Molonglo Catchment Strategy 2004-2024

May 2005

This document is a living document, to be reviewed regularly. The Molonglo Catchment Group Inc. welcomes feedback on this Molonglo Catchment Strategy.

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Foreword

The Molonglo Catchment Strategy (MCS) is part of our community's contribution to meeting the challenge of finding new ways to manage the natural resources of New South Wales and the Australian Capital Territory.

The MCS is a 20 year plan for integrated catchment management of the Molonglo Catchment. We have chosen this timeframe to focus on our responsibilities to the next generation and to align with regional planning frameworks projecting similar timeframes. It represents a major step forward in our quest for balanced, cooperative cross border natural resource management in the region.

Building on the valuable work of local communities and Landcare, the MCS contains specific and measurable targets to be achieved in a set period of time, and the management actions required in meeting these targets. Targets and actions are influenced by those set in the Murrumbidgee Catchment Blueprint, currently being superseded by the Murrumbidgee Catchment Action Plan and the ACT Natural Resource Management Plan and the community's vision for resource condition in the catchment.

Many people have contributed to the development of the MCS. First and foremost, we thank the community of the Molonglo Catchment. Development of the strategy has been a great effort from people with wide-ranging backgrounds and views on natural resource management, including Indigenous people, working in a spirit of seeking consensus.

We also thank the individuals, groups and organisations that made contributions in various ways, particularly those who took the trouble to make a submission outside the consultation period. We acknowledge the support provided by many staff of various government agencies at the local, state and federal government levels, in both the ACT and NSW.

The Molonglo Catchment Group is endeavouring to develop long lasting working relationships with both the ACT Natural Resource Management Board and the Murrumbidgee Catchment Management Authority because it is now time to put the strategy into action. The next step is to benchmark catchment health, define arrangements for sourcing investment, develop cross border collaborative projects and encourage the broader community to take part in sustainable natural resource management practices.

I commend the Molonglo Catchment Strategy to you and encourage you, your group or organisation to consider how you may participate in its implementation. I suggest that, in the first instance, you contact the Molonglo Catchment Group or visit our website (www.molonglocatchment.com.au) to investigate your potential involvement. Together, we can improve the way we manage the natural resources that are so vital for the future of our catchment.

Lynton Bond
President
Molonglo Catchment Group

May, 2005

Acknowledgements

The catchment community is to be commended for their tireless participation in matters such as these. Natural resource management is never easy at the whole of catchment scale and for individuals to appreciate issues beyond 'their patch' is a challenge for most. Notwithstanding this, it is pleasing to have had such enthusiastic participation throughout the planning process in the Molonglo.

Thanks also must go to the Molonglo Catchment Group Executive, who have provided steadfast support throughout this process. The final product is testament to their patience, enthusiasm and commitment to 'doing the best we could do'.

Natural resource management in the Molonglo Catchment is a complex job!

The community has to battle the intricate web of environmental policy plus the added challenges that a State border poses to coordination, cooperation and implementation. Hence the MCS is a definitive step towards the cross-border cooperative management of our resources. It is imperative that both the ACT Natural Resources Management Board and the Murrumbidgee Catchment Management Committee fully utilise the insights this document provides.

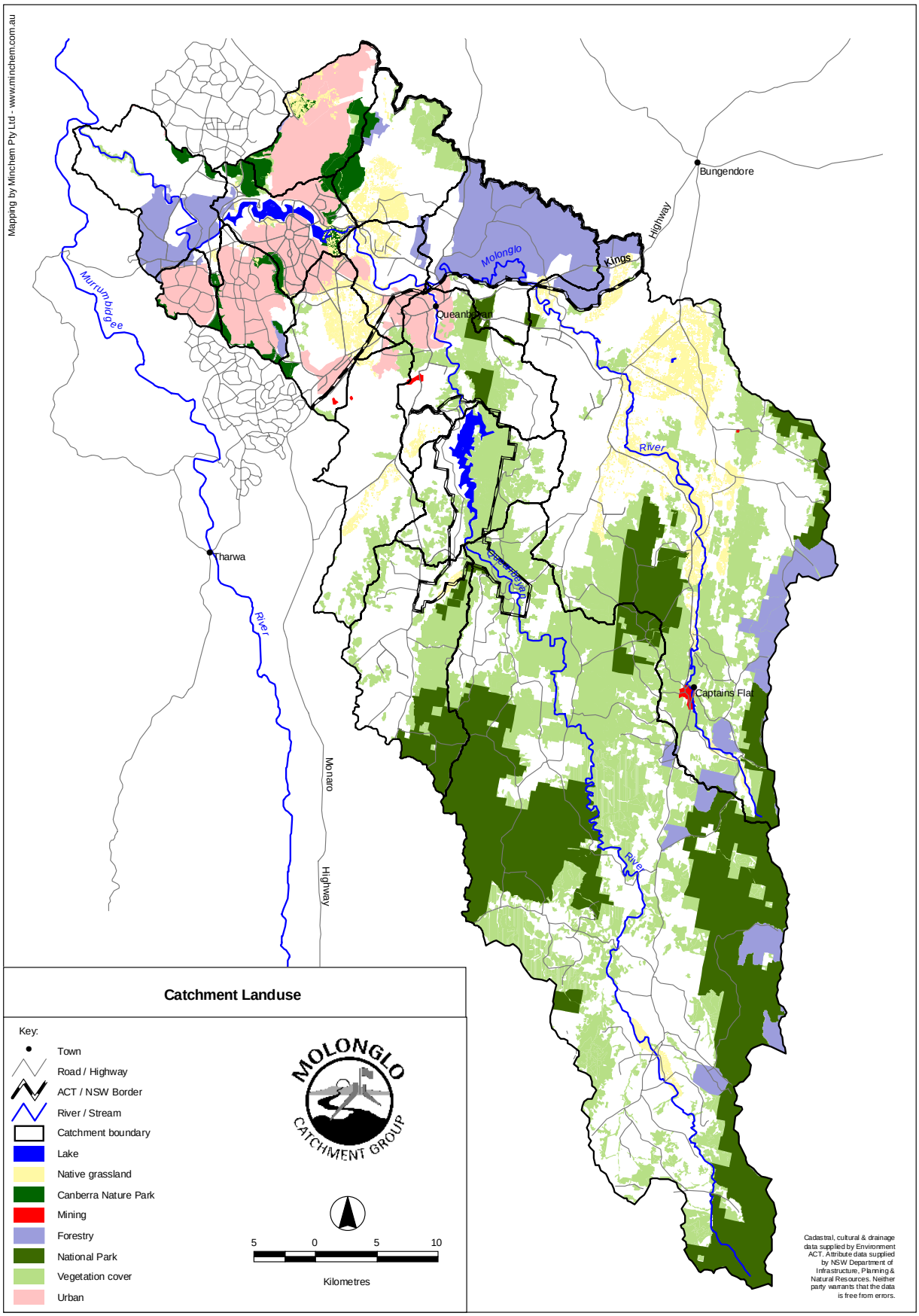
With the development of the catchment management authorities in NSW, a new era of catchment management is upon us, and I sincerely hope that cross border communication does not take a back seat to politics.

It is therefore the catchment community's responsibility to ensure that the ACT NRM Board and the MCMA forge productive working arrangements, enhanced communication channels, and most importantly, long term management solutions that put the community first.

Again, I am thankful for the work the community has done to put this document together and I commend it to everyone as a strategy for future action.

Damian Wall
Molonglo Catchment Coordinator

May, 2005


Mapping by Minchem Pty Ltd - www.minchem.com.au
Bungendore
Highway
Kings
Molonglo
Murrumbidgee
Queanbeyan
River
Tharwa
River
Monaro
Highway
Captains Flat
River
Catchment Landuse
Key:
Town
Road / Highway
ACT / NSW Border
River / Stream
Catchment boundary
Lake
Native grassland
Canberra Nature Park
Mining
Forestry
National Park
Vegetation cover
Urban
MOLONGLO CATCHMENT GROUP
5 0 5 10
Kilometres
Cadastral, cultural & drainage data supplied by Environment ACT. Attribute data supplied by NSW Department of Infrastructure, Planning & Natural Resources. Neither party warrants that the data is free from errors.

Layout of the strategy

The Molonglo Catchment Strategy is divided into 3 main parts – Setting the Scene, Targets & Actions and Monitoring & Milestones.

Part 1. Setting the Scene

Sets out current demographic, social and economic dimensions of the catchment, and presents a view of the forces shaping the catchment and region that seem likely to impact on natural resource management over the next 20 years.

Part 2. Targets and Actions

This part details targets for future resource condition in the catchment. The catchment and management targets listed are obtained from regional level plans (from both the ACT and NSW) and serve to guide the MCS towards addressing priority NRM issues.

This part also identifies community capacity, investigative and on-ground actions for the Key Target Areas in the catchment. The actions provide a basis for quantifying the costs of achieving the catchment and management targets, how investments might be financed, and how targets and investments might be adapted in response to changed information and funds availability.

Part 3. Monitoring and Milestones

Sets out key milestones and defines monitoring / evaluation needs against which to assess progress.

Part 1. Setting the Scene

1. Our Visions

1.1 a healthy environment

On the whole, the environmental health of the catchment is declining. With pressures including the growth and expansion of major urban centres and rural residential areas, human activity will make even more demands on the catchment's natural resources. Many of the existing threats the catchment currently faces will intensify.

The MCS aims to improve the health of all landscapes by 2020. Healthy environments have good quality air, water, and soil, and viable ecosystems to maintain these.

This will not be easy, and the choices to be faced are difficult ones. The MCS will attempt to guide investment to improve environmental health, buffer the environmental impact of demands for higher living standards and a rising population and determine what specific targets are achievable, given the current trends in environmental condition.

1.2 sustainable economic use of natural resources

The natural environment of the Molonglo Catchment has its limits. To be sustainable, economic use of natural resources should respect these limits and work with, rather than against natural processes.

The MCS strives to encourage land mangers to choose those practices that are economically viable whilst sustaining their natural asset base. The catchment group acknowledges that profitability and sustainability are not mutually exclusive and that this approach is ultimately the only way agronomic enterprises can truly maintain long-term profitability in an environmentally conscious manner.

There must, however, be a realisation that broad scale sustainable economic use of the catchment's natural resources is the responsibility of the whole community (Corangamite Catchment Management Authority (CCMA), 2003).

This goal hinges on the further development of an underlying 'environmental ethic' that is widely accepted in the catchment community.

1.3 cohesive, innovative communities

The catchment is currently experiencing an expansion of rural residential estates, which is likely to result in some re-zoning of traditionally 'farmed' areas, in the next 20 years. On the whole, new rural residential residents may not immediately understand the way the landscape is managed which poses some challenges in terms of weed management, water quality and feral animal management. However, new residents do bring new ideas, a new set of knowledge and more resources.

The catchment group acknowledges that expansion of these areas will cause some conflict between adjoining larger land managers and even within the estates themselves. However, all residents share a passion for where they live which is a building block for creating a cohesive knowledge-sharing network.

Likewise, new skills facilitate new ideas and given that most of the answers to the riddle of 'sustainability' are yet to be invented, these small communities are in fact a 'breeding ground' for innovation (CCMA, 2003).

1.4 partnerships between community and government

The catchment group acknowledges that natural resource management (NRM) is a cooperative and collaborative endeavour. It requires expert scientific knowledge and local knowledge; government policy that facilitates the development of frameworks to address issues; innovation by enterprises and joint investment from public and private sources (CCMA, 2003).

The MCS aims to establish new partnerships between the community and government and enhance those networks which are perhaps experiencing a loss of direction because of changes to the regional planning framework and institutional amendments.

2. Scope

2.1 area and boundaries

The Molonglo catchment comprises approximately 212,000 hectares of south-eastern NSW in the Murrumbidgee Catchment and includes all the land that drains into the Molonglo River and Lake Burley Griffin including the Queanbeyan River and all their tributaries.

The catchment as a whole is defined by aggregation of its 13 sub-catchments – Upper Molonglo, Tinderry, Burra, Jerrabomberra Headwaters, Jerrabomberra, Googong, Lower Queanbeyan, Woolshed, Kowen, Fyshwick, Sullivan's Creek, Burley Griffin and Lower Molonglo.

It includes all of the Queanbeyan City Council and parts of Palerang Council and Cooma - Monaro Council local government areas and part of the ACT. Also included within the boundary is the entire city of Queanbeyan and a proportion of the central and southern suburbs of Canberra.

2.2 evolution of planning in the Molonglo

Sustainable water action management plan (SWAMP)

Integrated catchment planning in the Molonglo Catchment began in 1998 with the Sustainable Water Action Management Project (SWAMP), initiated by Environment ACT, ACT Department of Urban Services. The SWAMP planning process involved the preparation of a discussion paper and the subsequent production of a management plan in 2000. The SWAMP plan covered Woolshed Creek, Pialligo Brook, Reedy Creek, Molonglo River (from Burbong Bridge to the entrance of Lake Burley Griffin), Queanbeyan River (below Googong Dam), and Jerrabomberra Creek. The project area for a number of reasons did not cover the entire Molonglo Catchment.

SWAMP was developed to provide a framework to recognise current work and organise further actions and noted the following as the major NRM issues:

1. weed infestation (especially invasive willows);
2. stormwater quality;
3. in-stream erosion; and
4. fencing remnant vegetation along streams to prevent degradation.

The project also recognised a significant number of initiatives already being implemented and played a significant role in creating awareness and aimed to catalyse further action beyond its completion date. Prior to the MCS the SWAMP was the most significant community based cross-border planning initiative in the Molonglo and served as the basis for action development in this document.

the Molonglo planning framework

The MCS has extended the SWAMP initiative to develop a total catchment management strategy for the Molonglo Catchment - a comprehensive management strategy for the catchment that will facilitate the development of a framework between key stakeholders for regional delivery of NRM in the Molonglo.

As a precursor to the development of the MCS, the Molonglo Planning Framework document and associated background material was produced under a project hosted by the Conservation Council of the South East Region and Canberra in collaboration with Environment ACT. Funding was provided by the ACT Environment Grants Program to employ a Coordinator (2 days / week for six months) to develop a framework for future planning (the MCS).

In addition to proposing a planning process, the document also:

- Collated a comprehensive stakeholder contact list;
- Proposed indicative boundaries for the planning process;
- Identified environmental work undertaken in the catchment including:
    - On-ground projects;
    - Management plans and strategies;
    - Research papers;
    - Other relevant documents;
    - Relevant legislation; and
    - Relevant digital data sets and their custodians.

The planning framework document and other work was developed through initial consultation with key representatives in the catchment community. A Steering Committee was formed to provide input to the planning process and guide the project. The framework and supporting background work provided a basis for further consultation and was essentially a "scoping exercise" aimed at building an effective planning framework and collating useful information that laid the foundations for the development of the MCS.

Regional Planning – Murrumbidgee Catchment Management

Catchment planning in the Murrumbidgee began in 1997 with the development of the Murrumbidgee Catchment Action Plan (MCAP). The MCAP was developed by the then Murrumbidgee Catchment Management Committee to guide NRM investment in the Upper, Mid and Lower Murrumbidgee.

