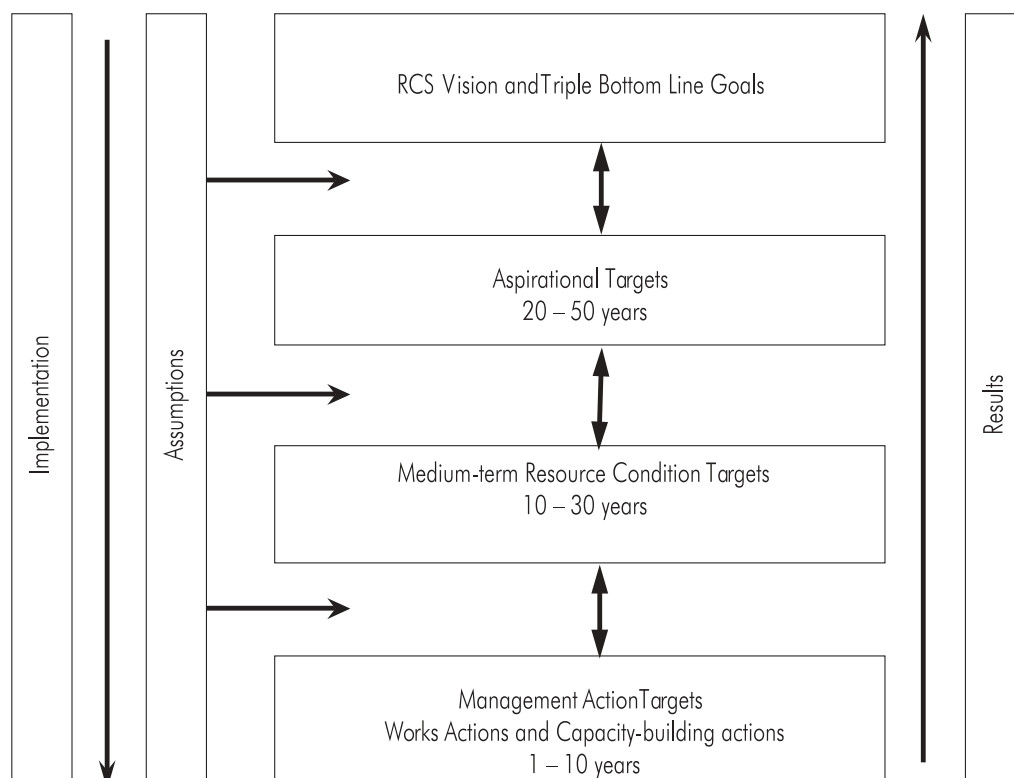
- Aspirational or long-term resource condition target.
- Medium-term resource condition targets we are aiming to achieve over the next 10 to 30 years.

- Management actions (works and capacity building actions) that will be implemented over the next five to ten years to achieve the resource condition targets.

We will continue to refine our approach to integrated catchment management with a greater emphasis over the next few years on asset protection rather than threat abatement.



## Targets hierarchy.



## Water Targets

Aspirational Target	Resource Condition Target
<p>Maintain the condition of all reaches (benchmark 2003) of rivers and streams rated as 'good' or 'excellent'.</p> <p>Improve the overall condition (benchmark 2003) of rivers and streams rated as 'marginal', 'poor' and 'very poor' by 2050.</p>	<p><b>In-stream and Riparian (see Riverine Health Strategy)</b></p> <ul style="list-style-type: none"> <li>Maintain condition of 1,400 km of streams at 2003 levels, as measured by ISC (riparian and channel form sub-indices)</li> <li>Improve condition of 1,200 km of streams on 2003 levels by one ISC rating (riparian zone and channel form sub-indices) by 2013.</li> <li>Improve 50 km of instream diversity and habitat values by 2013, as measured using ISC for improving habitat features.</li> <li>Increase length of river accessible to native fish by 200 km by 2013.</li> </ul> <p><b>Ecologically Healthy Rivers (see Riverine Health Strategy)</b>            Maintain condition of Ecologically Healthy Rivers until at least 2013, as measured by ISC            Improve condition of 6 rivers to ecologically health status by 2013, as measured by ISC</p> <p><b>Representative Rivers (see Riverine Health Strategy)</b>            Maintain Representative River in Ecologically Healthy Condition until at least 2013, as measured by ISC.</p> <p><b>Heritage Rivers (see Riverine Health Strategy)</b>            Maintain condition of all Heritage Rivers (Goulburn, Big and Howqua) until at least 2013, as measured by ISC.</p> <p><b>Rivers of Regional Significance - High Community Value River</b>            Maintain condition of 10 km of high valued community rivers, as measured by ISC.</p> <p><b>Public Frontages (see Riverine Health Strategy)</b>            Improve quality of 40 km of Public Frontages by one category (using Vegetation Quality Assessment manual) by 2013.</p>
	<p><b>Wetlands (see Wetlands Strategy)</b>            Manage extent of all wetland types at 2003 levels where the extent (area and number) has declined since European settlement.            Improve the condition of 70% of wetlands by 2030 using 2003 as the benchmark for condition.</p>
	<p><b>Recreation (see Riverine Health Strategy)</b>            Riverine health will be maintained and enhanced when managing for recreation purposes.</p>
	<p><b>Flood control infrastructure (see Regional Floodplain Management Strategy)</b>            Generally assets will be maintained and enhanced when managing for flooding by preventing inappropriate flooding and capitalising on opportunities.</p>
<p>Improve and maintain water quality at optimum levels within and downstream of the Catchment for native ecosystems, recreation, human and animal consumption, agriculture and industry.</p>	<p><b>Water Quality (see Water Quality Strategy)</b>            Reduce potential phosphorus loads by 65% by 2016 by reducing phosphorus loads from:</p> <ul style="list-style-type: none"> <li>irrigation drains by 50% (84.5 tonnes)</li> <li>dryland and diffuse sources by 20% (22 tonne)</li> <li>wastewater management facilities by 80%</li> <li>urban stormwater (9.84 tonnes)</li> <li>intensive agricultural industries and local water quality issues (3.5 tonnes)</li> </ul>