In October 2003, the NSW Premier announced reforms which significantly changed the approach to natural resource management in NSW. The reforms were based on the recommendations provided in the Final Report by the Native Vegetation Reform Implementation Group. The Native Vegetation Implementation Reform Group was appointed by the NSW Government in April 2003 to identify ways to improve the management of native vegetation in NSW. A number of key reform actions underpin the NRM reform in NSW including:

- Allocation of $406.3 million to fund locally-driven organisations and land managers responsible for managing the State's natural resources;
- An end to broad scale land clearing of remnant vegetation and protected regrowth;
- Direct funding to land managers to assist with conservation and management of important areas of natural vegetation;
- Creation of the Natural Resources Commission to set state-wide standards and targets for natural resource management; and
- Creation of locally driven organisations, ***Catchment Management Authorities*** responsible for making decisions about natural resources management.

The forerunner to the Murrumbidgee Catchment Management Authority (MCMA) the Murrumbidgee Catchment Management Board (MCMB) developed the Murrumbidgee Catchment Blueprint. The formulation of targets and actions in the Blueprint was guided by the MCAP and other regional planning instruments (for more information on the Blueprint, see section 2).

The ACT falls entirely within the Murrumbidgee catchment, however as a separate jurisdiction, the ACT has to deal with natural resource management within its own policy and planning framework (DLWC, 2003).

The ACT Natural Resource Management Board (ACT NRM Board) was set up in 2003 to meet the requirements of the Bilateral Agreement for the delivery of the Natural Heritage Trust. The Board is comprised of community members from the ACT representing community interests in relation to natural resource management in the Territory (Environment ACT 2004).

The ACT NRM Board is responsible for:

- preparation of the draft ACT Natural Resource Management Plan (ACT NRM Plan) for accreditation by the ACT and Australian Governments.
- development of the Territory's Natural Resource Management Investment Strategy; and
- oversight of the implementation and review of the Plan; including:
  - Projects derived from the Plan;
  - Expenditure of Natural Heritage Trust funds; and
  - Management Actions and Territory Targets identified in the Plan.

Both the MCMA and the ACT NRM Board recognise and acknowledge that the catchment must be managed across jurisdictional boundaries and, to this end, the ACT has participated fully in the preparation of the Blueprint. Furthermore to facilitate integrated cross border NRM, the ACT NRM Plan has the same First Order Objectives, however Catchment Targets relate to issues for which the ACT has responsibility. Some management targets, actions and activities are the same, and none are inconsistent (DLWC, 2003).

The Canberra Spatial Plan

The Spatial Plan is the key strategic planning document for directing and managing urban growth and change. It sets out actions for 30 years and beyond, to achieve this. The Canberra Spatial Plan outlines a strategic direction to achieve the social, environmental and economic sustainability of Canberra as part of the Canberra Plan (ACT Government, 2005).

The understanding of sustainability adopted by the ACT Government is one that recognises the need for a long term perspective, the need for responsibilities and benefits to be shared equitably, and the interdependence of the economy, environment and society. A key issue relating to the application of sustainability principles is the development of a framework that resolves the conflicts between various principles in relation to specific actions or policies (ACTPLA, 2004).

The Spatial Plan considers projections of population growth and provides a strategic direction for urban development/renewal and employment corridors whilst acknowledging the potential for growth outside the ACT, whilst acknowledging the recovery process following the January, 2003 bushfire:

"*The Strategic Direction provides an urban settlement strategy that contains growth within approximately 15 kilometres of the city centre over the next 30 years (reflecting the need to contain sprawl).*

"*The Molonglo Valley and the Kowen Plateau are identified as future greenfields residential development areas to meet the predicted demand for housing for low and medium density housing in addition to completion of Gungahlin. The Molonglo Valley will provide high levels of accessibility into Civic, Belconnen, Woden and Tuggeranong, allowing residents ease of access to different places of employment, services and education institutions. Development on the Kowen Plateau will also result in short journeys to central and eastern places of employment and education, including Queanbeyan.*

"*Three key employment corridors will concentrate development on major transport routes. Civic and the town centres will be the primary focus for future employment growth within these corridors. Activity nodes within the corridors will also accommodate employment growth, but to a lesser extent than Civic and the town centres.*

"*The protection of wildlife corridors through the whole of the ACT and containment of growth within a 15 kilometre radius minimises the impact of urban growth on areas of high conservation value.*"

A Regional Strategy for the Sydney-Canberra Corridor

The Sydney-Canberra Corridor comprises seven Local Government Areas between Canberra and Sydney (Yass Valley, Upper Lachlan, Wollondilly, Wingecarribee, Goulburn Mulwaree, Palerang and Queanbeyan City) and comprises an area of 2.5 million hectares.

The Corridor accommodates some 172,000 residents and has a rich array of cultural, economic, social and environmental resources and assets. The Corridor is changing - influenced by a range of constraints and opportunities including strong growth pressures from both Sydney and surrounds in the north and Canberra in the south. The Corridor also presents challenges for resident communities and visitors, economic and social well-being and environmental sustainability (DIPNR, 2004).

To meet these challenges, DIPNR is developing a Regional Strategy to ensure that the Corridor has a sustainable future. The Regional Strategy will be aiming towards a 'whole-of-government' approach to planning principles and strategic directions for community interests, economic growth, tourism and recreation, lifestyle options, the environment and natural resources.

Future versions of the MCS will need to be aware of the outcomes of this planning process and facilitate active involvement in the strategy to ensure local concerns and targets developed by the MCS are incorporated.

The ACT Water Supply Catchment Management Group

The ACT Water Supply Catchment Management Group is responsible for overseeing catchment management arrangements in the Cotter and Googong sub-catchments.

The Group will be responsible for the development and adoption of principles and management objectives for ACT water supply catchments, reviewing preparation of a catchment management plans and, for Googong, development of catchment management outcomes that the ACT should require as part of an Integrated Water Supply Strategy for the region (ACT Government, 2004).

The Molonglo Catchment Group intends to work very closely with the catchment management group to ensure that planning outcomes are not duplicated and that water supply issues are properly incorporated into land management arrangements and on the ground catchment management activities.

2.3 purpose of the catchment strategy

The MCS for 2004-2024 provides long-term direction for managing the future of land, water resources and biodiversity of the catchment, and the foundation for community investment decisions to ensure improved natural resource outcomes. The MCS:

- sets broad goals for 20 years;
- assesses threats to environmental, economic and social values;
- identifies opportunities for improving natural resource management processes over the next 10 years;
- provides a means for stakeholders to make NRM investment decisions; and
- sets guidelines for monitoring and evaluation of progress.

The MCS aims to assist and guide the planning and action of:

- private landholders, who own 35% of the land in the catchment;
- government, which manages the other 65% of land in the catchment on behalf of the community;
- local and State government agencies with responsibility for natural resource management;
- community groups and non-government organisations protecting and restoring the environment; and
- business and industry groups investing and operating within the catchment.

the role of the Molonglo Catchment Group

The Molonglo Catchment Group was formed with a principle objective of developing the Molonglo Catchment Strategy and a secondary objective and subsequent role in co-ordination and integration, appropriate to the level of support available to the group.

The lists of actions and the performance indicators should not be interpreted to imply that the group intends to take on a larger action/implementation role. While this may be appropriate where no other group or agency is acting, or has a role to act, it should be important that MCG does not seek to duplicate services that are currently available, but rather to coordinate and add value to those services.

2.4 the strategy integrates natural resource management initiatives

The MCS has a role in facilitating a 'connection' between all levels of government and the community, thus promoting integrated natural resource management. The strategy has been guided by relevant policies and initiatives, which Local, State and the Federal Government has committed to and is obligated to implement. The Molonglo Planning Framework compiled a comprehensive list of such policies and initiatives; the following describes the most relevant documents used to guide the development of the MCS.

State / territory initiatives

The MCS provides for the implementation of ACT and NSW strategies and their supporting documents. As a general rule, many of these strategies are influenced by national initiatives whose principles, goals, etc, are ultimately delivered by the community. Major initiatives that have guided the development of this strategy include:

- Integrated Catchment Management Strategy for the ACT;
- NSW Native Vegetation Conservation Strategy;
- The ACT Weeds Strategy;
- *Think water, act water* – a strategy for sustainable water resource management;
- ACT Lowland Native Grassland Conservation Strategy;
- ACT Lowland Woodland Conservation Strategy;
- ACT Weed Strategy;
- Canberra Nature Park Management Plan;
- NSW Biodiversity Strategy;
- ACT Roadside Management Strategy;
- Canberra Nature Park Management Plan;
- New South Wales Water Conservation Strategy;
- ACT Fire Fuel Management Plan;
- Draft ACT Vertebrate Pest Management Plan; and the
- New South Wales Salinity Strategy.

regional initiatives

The MCS is framed consistently with the ACT NRM Plan and the Murrumbidgee Catchment Blueprint, our regional target setting frameworks. These frameworks provide a consistent definition for natural resource management in the catchment and describe the preferred directions and approaches to on-ground action and performance evaluation.

At the time of publication, the MCMA was consulting with the Murrumbidgee Catchment community with the aim of developing the Murrumbidgee Catchment Action Plan (MCAP 2005), a statutory document which will reflect state-wide natural resource condition targets set by the NSW Natural Resources Commission by establishing catchment resource condition targets and management targets to achieve them. The MCAP 2005 was in an early draft stage when this Strategy was finalised; the Strategy incorporates the resource conditions and management targets as they were at that time, and will be updated when the MCAP is finalised.

State agencies and non-government organisations have also developed (or are in the process of developing) regional strategies etc that guide operations and attempt to deliver on state level targets.

Organisations such as the NSW Rural Lands Protection Board, Greening Australia and Conservation Volunteers Australia have been involved in the development of the strategy. Major regional initiatives include:

- Sydney–Canberra Corridor Regional Strategy (under development);
- Willow Management Strategy for the Upper Murrumbidgee Catchment;
- Lower Molonglo Corridor Management Plan;
- Jerrabomberra Wetlands Management Plan;
- ACT and Sub-Region Planning Strategy; and
- A Planning Framework for Natural Ecosystems of the ACT and NSW Southern Tablelands.

local government initiatives

Local government planning guidelines and environment plans are possibly the most critical element of natural resource management that must be considered in delivering integrated natural resource management. Local government in the catchment is heavily involved in many facets of NRM and notable initiatives in the Molonglo include:

- State of the Environment Reports;
- Local Environment Plans;
- Yarrowlumla Council Stormwater Management Plan;
- Queanbeyan City Council Stormwater Management Plan;
- Mount Jerrabomberra Management Plan (under development);
- Jerrabomberra Creek Management Plan (under development); and
- The Queanbeyan River Corridor Plan of Management.

The Local Environment Plans (LEPs) for all the councils within the catchment are being reviewed over a three-year period. The revised LEPs are to be informed by the CMA MCAP 2005 (and *vice versa*), as well as reflecting regional strategies such as the Sydney-Canberra Corridor Regional Strategy.

local community initiatives

Engaging the community in NRM is vital for the success of the MCS. Landcare and environmental groups have been, and continue to be involved in the development and implementation of local environmental and action plans that guide specific and integrated action at a local scale. These plans were also considered in developing the MCS. Input from local indigenous communities is also vital, in particular in maintaining cultural heritage values in the catchment. Some notable community planning initiatives in the Molonglo are:

- Oaks Estate Environmental Management Plan – Queanbeyan Landcare;
- Reedy Creek Catchment Plan – Reedy Creek Landcare;
- Flora of South East Yarrowlumla - A Preliminary Assessment – Stoney Creek Landcare Group;
- Sullivans Creek Catchment Management Plan – Sullivans Creek Catchment Group;
- Weston-Woden Sub-catchment Plan – Southern ACT Catchment Group;
- Sustainable Water Action Management Plan (SWAMP) Strategy and Action Plan 2000.
- Pialligo Brook: An Ecological Survey - Pialligo Residents Association
- Soil Erosion, Phosphorus and Dryland Salinity in the Upper Murrumbidgee: Past Change and Current Findings - Upper Murrumbidgee Catchment Coordinating Committee; and
- The Bushlands of Mt Foxlow – Harrisons Peak. A Preliminary Ecological Assessment - Stoney Creek Landcare Group.

2.5 coping with the complexity

A key task for the MCS is to ensure that the various NRM 'players' including government and industry are all aware of the community's catchment management intentions and that dual roles and responsibilities do not hinder on-ground results. For example, some government services at the regional level are threat-based (e.g. salinity, pest animals and plants), whilst others are asset-based (waterways, lakes), however many issues are handled at a state-wide level (e.g. Forestry by NSW and ACT Forests; aboriginal heritage and biodiversity plans by NSW Department of Environment & Conservation and Environment ACT).

Added to this, management of issues such as weeds are spread across different agencies with responsibilities split between the managers of waterways, wetlands, state forests, land owners, local councils and national parks.

A challenge raised by such organisational complexity is that some units may be unaware of knowledge and information generated by other units. For example, groundwater licensing information collected by DIPNR may be relevant to groundwater and salinity studies in the catchment. In addition, there are challenges associated with strategies being developed independently of each other, especially given the very active role that educational institutions and research organisations have in the catchment.

By remaining transparent and inviting comment from all levels of government, industry, research and development corporations etc, the MCS will facilitate cooperation, collaboration and innovation.

3. Design

3.1 consultation with our community – community workshops

Stakeholders at the local level were consulted through a series of 4 workshops conducted throughout the catchment. Together with the planning coordinator, the host Landcare groups/organisations were encouraged to invite a mix of people involved in NRM to reflect the issues of their area. A call for public involvement in the planning process was issued in the local media and websites. Appendix 3 presents a summary of the outcomes from the workshops.

3.2 the logic

Goals are expressed as aspirations for 2024. The terms used in the goal statements were listed in stakeholder workshops, in light of desired future management of priority issues.

Priorities identify the most valued assets and the most significant threats faced by each asset. They are based on workshops with stakeholders and review of current technical information about threats to assets.

Targets and *Actions* were obtained from:
(i) community inputs in workshops;
(ii) existing guiding regional strategies; and
(iii) discussions held with technical experts involved with the development of regional targets on appropriate targets for the MCS and their implementation feasibility.

Performance Indicators were developed through:
(i) in-house discussion of measures that would best assess the progress of the MCS in reaching regional targets; and
(ii) consideration of milestones for evaluating performance of the MCS implementation.

4. forces shaping the region

Forces shaping the catchment over the next 20 years provide a context for setting Goals, Priorities and developing Actions to address regional targets. NRM is wider than simply managing impacts on the environment, the MCS will take societal changes into account by remaining flexible enough to re-focus the community's NRM efforts as required.

4.1 history and people

Long before Canberra became the National Capital, the land was home to the Aboriginal people. The Aboriginal people lived in the Molonglo catchment for thousands of years, moving across the plains and into the mountain valleys in small groups to hunt and camp. They lived on kangaroos and small marsupials, caught fish, yabbies and water birds, ate tubers of the yam daisy and other plants and travelled in summer to the mountains west of the Murrumbidgee River to feast on the Bogong Moth. In winter, they wore cloaks made from possum skins for warmth and sought shelter in warm and sunny places along the banks of rivers and among rock formations (Furar, 1995).

There are hundreds of stone tool scatters along the banks of the Murrumbidgee and Molonglo Rivers and their tributaries, the remains of Aboriginal sites from time immemorial. Yet within 80 years of European settlement, the Aborigines had been dispersed; killed by exotic diseases to which they had no immunity and the despoliation of their ancient hunting grounds by the arrival of the settlers' sheep and cattle.

At the time of white settlement in the 1820's there appears to have been two major tribes of Aboriginal people in the Queanbeyan area, the Ngunnawal and the Ngarruga (or Ngarigo). It is estimated that there were 400 to 500 Aboriginal people in the district in 1850 and relations between settlers and Indigenous communities were generally peaceful. By 1872 the Aboriginal groups had become dispersed and it was believed only a small number remained in the district. Nelly Hamilton, known as 'Queen Nelly' was a well-known Aboriginal living in and around Queanbeyan until her death in 1897 (QCC, 2003).

The first Europeans to visit the area arrived in 1820. They came in search of the Murrumbidgee River which they failed to find but several returned in autumn of 1820 with an Aboriginal guide who led them to the river near Pine Island at Tuggeranong. The news was well received in Sydney where Governor Lachlan Macquarie was anxious to extend the limits of European settlement, provided permanent water could be found to sustain the settlers. Two further expeditions traversed the area and were quickly followed by overseers and assigned convicts who came south with sheep and cattle to establish stock stations on the newly discovered Limestone Plains. Joshua Moore's servants arrived in late 1824 from Baw Baw north of Goulburn, walking via the Yass Plains across Gungahlin and following Sullivan's Creek to its junction with the Molonglo River below Black Mountain. There, on high ground, they cleared a site for the first Europeans habitation in the district (Furar, 1995).

In 1825, James Ainslie became their neighbour after he arrived with 700 sheep from Bathurst to establish Duntroon station for the Sydney merchant, Robert Campbell. Others followed: George Thomas Palmer had 14 men at Ginninderra in 1826 and at Yarralumla, James Taylor was pasturing sheep without authority. The census of 1828 reveals that there were 60 men employed on the Canberry, Duntroon, Ginninderra, Jerrabomberra, Tuggeranong and Queanbeyan stock stations. Most were assigned convicts (Furar, 1995).

During the 1840s small villages were also beginning to form in the district. Starr (1999) notes that by 1862, when the Crown Lands Occupation Act came into operation, the vast majority of the best land was held as freehold. This Act allowed free selection of vacant or leased Crown Land.

Between 1840 and 1870 a sequence of low stock prices and drought led to overstocking, while floods in 1850 and 1870 probably changed the landscape forever (Starr, 1999). Many waterways, which had once been chains of ponds, became deeply incised channels with sand and gravel beds. By 1880 all available land on the Limestone Plains had been selected. Many of the early selectors sold their holdings to their neighbours or the adjoining station owner. Those selectors who remained accumulated blocks and built up sizeable estates.

The turn of the century saw the beginning of a break up of many of the large properties, due largely to the death of their owners and financial burden imposed by death duties (Starr, 1999).

At the same time, Federation had prompted a search for a site for a Federal Capital. In 1908 the Yass/Canberra district was selected. For the Federal Capital Territory, an area of about 900 square miles was confirmed by the Seat of Government Acceptance Act in 1909. This area had been determined to be sufficient to supply water for the expected population. In 1911, there were 1 714 people living on farms, 1 762 horses and 224 764 sheep grazing in the district. At that time, Queanbeyan had a population of 1 273 people; as a long-established town, Queanbeyan played an important role in the growth of the new capital (Starr, 1999).

NSW Government Surveyor, Charles Scrivener, selected the Canberra site and wrote: “The Capital would properly lie in an amphitheatre of hills with an outlook towards the north and north-east, well sheltered from both southerly and westerly winds”. He also indicated that the flood plain of the Molonglo River could form an ornamental lake in the centre of the city site. After an international design competition, Finally, in 1913 the Government appointed Walter Burley Griffin as Federal Capital Director of Design and Construction to implement his winning design. (NCA, 2003)

The First World War interrupted the growth of the capital, but Parliament opened there in 1927, signalling the real beginning of Canberra’s growth. The city grew slowly through the Depression, the Second World War and post-war shortages. The decision to move the central offices of all departments to the capital in 1954 saw the setting up of the National Capital Development Commission to oversee the planning, development and construction of Canberra. The population then was about 30 000.

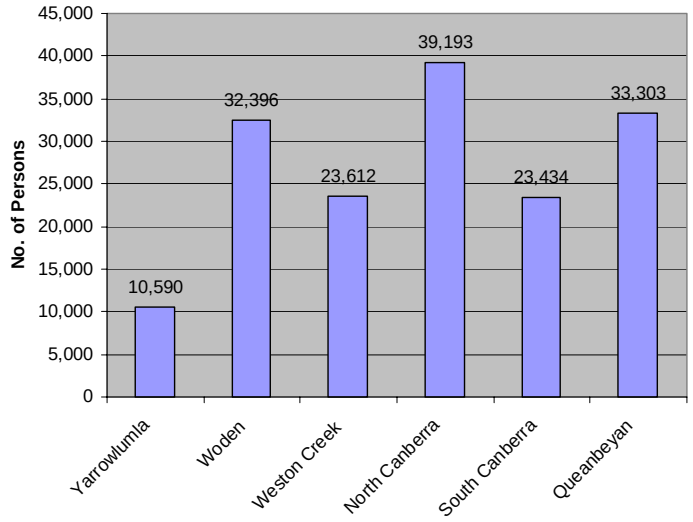
The growth became rapid, with new town centres being developed in Canberra. From the 1960s, a proportion of the mainly affluent population of Canberra sought an alternative lifestyle in villages and rural lands that surround the National Capital. Rural residential development has resulted in a dispersal of population in all directions from Canberra (Starr, 1999). Queanbeyan had grown to 25 000 people in 1991; at the same time, Canberra’s population had risen to over 290 000 and Yarrowlumla Shire’s was 8 000. Queanbeyan’s growth has been centred at Jerrabomberra development to the south west. Yarrowlumla Shire’s growth was located not only in rural residential areas to the north, east and south of Queanbeyan, but also in Bungendore village. Since the 1980s Canberra’s population has continued to grow, with even greater relative growth in Queanbeyan and the surrounding area.

In January 2003, ferocious fires inflicted serious damage and loss of life personal hardship and community cost on the rural areas of the ACT as well on urban Canberra. Following the fires, the ACT Government released a document, *Shaping our Territory*, addressing the recovery and rebuilding processes in terms of the "bush capital", considering recreational opportunities and aesthetics, and the need to more effectively manage bushfire risk. This discussion paper led to a firmer direction for future urban expansion, which is now planned to occur within the Lower Molonglo Valley, west of Canberra City.

4.2 population

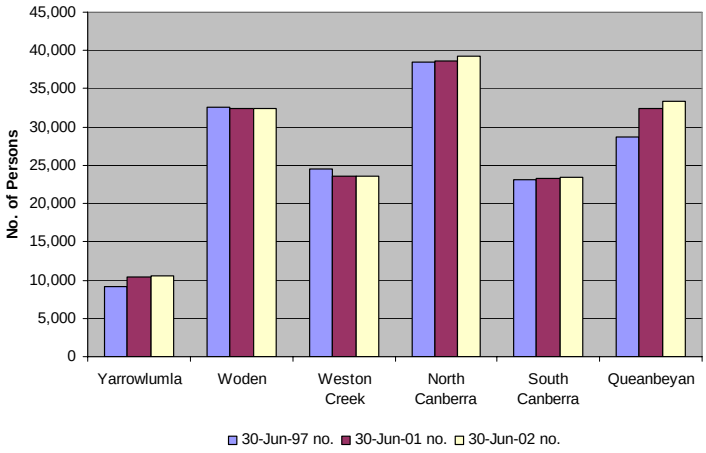
The population of the catchment was approximately 130,000 in 2002. As is shown in Figure 2, there has been no significant population change in any of the statistical subdivisions in the period from 1997 - 2002. However the Yarrowlumla subdivision does show a marginal increase in population over the five-year period as, too, does the city of Queanbeyan (most likely due to an increase in the popularity of the rural residential lifestyle and the larger lifestyle house blocks in the Jerrabomberra area).

Figure 1: Population by Statistical Subdivision, 30 June 2002.



Queanbeyan City had one of the fastest growing populations in New South Wales in the five-year period between 1996 and 2001, growing 3.0% per annum compared to the average annual growth rate of 1.3% in New South Wales (Source: ABS, Estimated Residential Population Local Government Areas – NSW 1991 – 2001, ref 3218.0). Further, Queanbeyan had the 7th highest annual growth rate in the whole of the State (GQCC, 2003).

Figure 2: Population Trend by Statistical Subdivision, 1997 - 2002



More recent projections, suggest that while there may be a slowing of population growth (DIPNR, 2004a), the number of households may continue to increase, with a significant change in demographics to smaller average household size (ABS, 2004).

There were 800 people of indigenous origin living in the catchment in 2002. Indigenous communities within Queanbeyan comprise largely of the Ngunnawal tribal people. Anecdotal evidence suggests that much of the local Aboriginal population is transitory, coming from and moving between various regional geographic areas. Indigenous people comprise 2.6% of the Queanbeyan population which is slightly higher than the NSW average of 1.7% and the surrounding Southern Highlands Area of 1.8% (QCC, 2003).

4.3 economy

employment

The economy of the catchment is diverse and relatively prosperous. Figure 3 presents employment data for the catchment in 2001 and is dominated by the Government, Administration and Defence sector, which is a reflection of the urban centres, Canberra and Queanbeyan. The Property and Business Services sector is also a very large employer reflecting perhaps the changing face of the region as it attracts more home buyers and rural residential lifestylers. Conversely, the traditional sectors, agriculture and forestry, employed only 1 % of the catchment's workforce in 2001 with only 857 jobs being directly associated with primary production in the catchment.

agriculture

Agriculture or land for farming represents approximately 35% of the catchment's land use pattern. Traditional industry including sheep and cattle grazing are the predominant enterprises in agricultural areas. All have experienced extremely harsh climatic extremes in the past decade and enterprises are also facing serious challenges relating to uneconomic farm size and an ageing farm population.

Land values are high in the catchment, being influenced by the proximity to urban centres. In the rapidly growing Palerang Council shire, median prices in excess of $14,000/acre south west of Queanbeyan are often achieved for rural residential blocks. The additional value attached by the market to land located close to major population centres impacts on the ability of farming businesses to expand through land purchase, and may tend to intensify any agricultural expansion towards the south east of the catchment and beyond.

In a complementary reaction to the increasing land values and tendency to smaller property sizes, agricultural viability becomes increasingly dependent on high value, often more intensive, enterprises such as vineyards (e.g. Pialligo, Mount Majura), olives, alpacas, even truffles, appear and disappear. Many of the activities are "trendy" and when the value of the produce declines, as it has done in the case of angora goats and deer, the enterprise may change focus to the newest trend.

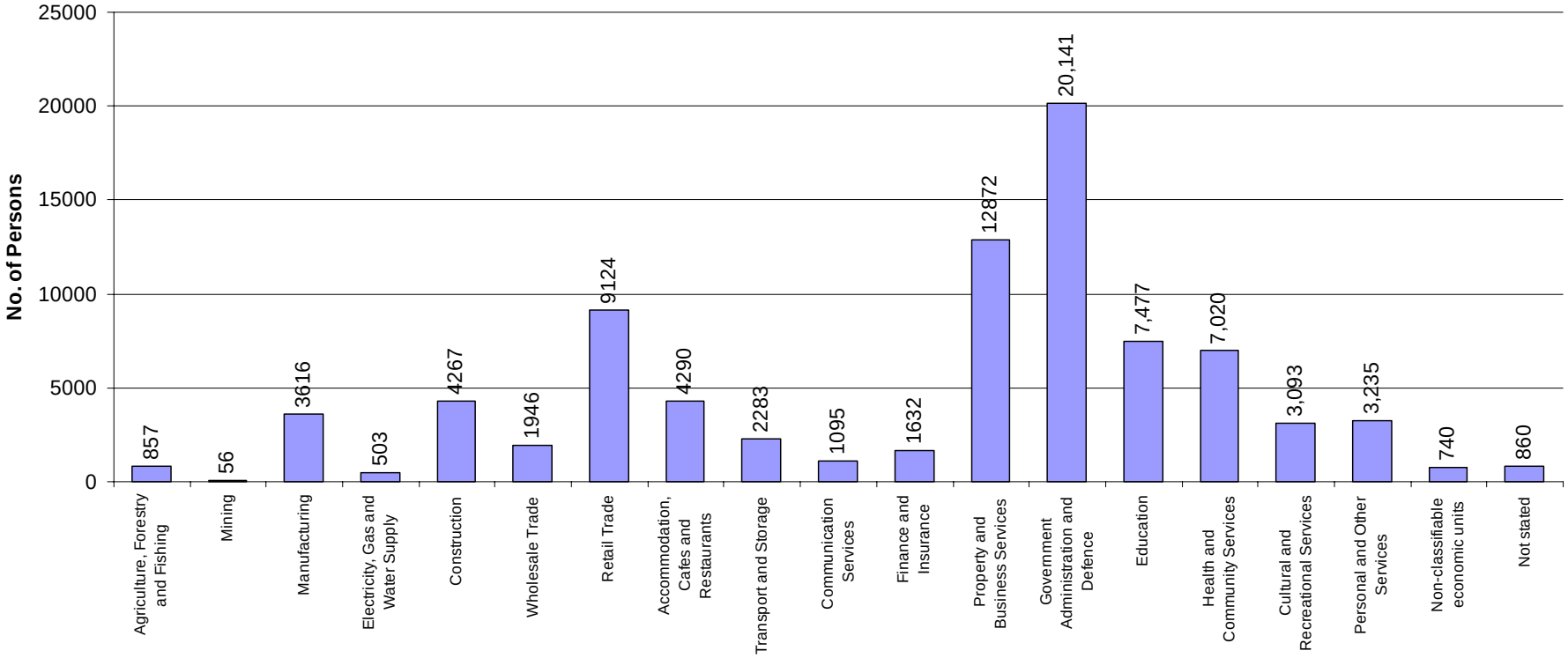
forestry

ACT Forests, a Branch of the Department of Urban Services, is responsible for the management of about 26,000 ha of pine and native forest on public land in the ACT. Extensive areas of pine plantation west of Canberra including those in the lower Molonglo catchment were destroyed by the fires of January 2003. Most of these areas, which are outside of the Molonglo catchment, will be replanted to Pine with some steep and riparian areas identified for replanting to native species. The final area of pine plantation is expected to be about 11,000 ha. Parts of the former Stromlo forest in the lower Molonglo catchment will be converted to urban development while areas around Mt Stromlo will be reforested with native and exotic species for use as a recreational forest.

The forests to the east of Canberra and lying within the Molonglo catchment (approx 5,500ha) were unburned and the pine plantation continues to be managed for timber production. ACT Forests has, however, adopted a revised corporate mission placing more emphasis on reforestation, protection of water quality, fire management, recreation and maintenance of the forest estate.

State Forests is a New South Wales Government Trading Enterprise responsible for sustainable management of more than 2 million hectares of public native forests and an expanding estate of hardwood and softwood planted forests (NSW Department of Primary Industries, 2004). In 2004 there was approximately 2,344 ha of forest managed for general timber production and a further 2,200 ha managed as informal reserves.