## Land Targets

Aspirational Target	Resource Condition Target
<b>SHEPPARTON IRRIGATION REGION</b>	
<p>The natural resources of the SIR are being managed sustainably for current and future generations:</p> <ul style="list-style-type: none"> <li>• with abundant and well maintained environmental assets delivering a range of ecosystem services,</li> <li>• recognised locally and internationally for its high quality produce and</li> <li>• with enthusiastic and progressive community the is actively engaged in care of its natural resources.</li> </ul> <p>This requires protection of threatened assets within the 519,240 ha of SIR by reducing ground water accession, soil salinisation and waterlogging by 2020. This means protecting 286,000 ha' of land from surface water accessions by 2020.</p>	Maintain increases to salinity levels of the River Murray at Morgan from the Shepparton Irrigation Region at or below 17.0 ECs by 2020.
	This means maintaining net saltloads below 102,000 tonnes/year from Shepparton Irrigation Region by 2020.
	Salinity concentrations of River Murray resulting from groundwater disposal to be kept within acceptable limits by only disposing when flows are sufficiently high.
	This also means keeping groundwater below 2m and remove saline water by consistently pumping groundwater over 216,000 ha of land.



## Land Use (cont'd)

Aspirational Target	Resource Condition Target
<b>GOULBURN BROKEN DRYLAND</b>	
<p>The long term targets our our revised dryland salinity management plan are to:</p> <ul style="list-style-type: none"> <li>• deliver an integrated program to protect and enhance natural resources within the catchment</li> <li>• develop a high level of community responsibility and accountability.</li> <li>• control land degradation and protect important terrestrial and aquatic assets.</li> <li>• maintain water quality for all beneficial uses, including agricultural, environmental, urban, industrial and recreational.</li> </ul>	<p>Maintain increase to salinity levels of the River Murray at Morgan from the Goulburn Broken Dryland at or below 1.3ECs by 2050. This means reducing saltloads by 34,000 tonnes per year by 2050 (below projected increase).</p>
	<p>Reduces increase in salinisation of dryland areas where possible.</p> <p>This means reducing area of dryland that would otherwise be salinised (in foothills and river valleys of highland areas): 1,500 ha by 2050.</p>
	<p>Manage salinised land and land with high watertables in the riverine plain ("Live with Salt").</p> <p>This means managing salinised land in the riverine plain: 30,000 ha by 2100 and managing land with high watertables in the riverine plain 120,000ha by 2100.</p>
<b>SOIL HEALTH</b>	
<p>We will seek to maintain the capacity of region's soils to support human health and habitation and to contribute to enhanced water and air quality.</p>	<p>The focus on soil health over the next five years will be to manage Soil salinity (EC) and sodicity in irrigated regions, and Acidity (pH) soil structure and erosion in dryland regions.</p> <p>We will also seek to improve our understanding of soil biodiversity and its contribution to developing more resilient soils.</p>
<b>PEST PLANTS AND ANIMALS</b>	
<p>Landowners will take responsibility for pest plant and animal management on their own land and prevent impact on neighbouring properties.</p> <p>Pest plants and animal populations will be decreased to levels acceptable to the community.</p>	<p>100% infestations of State Prohibited Weeds treated annually until eradicated.</p> <p>100% known infestations of New and Emerging Weeds treated annually for containment/eradication.</p> <p>100% known satellite infestations of Regional Priority Weeds treated for containment or where possible, eradication. 95% infestations of Regional Priority Weeds in priority project areas treated for containment or where possible, eradication.</p> <p>100% increase in area of the catchment declared "Rabbit Free".</p> <p>Reduction in impact of foxes and wild dogs on livestock industries and native fauna.</p>



### Biodiversity Targets

Aspirational Target	Resource Condition Targets
<p>'The community will work in partnership with Federal and State Governments and other agencies to protect and enhance ecological processes and genetic diversity to secure the future of native species of plants, animals and other organisms in the Catchment'.</p>	<p><u>Native Vegetation</u></p> <p>Maintain extent of all native vegetation types at 1999 levels in keeping with the goal of 'net gain' listed in Victoria's Biodiversity Strategy 1997.</p>
	<p>Improve the quality of 90% of existing (2003) native vegetation by 10% by 2030.</p>
	<p>Increase the cover of all endangered and applicable vulnerable EVCs to at least 15% of their pre-European vegetation cover by 2030.</p>
	<p><u>Threatened Species</u></p> <p>Increase 2002 conservation status of 80% threatened flora and 60% threatened fauna by 2030.</p>

### Climate Change (Air) Targets

Aspirational Target	Resource Condition Target
<p>Greenhouse emissions from the Catchment will be limited to nationally agreed levels.</p>	<p>Regional and sub-regional goals and targets will be determined.</p>







### Acknowledgements

Front cover painting "The River" by Rebecca Atkinson. Rebecca says: "The painting is about the bush, particularly the animals that live there. The story behind the painting is my interpretation of the way I see the bush."

### Disclaimer

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Goulburn Broken  
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