Figure 3: Employment by Industry, Census 2001

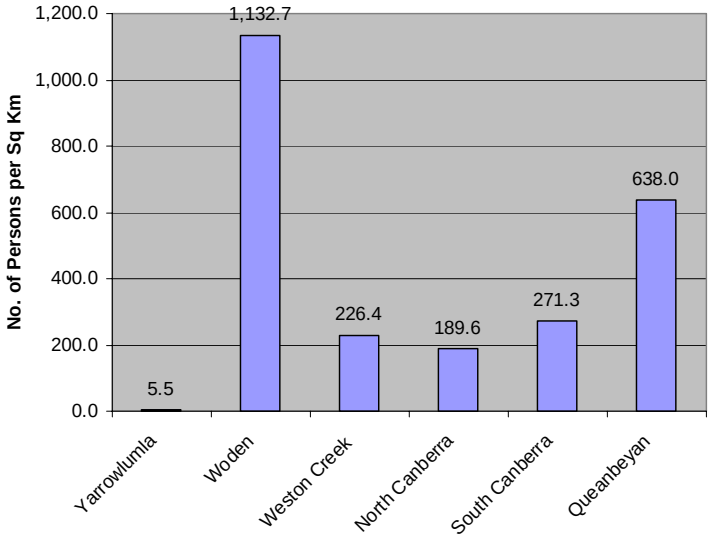


4.4 urban migration

People from the city are moving to rural sub-catchments for permanent 'lifestylers', weekenders and retirement. The attraction of the catchment will rise as Canberra and Queanbeyan land values increase and as services improve. At the growth rates experienced between 1997 and 2002 the population could increase by over 25,000 people in the next 20 years significantly changing current population densities in the catchment.

In addition, based on trends from the Australian Bureau of Statistics, there is an expectation that the population of the NSW portion of the Sydney to Canberra Corridor (see 2.2) will increase by 45,000 to 2016, and 66,000 to 2026 (currently approximately 177,000) which will have a significant effect on the availability of land for agriculture and other issues such as water security and availability in the Canberra region.

Figure 4: Population Density by Statistical Division, 30 June 2002.



Migration to current rural areas will change the character of communities, bringing in people with little experience of managing rural land, but with high expectations of their rural lifestyle. Growth of smaller lots will make biodiversity and waterway protection more complex and present a new challenge to Landcare and other local environmental groups. Land use planning decisions by local government may pose significant challenges for catchment health. Increased residential and visitor populations in the catchment has the potential to increase the rate of environmental damage. One observation from Palerang Council is that there is a relatively high turnover rate of properties, with landholders remaining in the shire for an average of around seven years. This presents challenges in maintaining a satisfactory awareness of environmental issues.

There is uncertainty about whether the trend of urban migration will continue in the light of predictions of an aging population and increasing oil prices. Even if the trend continues, the emphasis may shift from rural residential developments to rural village developments.

competition for water

Demands for water supply for Canberra and Queanbeyan will continue to grow, as will the needs of agriculture. The need for environmental flows will set an upper limit on extraction for economic uses, and reduced summer flows will increase pressure on winter use of flows. The gap between demand and supply will have to be met by reducing urban demand, reusing water, reducing loss in the handling of water or by tapping new sources of supply (Environment ACT, 2004).

There will be increased debate within the region as a whole, between different agricultural users, between rural users, and flows needed for the environment, recreation and public water supply. Groundwater flows will receive more attention, particularly the impact of extraction for stock and domestic supply.

greater complexity for communities

The complexity of natural resource management, of running a business, of governance and of being a citizen are all increasing. As policies and regulation increase, it is harder for the community and government agencies to know what is required of them and who is responsible for what, within and between each level of government. There is more consultation, more papers to be read, more choices. This places great demands on volunteer-based community groups who want to contribute to planning decisions, and also take on-ground action (CCMA, 2004).

5. the region's natural assets

5.1 geology

Much of the ACT is underlain by rocks formed from sediments deposited some 460 million years ago, when the region was under the sea. These sediments have become sandstone, limestone, siltstone and shales —rocks that are part of the Palaeozoic Lachlan Fold Belt that stretches from central NSW to Victoria.

Silurian rocks are well represented in the catchment, with many of the major peaks including Mt Majura, Red Hill and Mt Ainslie showing Silurian volcanism towards the top of the formation. Granitic intrusions are also well represented in the upper reaches of the catchment as too are deep alluvial deposits found on the Carwoola Flats, Dairy Flats and much of the Bungendore Plain. Many smaller alluvial deposits occur in minor drainage lines and on lower hill slopes and there are some accumulations of aeolian sands on Dairy Flat to the east of Lake Burley Griffin (Jenkins, 2000).

There are no mineral-bearing rocks of economic significance in the ACT half of the catchment, however deposits of gold and base metals have been mined extensively over the border along the Molonglo River. Gold was found at Foxlow station in the 1870s, but it was not until 1882 that serious mining activity commenced at Captains Flat. The gold was heavily associated with silver and lead, and in 1885 silver smelting facilities were erected. By 1893, the main mineral extracted was copper and at this time Captains Flat was booming and there were as many as 2,000 on the field. There were a number of attempts to recommence mining, but little happened until the 1930s, when Captains Flat developed into a silver, lead and zinc mining centre of national importance. Mining ceased in Captains Flat in 1963.

A number of quarries in the catchment provide materials such as crushed granite, gravel and sand for building in the ACT and NSW.

5.2 climate

The region experiences hot summers with maximum daily temperatures ranging from 36 to 38°C, and very cold winters with daily minimum temperatures below freezing. Long term records indicate evenly distributed rainfall throughout the year, however the past decade has experienced some extremely dry conditions, well below the 600mm average annual rainfall. The Bureau of Meteorology has recorded that in the 36 months from 31st October 2001 to 30th September 2004 the region has experienced the lowest rainfall figures on record.

5.3 landscapes

The landscapes of the catchment reflect geological events, the long-term effects of weather and climate, and the influences of human settlement. The three broad landscape types are:

1) Uplands (areas at altitudes above 800 metres): The uplands lie mainly on erosion-resistant, ancient, sedimentary rocks and granites. Most of the south western corner of the catchment is in this category.
2) Rolling or undulating country (usually 600–900 metres): These areas are formed across moderately weathered rocks, and account for most of the eastern half of the catchment. The country is crossed by minor streams such as Woolshed, Guises and Jerrabomberra Creeks.
3) Plains (550-650 metres): These areas occur along many of the streams in the Upper Molonglo Sub-catchment, the lower Molonglo at its junction with the Murrumbidgee River and surrounding the upper reaches of Jerrabomberra Creek. They surround isolated hills and ridges of erosion-resistant rock, such as Black Mountain and Mount Ainslie, which are evidence of greater elevations and a more-pronounced topography in times past.

5.4 waterways

The catchment lies within the upper Murrumbidgee River catchment, in the Murray-Darling Basin. The Molonglo River flows through the catchment from the south east, and its tributary, the Queanbeyan River, from the south west. Other tributaries which are important watercourses are Jerrabomberra, Reedy, Woolshed, Ballinafad, Sherlock, Tinderry, Primrose Valley, Chimney, Urilla and Burra creeks. Urban creeks including Yarralumla Creek and Sullivans Creek discharge to the Molonglo below Scrivener Dam and Lake Burley Griffin respectively.

When the ACT was gazetted, the borders were planned so that the Territory would incorporate sufficient area for an adequate water catchment for the new city that was to arise on the plains. The new Territory was granted rights to the NSW catchment of the Queanbeyan and Molonglo Rivers for the purposes of water supply. These rights have been exercised by the construction of Googong Dam (Environment Commissioner, 2000).

5.5 hydrogeology

Review of various information sources indicates that there is insufficient data on groundwater quantity within the ACT region to accurately assess changes to groundwater levels and water levels within regional aquifers.

The lack of comprehensive groundwater data is problematic. Risk of overuse of water resources is possible due to an incomplete understanding of the dynamics of the total water resource in the catchment. This would have implications for the availability of groundwater for future use. A better understanding of this resource is essential in monitoring and assessing groundwater in the entire catchment. Data are required on the groundwater resource in relation to the number of bores in use (both licensed and unlicensed), extraction rates, and trends in watertable levels. Ongoing monitoring of bore data is required to establish trends and responses to landuse and surface water use practices, and extractions (Environment Commissioner, 2000).

Changes to groundwater levels the catchment not only have the potential to impact upon landuse, but they can also reflect changes in landuse, such as conversion of forest to agriculture, changing the proportion of perennial vegetation in a groundwater catchment or changing the amount of water used for irrigation or urban/peri urban consumption.

5.6 lakes and wetlands

Lake Burley Griffin

Lake Burley Griffin is an integral part of Canberra's design and is a vital element in the plan for the nation's capital. The lake consists of the waters of the Molonglo River between Scrivener Dam and the Dairy Road Bridge.

Named after Walter Burley Griffin, winner of the design competition for the National Capital in 1912, the lake is a key element in Griffin's Plan for the city. The heart of Griffin's plan was a central artificial lake and a 'Parliamentary Triangle', in which the most important national buildings were to be placed. Griffin's original plan was modified to become a lake controlled by Scrivener Dam. The dam is an important flood control structure in the upper catchment of the Murrumbidgee River, and the scheme has created valuable wetland habitats upstream of the lake.

Different sections of Lake Burley Griffin have different uses appropriate to their special physical characteristics, their foreshores and their water quality. As an important freshwater ecosystem, the lake and its margins are a significant wildlife refuge and bird habitat. The Jerrabomberra Wetlands, at the eastern end of Lake Burley Griffin, provide a valuable habitat for many species of waterbirds. Westlake and West Basin are the main areas for sailing, sailboarding and swimming. There are many areas around the lake where public recreation has priority, such as Commonwealth, Kings and Grevillea Parks, Lennox Gardens and Commonwealth Place to name a few. The water area covers 664 hectares and the distance around the shoreline is 40.5 kilometres and is managed and maintained by the National Capital Authority on behalf of the Commonwealth of Australia.

Jerrabomberra Wetlands

The Jerrabomberra Wetlands are an artificially formed area of wetlands at the head of Lake Burley Griffin. The wetlands are one of the most valuable wetland habitats in the ACT, increasing the biological diversity of Lake Burley Griffin and Canberra City. It provides a series of wetland habitats which support a rich and diverse bird fauna, including most of the wetland species occurring in southern Australia. Many terrestrial birds occur there as well as a number of platypus and water rats and other wildlife including invertebrates, amphibians, reptiles and fish.

Sections of the wetlands are used as a stopover for migratory waders, including Latham's Snipe which is the subject of protection agreements between Australia, Japan and China. The agreements encourage the signatory nations to protect the habitats of species listed as well as to conserve the bird species themselves. The wetlands provide the only extensive area of riverine flood plains with existing palaeochannels in the ACT.

Googong Dam

The Googong Dam was constructed in the late 1970s for the Queanbeyan and Canberra water supply. It is located five kilometres upstream of Queanbeyan City and holds approximately 125 GL of water. The Commonwealth Government owns the dam, it is operated and managed by ACTEW and the ACT Government manages the dam foreshores.

Flow diversions caused by Googong Dam have significantly altered the river corridor. Consequently management of the Queanbeyan River must take account of the effect of flows released from Googong Dam, which include: year-round regularity of flows; differences in water temperatures; willow invasions in areas near the Dam wall and loss of upstream spawning grounds.

Catchment management in the Queanbeyan River catchment in NSW, apart from the Googong Dam foreshores, is the responsibility of relevant NSW Government agencies. Through the activities of these agencies and the laws under which they operate, NSW has mechanisms in place which can be used to meet its obligation under the Seat of Government Acceptance Act 1909 to prevent the pollution of the Queanbeyan and Molonglo rivers throughout their whole course above the ACT (Environment ACT, 2000).

5.7 terrestrial resources

land use

The catchment has been cleared for pasture, agriculture and urban development. Sheep and beef cattle grazing dominate the remaining large pastoral areas of the Upper Molonglo sub-catchment and the rural areas of the lower Molonglo in the ACT. The fertile alluvium on the river flats south of Lake Burley Griffin supports an established turf farm and some dairy (until recently). Areas of remnant grasslands and woodlands exist in most sub-catchments and there are good in-stream habitat values in the upper reaches of the Molonglo and Queanbeyan rivers.

Some of the creeks in the Kowen, Jerrabomberra, Lower Queanbeyan and Woolshed sub-catchments maintain some of the 'chain of ponds' characteristics, while the Jerrabomberra Wetlands are listed as important JAMBA and CAMBA sites. Many of the associated wetlands contain rare vegetation communities and both major lakes are used for recreational pursuits, including fishing, yachting and rowing.

There is approximately 3,000 Ha of land in nature reserves (the majority of which occurs in the Canberra Nature Park system managed by Environment ACT), 30,355 Ha of National Parks and 14 100 Ha of land under Forestry (9 600 Ha in ACT and 4,500 Ha in NSW).

The Lower Queanbeyan, Fyshwick, Weston, Woden, Lake Burley Griffin and Sullivans Creek sub-catchments are heavily urbanised with almost an 80-85% built environment.

indigenous cultural heritage values

The Molonglo catchment is part of the traditional lands of the Ngunnawal people. Today, descendants of the Ngunnawal are active in their efforts to maintain their culture and history with three Aboriginal organisations representing the various interests of the Ngunnawal community. They are the Buru Ngunawal Aboriginal Corporation, the Ngunnawal Aboriginal Corporation and the United Ngunnawal Elders Council.

Whilst a significant amount of information is available from historical sources on the broad pattern of Aboriginal land use in the catchment—few direct references exist in relation to particular sites throughout the catchment. McQuilton (in Walker, 1988) cited by Grinbergs (2003) suggests that Aboriginal people from the Queanbeyan area and surrounding districts would gather on the banks of the Queanbeyan river opposite the Oaks and that "Jerrabomberra" was of spiritual significance to the Ngunnawal people. However, no detail is provided on the source of that information or on the nature of the significance.

For the most part, Indigenous cultural heritage sites are associated with many of the lake and river foreshores throughout the catchment however many other forested areas also contain important sites.

The ACT Heritage Register is maintained by the ACT Heritage Council and lists aboriginal sites in the Hume, Symonston Jerrambombera (Jerrabomberra Creek), Fyshwick, and Kowen (Dairy Station Creek) areas.

The NSW National Parks & Wildlife Service (NPWS) maintains a database of recorded Aboriginal places in NSW. A search of this database reveals that to date 307 Aboriginal places have been recorded within the boundaries of the Ngunnawal Local Aboriginal Land Council (Grinbergs, 2003).

The sites in the ACT and NSW include:
- art sites;
- sites where flaked stone tools were made;
- burials;
- ceremonial sites;
- stone arrangements; and
- scarred or carved trees.

soil

The catchment falls within the area covered by the Canberra 1:100,000 soil landscape survey. Generally speaking, the dominant soil materials on crests and gentle hill slopes in the catchment are lithosols and shallow red podzolics, with bleached sodic yellow podzolics in lower lying areas (Jenkins, 2000).

Steeper slopes are also largely lithosols soils with rocky outcrops and extensive surface stone. Broad crests and gentle side slopes, such as those in much of the mixed grazing areas of the catchment carry a mix of lithosol and red podzolic soils which display fine sandy loam topsoils to a depth of around 5 to 10cm, grading to a clay loam to light clay subsoil (Jenkins, 2000).

Soil depth is commonly in the range of 40 to 60cm before grading to weathered shale bedrock with the exception of terrace and alluvial flats which display light grey coloured silty loam topsoil to a depth of 30 to 50cm sharply overlying a yellowish coloured clay loam to light clay subsoil. Discontinuous layers of gravel are also a feature of these soils, reflecting their formation in a depositional environment. Total soil depth of the yellow podzolics is variable, but generally doesn't exceed 1 to 1.5m (Jenkins, 2000).

Most soils in the catchment are very low in the nutrient elements phosphorous and nitrogen and also vary in pH and salt levels. Many subsoils are relatively sodic and display a relatively high content of magnesium relative to calcium. This can create problems in the effective functioning of septic systems / adsorption trenches in some areas.

5.8 biodiversity

native vegetation

'*The Planning Framework for Natural Ecosystems' presents regional-scale information on natural ecosystems and biodiversity. It identifies important species and ecological communities at the regional scale and accesses databases which cross jurisdictional boundaries. Important regional issues for the conservation of natural ecosystems are also identified*' (Fallding, 2002). The planning framework provides an excellent record of important species and threatened species information for each of the Landscape units that cover the Molonglo Catchment (Appendix 1).

In addition to these vegetation communities, natural temperate grasslands in the catchment are of particular importance. The Southern Tablelands is recognised as an ecological community that is distinguishable from natural temperate grassland elsewhere in south-eastern Australia and is listed in the ACT as an endangered ecological community (ACT Government 1997a). It is estimated that 20,000 ha of natural temperate grassland occurred in the ACT prior to European settlement.

Remaining grassland areas in the catchment occur in moderate to good condition and a further 500 ha of low botanical significance is also found, providing buffers or protecting grassland habitat for threatened species. Most of the sites occur as small urban remnants and roadsides, but several large (over 100 ha) sites still remain, of which the majority is Commonwealth land within the ACT, mainly managed by Department of Defence (Department of Environment and Heritage, 2000).

native fauna

The Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) online database search tool helps to determine whether matters of national environmental significance or other matters protected by the EPBC are likely to occur in an area. A search of the database revealed a total of 3 Threatened ecological communities, 26 Threatened species, 8 terrestrial and wetland species covered by EPBC migratory provisions and 12 species covered by EPBC marine provisions.

The Threatened Species Conservation Act 1995 (NSW) (TSC Act), the Fisheries Management Act 1994 (NSW) and the Nature Conservation Act 1980 (ACT) also specify ecological communities and species of environmental significance within NSW and the ACT and which may not have the same status nationally.

The *Planning Framework for Natural Ecosystems of the ACT and NSW Southern Tablelands.* (Fallding, 2002) consolidates information on threatened ecological communities and species (with the exception of freshwater aquatic species – fish and crustacea) for each of the landscape units the framework recognises. Appendix 1 presents the information for those landscape units in the Molonglo Catchment.

natural habitats and ecological processes

Birds

The majority of native birds in the catchment are insectivorous or nectarivorous, typically occurring in woodlands with an intact grassy understorey. Pasture habitat with scattered remnant trees provide a limited foraging and breeding resource for woodland birds on an occasional or transitory basis from their core habitat areas (larger woodland remnants in the catchment). Of particular note are the endangered and vulnerable species listed under the EPBC Act and the TSC Act. Grassy woodland birds forage on occasion into open pasture areas or open woodlands but are not wholly reliant on these habitats for their life cycle requirements.

Mammals

The native mammals in the catchment similarly occur in grassy woodlands with an intact grassy understorey for shelter. The pasture habitat in the catchment in which there are areas with few scattered remnant trees, would also be expected to represent a limited foraging and breeding resource for mammals. As with native birds, mammals may forage on occasion into open pasture areas or open woodlands but would not be exclusively reliant on these habitats for their life cycle requirements. Species including the Eastern Grey Kangaroo, Swamp Wallaby, Brush tailed Possum, the Echidna and Common Wombat are perhaps more resilient and do occur in most areas of the catchment. Insectivorous bats may forage throughout the catchment on an occasional or transitory basis, with a number of roosts expected to occur in heavily wooded areas (Fallding, 2002).

Amphibians

Most frogs in rural areas of the catchment typically occur in woodlands or open woodlands with adequate groundcover for shelter (rocks, logs, dense grass) in the vicinity of watercourses or ponds for breeding. Urban areas surrounding stormwater drains and subsidiary watercourses are also important habitats for frogs. Ephemeral creek lines which represent the upper most watershed of the catchment as well as large dams and lakes in the catchment would be expected to provide a seasonal breeding resource for native frogs.

Reptiles

Snake and lizard species listed as vulnerable and threatened under the EPBC Act and TSC Act have been previously recorded in the catchment in eucalypt woodlands, native grasslands and typically on stony hills where there is adequate shelter.

6. threats to the catchment's natural assets

6.1 waterways

threats to the rivers, streams, lakes and wetlands

A biological assessment of river health in the Upper Murrumbidgee catchment has been undertaken since 1997 using the Australian River Assessment System (AUSRIVAS) method. Results show that stream ecology varies in different parts of the catchment, but many streams are degraded in terms of the AUSRIVAS criteria.

At Molonglo River at Dairy Flat Road (WQ Site 601, AUSRIVAS Site 284), for example, AUSRIVAS results indicate that this site is impoverished with more than 80% of expected aquatic species missing, which may be due to the fact that this site is actually the backed-up water of Lake Burley Griffin and does not provide a good habitat for AUSRIVAS monitoring. Notably, despite water quality standards being satisfied at the site, there was an increase in total oxidised nitrogen and blue green algal concentrations since the previous recording period at this site, suggesting that nutrient delivery has occurred (Environment Commissioner, 2000).

In addition, at the Molonglo River downstream of the Sewage Treatment Plant (WQ Site 401, AUSRIVAS Site 191), where 50-80% of expected aquatic animals are missing, aquatic ecosystems values for surface water quality have been met, despite the highest concentrations of nitrogen in the ACT being recorded here. This shows the impact of the Sewage Treatment Plant on macro-invertebrate assemblages (Environment Commissioner, 2000).

Activities including removal of streamside vegetation, un-restricted stock access to rivers, bed and bank erosion, obstruction to fish passage and woody weed invasion (particularly willows and blackberry) has seen degradation of stream condition becoming relatively widespread throughout the catchment. Bed and bank erosion affect an estimated 166 km of river reaches with severe ecological impacts on downstream wetlands due to siltation.

Approximately 35 km of stream reaches are in danger from nuisance plants. The cost to return all reaches to good condition and to prevent further deterioration is dependant upon a range of factors and is yet to be determined.

threats to surface water flows

Reduced surface water flow is a priority of the catchment community for a number of reasons, particularly their concerns about future water availability for urban or peri-urban use. Foremost in peoples' minds is the impact of further growth in diversions that may push the system closer to its environmental limits. Rural subdivision and the expansion of the lifestyle block complete with a 1 megalitre storage dam are issues of particular in relation to their impact on overland flows.

Licenses for diversion from the major rivers are few, however some large licenses do exist in the Molonglo river system. The NSW Department of Infrastructure Planning and Natural Resources (DIPNR) is the licensing authority for water licenses, groundwater use and water storages in the NSW part of the catchment. The community is of the opinion that tighter controls are required to be applied in relation to the size, siting and design of private dams for domestic use.

Both the Molonglo and Queanbeyan rivers are 'flow stressed' river systems. There is significant demand for water resources to supply Canberra and Queanbeyan. Councils and water authorities are key components in ensuring environmental flow regimes are maintained. Climate change is also a concern. Projections for precipitation trends in the region are still uncertain, but global warming is now undisputed, and this aspect of climate change will increase evaporation and transpiration, and tend to reduce runoff.

threats to surface water quality

The Molonglo River is sampled by the ACT Government at two sites above Lake Burley Griffin, (Dairy Flat and Yass Road) and two sites below the Lake (Coppins Crossing and Sturt Island) before it enters the Murrumbidgee River. The biological condition for 2002/2003 reporting period was 'extremely impaired' rating. The poor result which improved marginally in spring, can be attributed to the concentration of pollutants and deterioration of conditions caused by very low flow conditions. In the majority of cases dissolved oxygen readings were very low, there was an increasing Chlorophyll 'A' trend and a number of Phosphorus exceedences recorded (Environment ACT, 2002).

Surface water resources are stressed throughout the catchment, with elevated levels of phosphorous and nitrogen in most streams. Extensive clearing of native riparian vegetation has resulted in streambank erosion and sedimentation problems in waterways producing siltation and nutrient enrichment. Blue-green algal blooms are increasing in frequency in the catchment and in the region as a whole. These are attributed to several factors, including agricultural and urban runoff, sewage discharges and some forest operations (Starr, 1999). Unrestricted stock access to watercourses is also of concern in some parts of the catchment.

Densely urbanised sub-catchments generate high levels of nutrients and toxins from stormwater systems. Studies within the ACT have indicated that sources of nutrients include disturbed soils in areas undergoing urban development, and organic material derived from established urban areas (Middelmann, 1998). In addition, there has been increasing attention to the salt load of wastewater discharges from the Lower Molonglo Water Quality Control Centre (LMWQCC). Treated effluent from the LMWQCC is discharged to the Molonglo River just above its confluence with the Murrumbidgee River. There are few small sewerage treatment plants outside metropolitan Canberra and as a result, the LMWQCC treats nearly 100% of Canberra's sewage.

Queanbeyan City Council Sewerage Scheme serves all the developed areas of the city area and consists of a gravity reticulation system and the sewage treatment plant at Oaks Estate (in the ACT). The treatment plant has been progressively upgraded since the 1930s to maintain a satisfactory level of service for the future population an upgrade is needed. Sewerage treatment is undertaken at the sewerage treatment plant (STP) operating under a licence issued by the ACT Pollution Control Authority (which became the ACT Environment Protection Agency in 1997). The effluent is discharged to the maturation ponds before release to the Molonglo River under Environment ACT licence conditions (GQCC, 2003). The current capacity of the STP is 34 500 people and is being increased as the city continues to grow.

Water quality in the Molonglo River is also partly degraded by leachate discharging from the disused Captain's Flat mine site as a result of the collapse of waste dumps. On-going rehabilitation work at the site is designed to control further leachate being discharged to the river.

6.2 terrestrial resources

impacts of human activities on the landscape

The Molonglo River catchment area has suffered extensive land degradation, initiated during the early periods of European settlement in the 1850's, with many of the degradation processes continuing to be active under the present regime of land use. Extensive clearing, heavy grazing, burning, droughts and rabbits all contributed to the creation of conditions which have led to extensive loss of soil from hill slopes and the development of gullies in drainage lines (Wasson et al, 1998).

The poor condition of the Molonglo catchment was a concern to planners in Canberra in the early 1960s, with the impending construction and filling of Lake Burley Griffin. Land degradation in the catchment was perceived as a significant threat to water quality and longevity of the storage (DLWC, 2000).

In order to remediate the active erosion occurring in the catchment of the new lake, the Lake Burley Griffin Catchment Protection Scheme was initiated. The Commonwealth provided significant annual funding and the NSW government provided planning and supervision of works, with landholders making in-kind contributions such as fencing, tree planting and pasture improvement (DLWC, 2000).

Contemporary erosion processes in the Molonglo catchment have been measured from accumulated farm dam sediments. The research showed that gully erosion is the dominant source of sediment being exported from small catchments to the Molonglo system, while well-grassed hill slopes were a relatively minor contributor of sediment. Gullied catchments were shown to yield 50 times the volume of sediment from catchments in a natural condition, the latter measured at 3t/km^2/yr (Wallbrink and Fogarty, 1998).

Pastured hill slopes yielded four times the natural rate and heavily grazed pasture yielded twenty times the natural rate. Dairy Station Creek, which drains to the Molonglo River, was one of the most degraded sub-catchments of the Molonglo River, with a ratio of gully length to catchment area of 16.9 m/ha. This is five times greater than other sub-catchments, with an estimated annual average sediment yield of 476 tonnes (Wallbrink and Fogarty, 1998).

Today, perhaps the single biggest threat to the landscape is the intensification of pressure through greater numbers and demand for a rural lifestyle adjacent to the major urban centres of Canberra and Queanbeyan. This issue is difficult to manage in some locations where demand is greatest, however it emphasis's the need for good planning. Increasing density following sub-division in traditional farming areas can also detract from landscape values and catchment health. Any further deterioration of the quality of rivers and streams adversely affects a range of water-based recreational activities.

salinity

Some saline scalding has also developed on foot slope areas in the catchment. The Dairy Station Creek catchment was targeted for extensive soil conservation works under the Lake Burley Griffin Catchment Protection Scheme mentioned previously. Works to combat the effects of salinity constructed during 1989 to 1990, included farm dams, diversion banks, gully filling, saline scald reclamation and revegetation by direct seeding. Landholders have also carried out extensive tree plantings, and fenced out areas of remnant woodland. Piezometers were installed on some salinised sites to monitor movements in the shallow groundwater system.

It is generally accepted that more information needs to be obtained to accurately assess the salinity status of many sub-catchments.

pest plants and animals

Pest plants have reduced agricultural land productivity in parts of the catchment and impacted upon biodiversity values. European settlement has introduced many pests, including weeds such as Serrated Tussock, Pattersons curse and St Johns Wort. Other weeds including Blackberry, Willows, African Lovegrass and Chilean Needlegrass are particularly widespread. Animal pests (especially foxes, wild dogs, pigs and feral cats) have thrived on both public and private land. Foxes (and some native fauna), that are predators of rabbits, lambs, calves and other small farm animals reach high densities in rural areas of the catchment. Carp, redfin and mosquito fish are widespread in many of the waterways in the catchment. Rural residential developments, with their ubiquitous farm dams and often aesthetically maintained lawns, paddocks and road verges encourage Eastern Grey Kangaroos to reach plague proportions.

threats to soil

Degradation at both the local and regional level is undermining the values of our soil asset. Soil degradation issues broadly include those affecting soil chemistry (soil chemical fertility), soil structure and soil loss. More specifically, the following key issues are considered to be a priority in the catchment:

- soil erosion by water;
- soil structure decline including soil sodicity and waterlogging;
- soil acidity; and
- soil fertility decline.

There is an increasing need for the catchment community to develop a clear understanding of the trends and threats associated with soil degradation and establish actions and targets as appropriate. Improved data is needed on the actual condition of soil and the regional significance of each degradation issue. Understanding the influences on good soil management and encouraging best management practices is required for the catchment, to be able to plan and invest in this area more strategically. It is estimated that there is 416 km of gully erosion in the catchment ranging from minor (<1.5m deep) to very severe (>6m deep).

6.3 biodiversity

threats to native vegetation

There are two major groups of threats to remnant vegetation in the catchment, those affecting the *extent* or quantity, and those that have an impact on *quality*. The greatest loss to the catchment's native vegetation is attributed to land clearing. Over half of the catchment has been cleared mostly as a result of human activity, including settlement, agriculture and forestry.

The removal of understorey and mid-storey species through feral animals, stock grazing, fire prevention practices, pesticide drift and draining of wetlands are common threatening process to native vegetation. These processes often lead to the decline of trees and taller shrubs due to the absence of regrowth, an increase in 'dieback', mistletoe and the absence of habitat for fauna species that prey on insects (which have a detrimental impact on the remaining vegetation). In some areas however, clearing has resulted in the regeneration of a monoculture understorey of *Kunzea* which does little for local biodiversity.

Inappropriate management can also lead to losses in the *extent* of native vegetation. In the rural areas of the catchment, much of the remnant vegetation has been confined to roadsides which are under pressure from upgrades to the road system as rural residential development increases (especially around the vicinity of the major urban centres of Canberra and Queanbeyan).

Loss and fragmentation of natural temperate grassland has been continuous from the time of earliest settlement of the region, and has increased in this century, particularly due to the establishment of the city of Canberra, and associated with the development of areas for domestic, civic and industrial use and for infrastructure such as roads, utilities, lakes and other recreation areas. The focus of much of this development has been in the valleys and low-lying areas where natural temperate grassland habitat occurred (Environment ACT, 2002). Urban development has been a major factor leading to an estimated 95% loss of natural temperate grassland in the ACT, and to severe fragmentation of the remaining 5% (Office of the Commissioner for the Environment 1995).

In 2004, the ACT Government released two Conservation Strategies, one for ACT Lowland Woodland and the other for ACT Lowland Native Grassland. These strategies are intended to fulfil a role a number of roles, including:

- action plans for threatened species and ecological communities listed under the Nature Conservations Act 1980 (ACT);
- a multi-species ecological community strategy for native grassland and woodland conservation;
- a source document on native grassland and woodland for ACT and Commonwealth Government agencies with responsibilities for nature conservation and land management; and
- a source document for community and other stakeholders with an interest in native grassland and woodland conservation. (ACT Government, 2004a, 2004b)

threats to native fauna

Habitat destruction is the principal threat to fauna in the catchment. It results from a wide range of activities, including land clearing and cultivation, grazing of stock on roadsides and wetlands, establishment and intensification of rural sub-divisions and impacts of public utilities. Other threats include degradation of waterways, weeds and predation by feral animals. The main threats to native fish populations come from habitat degradation and competition from introduced species including redfin and carp. Changed water flow regimes and water quality also affect populations and emphasise the need to sustain environmental flows (Environment ACT, 2004).

Part 2. Targets and Actions

Part 2 details targets for future resource condition in the catchment. The management targets listed are obtained from regional level plans (from both the ACT and NSW) and serve to guide the MCS towards addressing priority NRM issues.

Part 2 also identifies community capacity, investigative and on-ground actions for the key NRM Issues in the Molonglo catchment. The actions provide a basis for quantifying the costs of achieving the catchment and management targets, how investments might be financed, and how targets and investments might be adapted in response to changed information and funds availability.

7. Regional targets

7.1 State-wide Standards and Targets

State-wide targets for natural resource management in NSW were developed by the Natural Resources Commission (NRC) in consultation with key stakeholders and released for comment in November, 2004, for broader consultation before recommendations for state-wide targets were made to the NSW Government in April 2005. State-wide targets express desired natural resource outcomes that are important to the state. They provide a common reference point for cooperative and coordinated effort for all natural resource managers across NSW. The NRC proposed three categories of targets consistent with the National Framework for Standards and Targets. These are:

- *Aspirational Goal* A high level statement that describes the desirable long term function of landscapes across NSW to support environmental, social, cultural and economic values.
- *Resource condition targets* These describe medium term natural resource outcomes that are time-bound and measurable.
- *Management action targets* These can be used to ensure that actions are implemented at the state level to support the achievement resource condition targets. These particularly relate to policy development, research, monitoring and evaluation.

The aspirational goal incorporates environmental, economic, social and cultural values of NSW communities. It recognises that natural processes operate in an integrated way to serve a number of related functions.

The resource condition targets are organised around four asset classes; biodiversity, water, land and community. They set a benchmark of at least maintaining, and in many cases improving, the current condition of NSW's main natural resource assets. Currently, most of these targets are to be achieved in a 10 year period. This period aligns with the life-cycle of the first Catchment Action Plans (CAPs), developed by CMAs, and would allow for the completion of at least two audit cycles within the period the targets are to be achieved. (NRC, 2004)

7.2 the Murrumbidgee Catchment Blueprint

The "Integrated Catchment Management Plan for the Murrumbidgee Catchment 2002", also known as the "Murrumbidgee Catchment Blueprint" was prepared by the Murrumbidgee Catchment Management Board (under the Catchment Management Act 1989 and the Catchment Management Regulation 1999) to provide clear direction for natural resource management and investment in the Murrumbidgee catchment.

The Blueprint builds on the planning previously undertaken in the Murrumbidgee Catchment and serves as a strategic framework that complements and supports some of the specific regional natural resource plans such as Regional Vegetation Management Plans and Water Sharing Plans.

The Blueprint has determined CATCHMENT TARGETS which indicate an acceptable condition for the natural resources at a specified point in time. They provide a broad indicator of catchment health and are specific, measurable, achievable and relevant. The catchment targets are in effect quantifiable goals for natural resource management efforts in the entire Murrumbidgee catchment.

7.3 Draft Murrumbidgee Catchment Action Plan

The development of the State-wide Standards and Targets supports the development of Catchment Action Plans. At the time of publication of the MCS the Murrumbidgee Catchment Action Plan was in a draft stage. When it is finalised in December 2005, the MCAP will be a statutory document guiding investment in NRM in the Murrumbidgee Catchment for the next ten years. The CAP will build on the Blueprint, to meet the requirements of the Catchment Management Authorities Act, the Native Vegetation Act and the Natural Resources Commission.

7.4 the ACT Natural Resource Management Plan

The ACT Natural Resource Management Plan has been developed by the ACT NRM Board to provide a strategic framework for natural resource investment at the Territory and local scale. Whilst recognising that the ACT is part of the Murrumbidgee River Catchment, the ACT has dealt with natural resource management within its own distinctive policy and planning framework.

The ACT NRM Board has adopted the Catchment Targets from the Murrumbidgee Catchment Management Blueprint which were determined through a process of extensive consultation across the whole of the Murrumbidgee Catchment. The ACT CONTRIBUTION TO CATCHMENT TARGETS indicates how the ACT will contribute to achieving each of the Murrumbidgee Catchment Targets.

It is expected that the ACT NRM Plan will be revised to reflect the implementation of the Murrumbidgee Catchment Action Plan.

8. Addressing regional targets at the local scale

Each action is a community response to an issue of concern. Actions have been grouped in accordance with their ability to positively impact on the corresponding Management Target (and ultimately the Catchment Target) from the draft MCAP 2005 and ACT NRM Plan.

The MCS is focused on achieving quantifiable NRM **OUTCOMES** and **OUTPUTS**, therefore by creating the link between regional targets and local actions, the catchment group is able to effectively evaluate the community's contribution to achieving our long term catchment goals.

Actions have been formulated to be measurable and quantifiable. It is envisaged that through discussion of the MCS and on-going review, those groups/organisations/agencies best placed to assume the 'lead responsibility' for implementation of particular actions, will be identified and listed in future versions of the strategy.

Dates for implementation are aspirational and linked to the availability of resources (investment, information, expertise etc). Should required elements for implementation be acquired for an action, the timeframe for implementation may be shortened.

9. Key Target Areas and Actions

State-wide Resource Condition Targets have been set by the NSW Natural Resource Commission and describe medium term natural resource outcomes that are time-bound and measurable.

Draft Murrumbidgee Resource Condition Targets utilised in the Draft Murrumbidgee Catchment Action Plan have been developed using the same guiding principles as the Blueprint and are in line with and build on the "Murrumbidgee CMA Case Study – application of State-wide standards and targets" (2004) prepared by the Natural Resource Commission. The final Murrumbidgee Catchment Action Plan is expected to be available in December, 2005.

Goals are expressed as aspirations for 2024. The terms used in the goal statements were listed in stakeholder workshops, in light of desired future management of priority issues.

Priorities identify the most valued assets and the most significant threats faced by each asset. They are based on workshops with stakeholders and review of current technical information about threats to assets.

Targets and *Actions* were obtained from:
(i) community inputs in workshops;
(ii) existing guiding regional strategies; and
(iii) discussions held with technical experts involved with the development of regional targets on appropriate targets for the MCS and their implementation feasibility.

Performance Indicators were developed through:
(i) in-house discussion of measures that would best assess the progress of the MCS in reaching regional targets; and
(ii) consideration of milestones for evaluating performance of the MCS implementation.

9.1 Water Asset Management

Community Water Quality Issues

• Stormwater management • Water supply in peri-urban areas	• Water use and sustainability • Salinity	• Water Quality • Sustainable use and quality of Groundwater.

State-wide Resource Condition Targets

WSRCT1: By 2015 there is a net improvement in the condition of rivers and wetlands as assessed against the Stressed Rivers Classification and the Water Quality and River Flow Objectives (WQO and RFO) for NSW.

WSRCT2: By 2015 extractions from aquifers are within identified sustainable yields.

Draft Murrumbidgee Resource Condition Targets

WRCT1: By 2015 in the Murrumbidgee River and its main tributaries, suspended sediment levels will be reduced so that they meet the interim NSW Water Quality Objectives. Flows and water extractions will be managed to maintain or improve river health consistent with the River Flow Objectives (RFO) and the MDBMC Cap *(to be amended to include measurable quantities of sediment reduction).*

WRCT2: By 2015 target of less than 245 EC for 50% of the time and less than 320 EC for 80% of the time at Balranald. A salt load of less than 145 000 tonnes per year for 50% of the time and less than 325 000 tonnes per year for 60% of the time by 2010. (*To be reviewed within MDBC audit)*

WRCT3: By 2015 extractions from aquifers are within identified sustainable yields.

MCS Resource Condition Goal

Water in rivers, creeks, lakes and wetlands that is above the national standards for healthy ecosystems.

MCS Community Goal

A collaborative and coordinated approach to benchmarking surface and groundwater quality in the catchment. Sustained community involvement in water quality monitoring to assess catchment health.

Table 1: Water Asset Management Targets and Actions

Issue	Management Targets		Actions
	Draft Murrumbidgee CAP	ACT NRM Plan	
Water quality	**WMT1** By 2015 assist land managers and communities to: protect and enhance 1500km of streambank using native riparian vegetation for bank stabilisation and runoff filtration. **WMT2** By 2015 assist land managers and communities to: along those stream reaches which yield the highest sediment and nutrient loads, control streambank and gully erosion using structural control works covering a total length of 50 km. **WMT6** By 2015 assist land managers and communities to: reduce the water quality impacts of urban, industrial and rural residential development throughout the Murrumbidgee catchment.	**WMT3** Reduce the intensity of and the volume of urban stormwater flows.	**COMMUNITY CAPACITY** 1.1 By June 2005, expand the community water quality monitoring network by implementing the Molonglo Catchment Health Indicators Project (M-CHIP) in all sub-catchments. 1.2 By June 2005 involve 6 schools in the M-CHIP. 1.3 By 2005 develop a water quality monitoring strategy that includes methods for delivery of meaningful trend data to the community. **INVESTIGATIVE** 1.4 By 2006 secure resources to further develop the Total Dissolved Sediment, Total Nutrient and Total Phosphorous Load map series (Section 10) for all sub-catchments. 1.5 By 2006 use GIS and existing bore/piezometer information to assess the current depth to groundwater in all sub-catchments 1.6 By June 2005 assess willow removal priority reaches in all sub-catchments. 1.7 By 2006 identify potential urban wetland sites in the catchment.

Issue	Management Targets		Actions
	Draft Murrumbidgee CAP	ACT NRM Plan	
Water quality	**WMT1** By 2015 assist land managers and communities to: protect and enhance 1500 kilometres of streambank using native riparian vegetation for bank stabilisation and runoff filtration. **WMT2** By 2015 assist land managers and communities to: along those stream reaches which yield the highest sediment and nutrient loads, control streambank and gully erosion using structural control works covering a total length of fifty kilometres. **WMT6** By 2015 assist land managers and communities to: reduce the water quality impacts of urban, industrial and rural residential development throughout the Murrumbidgee catchment.	**WMT3** Reduce the intensity of and the volume of urban stormwater flows.	**ON-GROUND** 1.8 By June 2006 remove willows and woody weeds from 5km of priority reaches in the catchment. 1.9 By 2007 rural areas maintaining 90% groundcover all year. 1.10 By June 2006 fence and revegetate (where necessary) 5km of Sediment & Nutrient Load priority reaches to control stock access in riparian areas. 1.11 By 2006 assist the development of 2 urban wetlands in the Sullivans Creek sub-catchment.
Sustainable water supply	**WMT6** By 2015 assist land managers and communities to: reduce the water quality impacts of urban, industrial and rural residential development throughout the Murrumbidgee catchment. **WMT7** By 2006 assist land managers and communities to maximise environmental outcomes according to requirements of the Water Sharing Plan.	**WMT2** Reduce potable water use through water efficiency, sustainable water recycling and the use of stormwater and rainwater. **WMT4** Environmental flow allocations that meet the needs of aquatic ecosystems.	**COMMUNITY CAPACITY** 1.12 By 2007 undertake a catchment wide community education and awareness campaign about the role and value of environmental flows. 1.13 By 2007 use research to develop a strategy and inform the community on Water Sensitive Urban Design principles. **INVESTIGATIVE** 1.14 By 2006 develop a Farm Dams map series to quantify current water holding in all sub-catchments. 1.15 By 2006 use the M-CHIP to assess the effect of the current environmental flow regime on ecosystem health.

Issue	Management Targets		Actions
	Draft Murrumbidgee CAP	ACT NRM Plan	
Groundwater	**WMT7** By 2006 assist land managers and communities to maximise environmental outcomes according to requirements of the Water Sharing Plan. **WMT12** By 2015 extractions from aquifers to be within identified sustainable yield.		**COMMUNITY CAPACITY** 1.16 By June 2006 develop a community education program on sustainable use and management of groundwater in urban, peri-urban and rural areas. **INVESTIGATIVE** 1.17 By June 2005 expand the M-CHIP to a defined Piezometer network for groundwater monitoring throughout the catchment. 1.18 By June 2006 collaborate with government to develop a Groundwater map series to assess depth to groundwater in the catchment. **ON-GROUND** 1.19 By 2006 engage councils to establish bore meters on 50 private bores in rural residential subdivision areas.
Salinity	**WMT10** By 2015 assist land managers and communities to: increase perennial vegetation in the 12 priority sub-catchments with the aim of reducing the predicted mean annual mid catchment salt load by 12 000 tonnes at Wagga Wagga without a reduction in annual flow.	**ST1** Determine the extent of known and potential salinity risk in rural and urban areas. **ST2** Increase perennial vegetation in saline and potentially saline catchments to reduce recharge.	**COMMUNITY CAPACITY** 1.20 By 2007 develop a community awareness program on the symptoms and signs of salinity in urban, per-urban and rural areas. **INVESTIGATIVE** 1.21 By 2006 secure resources to develop a Salinity Hazard map series for all sub-catchments. **ON-GROUND** 1.22 By June 2006 in priority sub-catchments identified by the Salinity Hazard map series: • focus establishment of perennial pastures including native species; • retain, protect and regenerate native vegetation; • revegetate with appropriate native species.

9.2 Biodiversity Asset Management

Community Biodiversity Issues

• Management of Fire Fuel • Management of Regrowth • Willow Control and Management • Impact of Rural Subdivisions • Roadside Vegetation Management • Riparian Restoration and Management	• Waste Management • Native Tree Decline • Feral Animal Management • Weed Management and Control • Chemical Use and Management • Promoting appropriate revegetation.	• Enhancing Habitat for Native Fauna • Biodiversity improvement • Remnant Native Vegetation Management • Salinity • Identification and protection of wildlife corridors

State-wide Resource Condition Targets

BSRCT1: By 2015 there is a net increase in extent and diversity of native vegetation cover.

BSRCT2: By 2015 there is an increase in the extent and diversity of native vegetation cover of riparian zones (Within the Draft MCAP 2005, this target Is addressed under the water asset through WRCT1 and WMT1).

BSRCT3: By 2015 there is a net increase in connectivity across terrestrial and aquatic ecosystems.

BSRCT4: By 2015 there is reduced risk of species, populations and ecological communities becoming threatened.

BSRCT5: By 2015 there is a net reduction in the abundance of and area affected by invasive species and no new invasive species have become established.

Draft Murrumbidgee Resource Condition Targets

BRCT1: Manage for biodiversity conservation a minimum of 30% of the remaining area of each of the terrestrial native vegetation classes and related habitats of the Murrumbidgee Catchment by 2015.

BRCT2: Increase the extent, diversity condition and connectivity of inland aquatic ecosystems in the Murrumbidgee catchment by 2015.

BRCT3: Maintain the population of locally rare (indicator) species and threatened species within the Murrumbidgee Catchment by 2015.

BRCT4: Reduce the population of environmental pests and the area affected by environmental weeds within the Murrumbidgee Catchment by 2015.

MCS Resource Condition Goal

Land and water environments that are rich in species diversity and self sustaining with a good quality range of amenable habitats.

MCS Community Goal

A catchment community that is aware of the value of a biodiverse environment, who strive for habitat protection, work towards eradicating pests and integrate biodiversity considerations into future planning to minimise threats

Table 2: Biodiversity Targets and Actions

Issue	Management Targets		Action
	Draft Murrumbidgee CAP	ACT NRM Plan	
Weeds	**BMT1** All areas of identified high conservation value (HCV) will be managed for conservation by 2015. **BMT3** Regionally Endangered and Regionally Vulnerable vegetation classes will have a minimum of 25,000 ha of native vegetation planted with a corresponding increase in diversity and condition by 2015. **BMT5** Listed terrestrial and aquatic threatened species, populations and endangered ecological communities will be managed for biodiversity conservation for the life of the CAP. **BMT6** Identified environmental weeds and/or populations of environmental pests in all MCMA project sites will be controlled and suppressed by 2015.	**BMT2** Minimise threats to threatened species posed by invasive plants.	**COMMUNITY CAPACITY** 2.23 By June 2005 attain resources to assist volunteers become 'ChemCert' accredited. 2.24 By 2005 ensure that all catchment projects that require weed removal (especially willows) place an appropriate emphasis on succession planting and planning for follow-up control. 2.25 By June 2006 facilitate 3 'educate the buyer' workshops to inform potential rural subdivision buyers of their NRM responsibilities. 2.26 By 2006 develop and implement a Weeds education and awareness strategy. The strategy shall: • focus on priority weeds in the catchment that are having a detrimental effect on those species and communities listed in Appendix 1; • have strategies to engage the community in education programs; • have defined communication goals & strategies; and • assist the community to identify priority weeds and access further information. **INVESTIGATIVE** 2.27 By 2006 secure resources to develop a Weed Extent map series for all sub-catchments. 2.28 By June 2006 develop a Molonglo Catchment Weed Management Plan. The plan shall: • focus on priority weeds in the catchment that are having a detrimental effect on those species and communities listed in Appendix 1 • collaborate with industry and government to highlight emerging aquatic weeds in all sub-catchments. • prioritise weeds in terms of their extent, impact on biodiversity and potential economic cost to the community. • provide management and control options for priority weeds in both an urban and rural context; and • provide the basis for continuing cooperative weed management.

Issue	Management Targets		Action
	Draft Murrumbidgee CAP	ACT NRM Plan	
Weeds	**BMT1** All areas of identified high conservation value will be managed for conservation by 2015. **BMT3** Regionally Endangered and Regionally Vulnerable vegetation classes will have a minimum of 25,000 ha of native vegetation planted with a corresponding increase in diversity and condition by 2015. **BMT5** Listed terrestrial and aquatic threatened species, populations and endangered ecological communities will be managed for biodiversity conservation for the life of the CAP. **BMT6** Identified environmental weeds and/or populations of environmental pests in all MCMA project sites will be controlled and suppressed by 2015.	**BMT2** Minimise threats to threatened species posed by invasive plants.	**ON-GROUND** 2.29 By June 2005 develop an in-principle agreement with local councils and relevant state agencies to establish a 'chemical share fund' for coordinated control of weeds in priority areas including roadsides, Travelling Stock Reserves and properties adjacent to State Forest. 2.30 By June 2005 develop a willow management plan for the riparian zone from the Molonglo Gorge to Scrivener Dam. 2.31 By June 2006 remove invasive willows from 10 km of streams in the catchment.

Issue	Management Targets		Action
	Draft Murrumbidgee CAP	ACT NRM Plan	
Feral animals	**BMT6** Identified environmental weeds and/or populations of environmental pests in all MCMA project sites will be controlled and suppressed by 2015.	**BMT2** Minimise threats to threatened species posed by feral animals.	**COMMUNITY CAPACITY** 2.32 By June 2006 develop and implement a Feral Animal Education and Awareness strategy. The strategy shall: • focus on priority species in the catchment; • assist the community to access further information; • have defined communication goals & strategies; • have strategies to engage the community in education programs; and • simplify the legislative requirements of feral animal control and management in peri-urban environments.
Remnant vegetation management	**BMT1** All areas of identified high conservation value will be managed for conservation by 2015. **BMT2** Regionally Depleted or Well Retained vegetation classes will have a minimum of 75 000 ha managed for conservation by 2015. **BMT3** Regionally Endangered and Regionally Vulnerable vegetation classes will have a minimum of 25,000 ha of native vegetation planted with a corresponding increase in diversity and condition by 2015. **BMT5** Listed terrestrial and aquatic threatened species, populations and endangered ecological communities will be managed for biodiversity conservation for the life of the CAP.	**BMT1** Protect and improve the biodiversity value of significant ecological communities. **BMT4** Urban biodiversity and integrated urban ecological function targets developed and implemented.	**COMMUNITY CAPACITY** 2.33 By June 2005 establish a Molonglo Community Revegetation Guide. The guide will: • promote coordination between groups; • provide appropriate species lists on a sub-catchment and landform basis; and • have defined communication and education goals. **INVESTIGATIVE** 2.34 By 2006 secure resources to develop a Remnant Vegetation map series for all sub-catchments. 2.35 By 2007 develop a Roadside & TSR Remnant Vegetation map series that highlights their conservation value. **ON-GROUND** 2.36 By June 2006 use existing mapping to identify and protect 20 ha of remnant vegetation. 2.37 By 2007 ensure all revegetation projects in the catchment consider species selection and suitability guidelines. 2.38 By June 2006 provide fencing incentives to protect 100 ha of remnant vegetation and create wildlife corridors.

Issue	Management Targets		Action
	Draft Murrumbidgee CAP	ACT NRM Plan	
Riparian restoration	**WMT1** By 2015 assist land managers and communities to: protect and enhance 1500 kilometres of streambank using native riparian vegetation for bank stabilisation and runoff filtration. **WMT2** By 2015 assist land managers and communities to: along those stream reaches which yield the highest sediment and nutrient loads, control streambank and gully erosion using structural control works covering a total length of fifty kilometres. **BMT4** Degraded sections of the Murrumbidgee River and/or its tributaries will have 20km of native aquatic habitat established maintained and improved by 2015	**BMT3** Wetland and Riverine Management policies and management actions to meet determined aquatic ecosystem targets developed and implemented.	**COMMUNITY CAPACITY** 2.39 By 2006 ensure NSW Fisheries and Environment ACT are involved in riparian project development. **INVESTIGATIVE** 2.40 By 2006 secure resources to develop a Riparian Condition map series for all sub-catchments by 2006. 2.41 By June 2005 prioritise riparian sites of regional significance or local importance that require protection, rehabilitation and/or ongoing management. 2.42 By June 2007 liaise with NSW National Parks and Wildlife Service and Environment ACT to investigate options for the control of native fauna (wombats) in riparian zones. 2.43 By June 2007 develop low impact recreation guidelines for riparian areas. 2.44 By 2006 develop streambank and gully erosion control plans at a property scale for 4 priority sub-catchments. **ON-GROUND** 2.45 By June 2006 provide incentives to establish 20 stock watering points away from streams. 2.46 By 2007 exclude and control livestock access to 10km of streams and wetlands. 2.47 By 2007 retain and reintroduce large woody debris (snags) to 5km of streams where necessary to enhance fish habitat.

9.3 Land Asset Management

Community Soil Health Issues

• Soil Erosion • Sedimentation	• Impact of Rural Subdivision • Salinity	• Land management and grazing • Groundcover management • Riparian Restoration

State-wide Resource Condition Targets

LSRCT1: By 2015 there is a net reduction in productive capacity lost due to salinity; acidity; erosion; acid sulphate soils; invasive species.

Draft Murrumbidgee Resource Condition Targets

LRCT1: By 2015 improve soil health across the catchment by:

a. Maintaining soil pH grater or equal to 5 ($CaCl_2$) in areas where acidity has been induced;
b. Increasing the duration of groundcover levels above 70%, and 50% for sandy loams, by at least one month a years across land used for agricultural production;
c. maintaining or reducing the extent of dryland salinity outbreaks within the 12 priority Murrumbidgee sub-catchments at or below 2001 levels;
d. improving water efficiency use of crops and pastures to 80%;
e. increasing the adoption of perennial pasture by 40% across land used for agricultural production; and
f. maintaining or reducing water table levels in urban landscapes and in areas adjacent to infrastructure critical to rural communities and agricultural production

MCS Resource Condition Goal

Grazing management that excludes stock from riparian areas, maintains groundcover and makes best use of holistic farm management principles.

MCS Community Goal

Community involvement in riparian protection, rehabilitation and identification of soil erosion hotspots.

Table 3: Land Asset Management Targets and Actions

Issue	Management Targets		Action
	Draft Murrumbidgee CAP	ACT NRM Plan	
Erosion	**WMT1** Protect and enhance 1500 km of streambank using native riparian vegetation for bank stabilisation and runoff filtration. **WMT2** Control streambank and gully erosion using structural control works. **LMT1** By 2015, assist land managers and communities to lift to and maintain a minimum of 70% ground cover for ten months of the year on land classes IV, V, and VI. **LMT3** By 2015, assist land managers and communities to lift to and maintain a minimum of 70% ground cover for nine months of the year on land classes I, II, and III.	**BMT3** Wetland and Riverine Management policies and management actions to meet determined aquatic ecosystem targets developed and implemented.	**COMMUNITY CAPACITY** 3.48 During 2005 continue to facilitate the implementation of programs to extend best practice grazing management systems including Prograze and Sustainable Grazing Systems emphasising soil health issues. 3.49 During 2005 develop management plans with landholders for erodible landscapes in 5 priority erosion hazard sub-catchments. **INVESTIGATIVE** 3.50 By 2006 secure resources to further develop the Erosion Hazard map series (Section 10) for all sub-catchments. 3.51 By June 2006 develop a program to assess the effectiveness of past erosion control measures on farms, streams and reserves. **ON-GROUND** 3.52 By June 2006 initiate soil stabilisation works in 5 priority erosion hazard sub-catchments.

Issue	Management Targets		Action
	Draft Murrumbidgee CAP	ACT NRM Plan	
Soil structure	**LMT8** By 2015, assist land managers and communities to lift to, and maintain topsoil at pH 5.0 (using Calcium Chloride test) on land classes I, II, III and IV where acidity has been reduced. **LMT5** By 2015, assist land managers and communities to lift the percentages of perennials in the pasture phase of farming systems (land classes I to IV) from 10% to 50%; and non arable land (land classes V to VII) from 40 to 80%.	**SHT2** To benchmark current soil acidity relative to natural levels by 2006. **SHT3** Soil fertility maintained to support perennial pastures in order to prevent erosion, and by 2006 a target for soil fertility will be developed.	**COMMUNITY CAPACITY** 3.53 By 2006 implement Prime Pastures I and II to assist land managers in the farm planning and technical aspects of establishment of perennial pastures. 3.54 By 2006 develop and facilitate the delivery of an information package that promotes the role of native pastures on acid soils. **INVESTIGATIVE** 3.55 By June 2006 undertake extensive paddock and soil testing program of pH and other soil chemistry parameters to enable benchmarking and better on-going soil management in 5 priority sub-catchments.
Groundcover management	**LMT1** By 2015, assist land managers and communities to lift to and maintain a minimum of 70% ground cover for ten months of the year on land classes IV, V, and VI. **LMT3** By 2015, assist land managers and communities to lift to and maintain a minimum of 70% ground cover for nine months of the year on land classes I, II, and III.	**SHT5** Maintain a minimum of 70% ground cover for nine months of the year on land classes I, II, and III. **SHT4** Maintain a minimum of 90% groundcover for twelve months of the year on land classes IV, V and VI.	**COMMUNITY CAPACITY** 3.56 By June 2007 encourage and facilitate participation in LandScan and Healthy Soils—Healthy Landscapes Program. 3.57 By June 2006 co-host 3 groundcover and pasture management field days in priority erosion hazard sub-catchments. **INVESTIGATIVE** 3.58 By 2007 use aerial photography to highlight priority sub-catchments for improved groundcover management. **ON-GROUND** 3.59 By 2006 engage 10 rural landholders to increase stubble retention practices and encourage minimum tillage as an on-ground trial.

9.4 Community Building Management

Community Capacity Building Issues

• Public Land Management • Cultural Sites Management • Communication of NRM / Rural Living issues • Raising awareness of Whole of Landscape issues • Promotion of Landcare and the Catchment Group	• Recreation Management • Planning for climate change • Holistic farm management • Dissemination of NRM information • Cross border communication of whole of catchment issues • Engaging the community to promote the Landcare Ethic	• Engaging the population in Landcare • Promoting Agency cooperation and coordination • Improving community environmental awareness • Engaging the decision makers • Accessing technical advice

State-wide Resource Condition Targets

CSRCT1: By 2010 information systems and training programs are in place that meet CMAs' identified needs to deliver better NRM outcomes.

CSRCT2: By 2010 communication networks and other strategies are established that lead to strong community commitment to better NRM outcomes

Draft Murrumbidgee Resource Condition Targets

CRCT1: By 2015, progressively build the MCMAs effective engagement of identified key stakeholders, with 100% of key stakeholders aware of the MCMAs role in NRM by 2006.

CRCT2: By 2015, increase the engagement of the Traditional Owners in NRM and increase the wider community's understanding of indigenous values in NRM.

CRCT3: By 2015, achieve and improvement in community capacity to deliver NRM outcomes by increasing skill, knowledge and adoption in NRM activities.

Community Goal

A catchment community armed with the knowledge to make justifiable decisions, who are prepared and willing to think regionally, act locally and promote the Landcare ethic.

Table 4: Community Capacity Building Targets and Actions

Issue	Management Targets		Action
	Draft Murrumbidgee CAP	ACT NRM Plan	
Raising environmental awareness	**CMT6** Enhance the knowledge and skills of landholders and the wider community to adopt profitable and sustainable farming systems. **CMT7** By 2006, establish and build an effective communication framework.	**CBMT4** Develop strategies to encourage the community to take responsibility for the impact of their activities on the environment.	**COMMUNITY CAPACITY** 4.60 By 2006 develop a Media Engagement Plan and network contact schedule. 4.61 By June 2006 develop guidelines on volunteer recruitment and engagement strategies for existing community groups. 4.62 By June 2005 expand the Molonglo Waterwatch program to include 5 new schools in macro-invertebrate surveys. 4.63 By 2006 develop a Landcare short film that highlights the importance and success of community action in the catchment. **ON-GROUND** By June 2006 establish 4 post willow removal trial revegetation sites in priority sub-catchments.
Environmental education	**CMT1** By 2010, build a knowledge base of NRM best practice to assist decision-making. **CMT2** Increase the capacity of the community to be engaged in NRM by identifying risks, impediments, drivers & opportunities **CMT3** Encourage the integration of CAP targets within the planning framework of relevant organisations including local government. **CMT5** By 2006, engage traditional owner communities to ensure cultural heritage values are incorporated into broader NRM planning & process.	**CBMT1** The community to have access to information, skills and knowledge required to undertake activities towards achieving the targets in the NRM Plan.	**COMMUNITY CAPACITY** 4.64 By 2006 engage the indigenous community through relevant agency staff to highlight the important features of the cultural landscape in the Molonglo. 4.65 By 2007 continue to support existing community planning initiatives by: • Assisting with implementation; • Facilitating cross border cooperative arrangements; • Engaging new project partners; and • Promoting on-ground initiatives to attract sponsorship and labour resources. **ON-GROUND** 4.66 By June 2005 develop a Landcare Trailer to provide groups with necessary equipment for on-ground activities.

Issue	Management Targets		Action
	Draft Murrumbidgee CAP	ACT NRM Plan	
Cross border communication	**CMT3** Encourage the integration of CAP targets within the planning framework of relevant organisations including local government. **CMT7** By 2006, establish and build an effective communication framework.	**CBMT2** Implement a strategy for investment to support environmental outcomes through appropriate cost sharing. **CMBT3** Develop and implement a ACT Communication Strategy that is aligned with the Murrumbidgee Catchment Communications Strategy.	**COMMUNITY CAPACITY** 4.67 By 2006 ensure that the ACT Communications Strategy continues to foster cross border communication. 4.68 By June 2005 foster and help establish communication and constructive working relationships between catchment community support staff. 4.69 By June 2005 facilitate the development of a Memorandum of Understanding between the catchment group and the Murrumbidgee Catchment Management Authority and the ACT Natural Resource Management Board. **ON-GROUND** 4.70 By 2006 assist with the cross border rollout of the Healthy Soils—Healthy Landscapes Program.
Cooperative public land management	**CMT3** Encourage the integration of CAP targets within the planning framework of relevant organisations including local government. **BMT3** Regionally Endangered and Regionally Vulnerable vegetation classes will have a minimum of 25 000 ha of native vegetation planted with a corresponding increase in diversity and condition by 2015. **BMT5** Listed terrestrial and aquatic threatened species, populations and endangered ecological communities will be managed for biodiversity conservation for the life of the CAP.	**CBMT2** Implement a strategy for investment to support environmental outcomes through appropriate cost sharing.	**COMMUNITY CAPACITY** 4.71 By 2007 develop a communications process that ensures the catchment community has the opportunity to engage in meaningful consultation with government. **INVESTIGATIVE** 4.72 By 2006 continue to develop the Public Land Management Buffer Zone map series (Section 10) and review recommended actions with government. **ON-GROUND** 4.73 By 2006 engage 20 landholders in a cooperative weed reduction program extending from priority roadside sites. 4.74 By 2006 engage 20 landholders in a cooperative feral animal reduction program extending from priority forestry sites.

10. Spatial inventory of the catchment

This section describes the methodology behind the development of each map series. All maps were developed to:

1. Benchmark catchment health in all sub-catchments;
2. Enable the catchment group to identify priority sub-catchments for the 'strategic' implementation of the MCS;
3. Contribute to regional NRM data sets; and
4. Enable quantification of the MCS contribution to Murrumbidgee Catchment Targets.

10.1 Sub-Catchment scale map series description & metadata

Gully Erosion map series

The gully erosion series shows aerial interpretations of known gully erosion sites. Data forms part of the land capability mapping series produced by the NSW Department of Infrastructure, Planning & Natural Resources.

Meta Data Element No.1

Depths to gully bottom (gully height) is expressed as Minor Gully Erosion (<1.5m deep), Moderate Gully Erosion (1.5-3m deep), Severe Gully Erosion (3-6m deep) and Very Severe Gully Erosion (>6m deep). Raw data was overlayed with a detailed streams layer and shape matched to fit the more detail data extent. Gully erosion sites were equated to minor creek line features of the detailed drainage data set. Sites that were labelled as 'salting' in the original data set were not included in the map series. Full data set can be obtained from the NSW Department of Infrastructure, Planning & Natural Resources (www.dipnr.nsw.gov.au).

Streambank Erosion map series

The streambank erosion series shows aerial interpretations of known streambank erosion sites. Data forms part of the land capability mapping series produced by the NSW Department of Infrastructure, Planning & Natural Resources.

Meta Data Element No.2

Depths to stream bottom (streambank height) is expressed as Minor Streambank Erosion (<1.5m deep), Moderate Streambank Erosion (1.5-3m deep), Severe Streambank Erosion (3-6m deep) and Very Severe Streambank Erosion (>6m deep). Raw data was overlayed with a detailed streams layer and shape matched to fit the more detail data extent. Streambank erosion sites were equated to major creek and river features of the detailed drainage data set. Full data set can be obtained from the NSW Department of Infrastructure, Planning & Natural Resources (www.dipnr.nsw.gov.au).

Erosion Hazard map series

The erosion hazard series is an interpretation of soil types characteristics within land classes in each sub-catchment. Erosion hazard is a measure of the susceptibility of an area of land to prevailing agents of erosion. The data forms part of the 'Soil Landscapes of the Canberra 1:100,000 Sheet' mapping program conducted by the then NSW Department of Land & Water Conservation.

Meta Data Element No.3

All soil types listed in each of the land classes were subjected to numerical conversion where very low = 1, low = 2, moderate = 3, high = 4 and very high = 5. Landuse and flow type 'grazing' and 'non-concentrated flows' respectively, were used in the numerical analysis. Other elements such as 'Landscape variants' and Associated soil landscapes' were assigned the same numerical value of the parent landscape unit. In the final data set:

Erod_1 = Erodibility under non-concentrated flows
Erod_2 = Erodibility under concentrated flows
Erod_3 = Erodibility under wind

Eros_Haz1 = Erosion hazard under non-concentrated flows
Eros_Haz2 = Erosion hazard under concentrated flows
Eros_Haz3 = Erosion hazard under wind

Eros_Haz1 is the feature category in the map series. Full raw data set (soil landscapes) can be obtained from the NSW Department of Infrastructure, Planning & Natural Resources (www.dipnr.nsw.gov.au).

Land Management map series

The land management series is a representation of suggested land management options based on available land class information. The methodology reflects that of the 'Feed the Sheep's, Cover the Seeps, Plus the leaks' data mapping exercise conducted by the NSW Department of Infrastructure, Planning & Natural Resources, Yass Office in-conjunction with the Yass Area Network of Landcare Groups.

Meta Data Element No.4
Land classes are those represented by the Land capability map series, Canberra 1:100,000 map sheet (NSW DIPNR). Classes are clipped to boundaries and amalgamated as follows: Classes I to III, Classes IV-V and Classes VI-VIII. Category descriptions are based on best available local knowledge and some aerial photography ground-truthing. Full land classes data set can be obtained from the NSW Department of Infrastructure, Planning & Natural Resources (www.dipnr.nsw.gov.au).

Public Land Management Buffer Zone map series

The public land management map series is a created buffer representation centring on public land (NSW National Parks, ACT and NSW State Forests).

Meta Data Element No.5
Polygon shapefiles are buffered at 1,000m. Overlapping buffer graphics internal to the target polygon, were deleted.

10.2 Catchment scale map series description & metadata

River Reach Condition – Biota Index map series

The assessment of river condition data focuses on the aggregate impacts of resource use on Australia's rivers. Integrated assessments such as this one provide a basin-wide context and framework within which decisions and river management priorities can be considered.

Meta Data Element No.6
The assessment incorporates a range of attributes that are considered to indicate key ecological processes at the river reach and basin levels. The map series features the Aquatic Biota Index which uses macro invertebrates with four sub-indices (catchment disturbance, hydrological disturbance, habitat and nutrient and suspended sediment load). All data is confined to major stream sin the catchment.

Full data sets can be obtained from the National Land and Water Resources Audit (NLWRA), Assessment of River Condition Database, 2001.

River Reach Condition – Environment Index map series

The assessment of river condition data focuses on the aggregate impacts of resource use on Australia's rivers. Integrated assessments such as this one provide a basin-wide context and framework within which decisions and river management priorities can be considered.

Meta Data Element No.7

The assessment incorporates a range of attributes that are considered to indicate key ecological processes at the river reach and basin levels. The map series features the Environment Index which uses a combination of macro invertebrates data with four sub-indices (catchment disturbance, hydrological disturbance, habitat and nutrient and suspended sediment load). All data is confined to major stream sin the catchment.

Full data sets can be obtained from the NLWRA, Assessment of River Condition Database, 2001.

Predicted Total Suspended Sediment map series

This data set is the vector streams coverage generated from the 9" (approx 250m) digital elevation model data set attributed with sediment and nutrient source, sink, load and delivery information. The data set is a product of the Water-borne Soil Erosion Project of the NLWRA.

Meta Data Element No.8

The streams theme has 39 layers preserved in its attribute table, in addition to the standard Arc/Info items. The layer represented in the map series is 'specsed_t/ha/y' = Predicted specific yield of suspended sediment (tonnes per hectare per year). This is feedout divided by catchment area.

For additional information, see: Ian Prosser, Paul Rustomji, Bill Young, Chris Moran, Andrew Hughes 2001. Constructing River Basin Sediment Budgets for the National Land and Water Resources Audit, CSIRO Land and water Technical Report 15/01, Canberra.

Modelled Total Dissolved Nitrogen (tonnes/year) map series

This data set is the vector streams coverage generated from the 9" (approx 250m) digital elevation model data set attributed with sediment and nutrient source, sink, load and delivery information. The data set is a product of the Water-borne Soil Erosion Project of the National Land and Water Resources Audit (NLWRA).

Meta Data Element No.9

The streams theme has 39 layers preserved in its attribute table, in addition to the standard Arc/Info items. The layer represented in the map series is Ndis_kgpy: Total dissolved Nitrogen input to river link from internal catchment –current conditions (source: NLWRA BIOS modelling) (kilograms per year).

For additional information, see: Ian Prosser, Paul Rustomji, Bill Young, Chris Moran, Andrew Hughes 2001. Constructing River Basin Sediment Budgets for the National Land and Water Resources Audit, CSIRO Land and water Technical Report 15/01, Canberra.

Modelled Total Dissolved Phosphorous (tonnes/year) map series

This data set is the vector streams coverage generated from the 9" (approx 250m) digital elevation model data set attributed with sediment and nutrient source, sink, load and delivery information. The data set is a product of the Water-borne Soil Erosion Project of the National Land and Water Resources Audit (NLWRA).

Meta Data Element No.10

The streams theme has 39 layers preserved in its attribute table, in addition to the standard Arc/Info items. The layer represented in the map series is Pdis_kgpy: Total dissolved Phosphorus input to river link from internal catchment – current conditions (source: NLWRA BIOS modelling) (kilograms per year)

For additional information, see: Ian Prosser, Paul Rustomji, Bill Young, Chris Moran, Andrew Hughes 2001. Constructing River Basin Sediment Budgets for the National Land and Water Resources Audit, CSIRO Land and water Technical Report 15/01, Canberra.

Part 3. monitoring and evaluation

The Molonglo Catchment Group acknowledges the importance of consistent approaches to monitoring and evaluation of NRM plans regardless of their scale. To this end, revised editions of the MCS will consider the integration of NSW state-wide standards and targets currently being developed by NSW Natural Resources Commission (NRC).

Ensuring the final version of the MCS is consistent with both regional and state level standards and targets will assist to illustrate the catchment community's contribution to local, regional and state wide positive NRM outcomes.

11. Performance indicators

Appendix 2 sets out performance indicators that the catchment group may use to monitor progress of the strategy's implementation. The list is not intended to be exhaustive; instead it represents some of the key aspects that may assist the catchment group to:

- assess the standard and performance of current and proposed actions;
- assess whether the current direction of a system is going up or down, forward or backward, getting better or worse (and to what extent), or staying the same;
- make comparisons over time, across similar services, against targets within the catchment.

The performance indicators are deliberately 'outcome-based' to compliment the new regional focus of NRM outcomes through on-ground delivery.

12. MCS review

The Molonglo Catchment Group will facilitate an annual stock-take of on-ground change attributed to the sub-catchment plan directly and a detailed review of the entire plan every three years, which involves a new series of community consultations.

The annual review will:

- use the performance indicators to assess the implementation direction in the past calendar year, noting the contributions made by the various participants;
- assess the total amount of funds obtained from all sources, to implement actions outlined for that calendar year;
- estimate the total amount of participants involved in the implementation of actions, derived by the plan for that calendar year; and
- forecast implementation actions to be initiated in the next year.

The three yearly review will:

- consult with the sub-catchment community to assess and review the community's NRM priorities;
- assess the influence of new regional developments (if any) on the strategy; and
- result in the production of a revised MCS, which accommodates changes made as a result of the review process.

13. monitoring catchment health

Water quality information for the catchment is available from numerous sources for some sites, however collection methods are not uniform. The MCG recognises that establishing 'baseline measurements' to assess sub-catchment health goes far beyond just collecting and analysing water quality data. The MCG is committed to developing a catchment health monitoring program that will assist to monitor the effectiveness of the MCS.

The Molonglo Catchment Health Indicators Program (M-CHIP) utilises and builds on existing data sources and community based resource assessment techniques, to enable informed decisions and a framework for future catchment health monitoring. Assessing sub-catchment (and ultimately whole catchment) health in this manner:

- helps to educate the community on catchment processes;
- facilitates targeted investment on a catchment scale;
- raises awareness of water related NRM issues; and
- greatly improves the link between information gathering, analysis and on-ground application.

13.1 M-CHIP methodology

The M-CHIP has been designed to ensure that output data is consistent with regionally focused monitoring programs to facilitate data sharing with State/Territory and regional programs. M-CHIP draws data from 13 existing and 23 newly established water quality monitoring sites within the catchment.

The program integrates continuous water quality data, annual macro-invertebrate survey results and a once off desk-top 'GIS' audit of the catchment's natural features.

The results, data and assessments are fed in to a model to gauge a level of sub-catchment health (Figure 5). Results are used to produce a series of Sub-catchment Health maps which are used to benchmark catchment health and (coupled with assessment of performance indicators) monitor the overall effectiveness of the MCS.

Program aims

1) To enable the Molonglo Catchment Group to recognise significant short-term pollution events and identify the causes or sources of pollution, so that the appropriate authority may be notified in a timely manner. Pollutants of particular relevance are those associated with:
    - stormwater runoff and erosion;
    - general litter and dumping of rubbish; and
    - accidental spills or improper disposal of toxic substances.

2) Monitor and evaluate the impact of projects undertaken by the Group and its members.

3) Identify currently degraded areas and long-term degradation in the Molonglo Catchment, with respect to:
    - ecological issues;
    - catchment and stream health; and
    - public health and amenity issues.

Objectives

1) To provide a measure of biological health of the stream, at key sites in the Molonglo Catchment, by monitoring:
- Macro-invertebrates;
- Frog watch; and
- Riparian Vegetation Surveys.

2) Collect baseline data at the bottom of Sub-catchment sites throughout the Molonglo Catchment to establish sediment and salinity exports for:
- pH;
- Electrical Conductivity (Salinity);
- Turbidity; and
- Presence and type of rubbish.

3) To provide turbidity measurements during Storm Events at key sites in the Molonglo Catchment.

4) To provide baseline data at key sites in the Molonglo Catchment by monitoring:
- Dissolved Oxygen
- Orthophosphates

5) To provide supporting data at 24 sites throughout the Molonglo Catchment by monitoring:
- Presence and type of algae;
- Water temperature;
- Water level;
- Water flow;
- Weather; and
- Rainfall.

Monitoring outcomes

The M-CHIP will assist the catchment group to assess:

1) What impact(s) has catchment group activities had on:
- physical - chemical water quality, particularly dissolved oxygen and turbidity?
- biodiversity - macro-invertebrates?
- habitat?

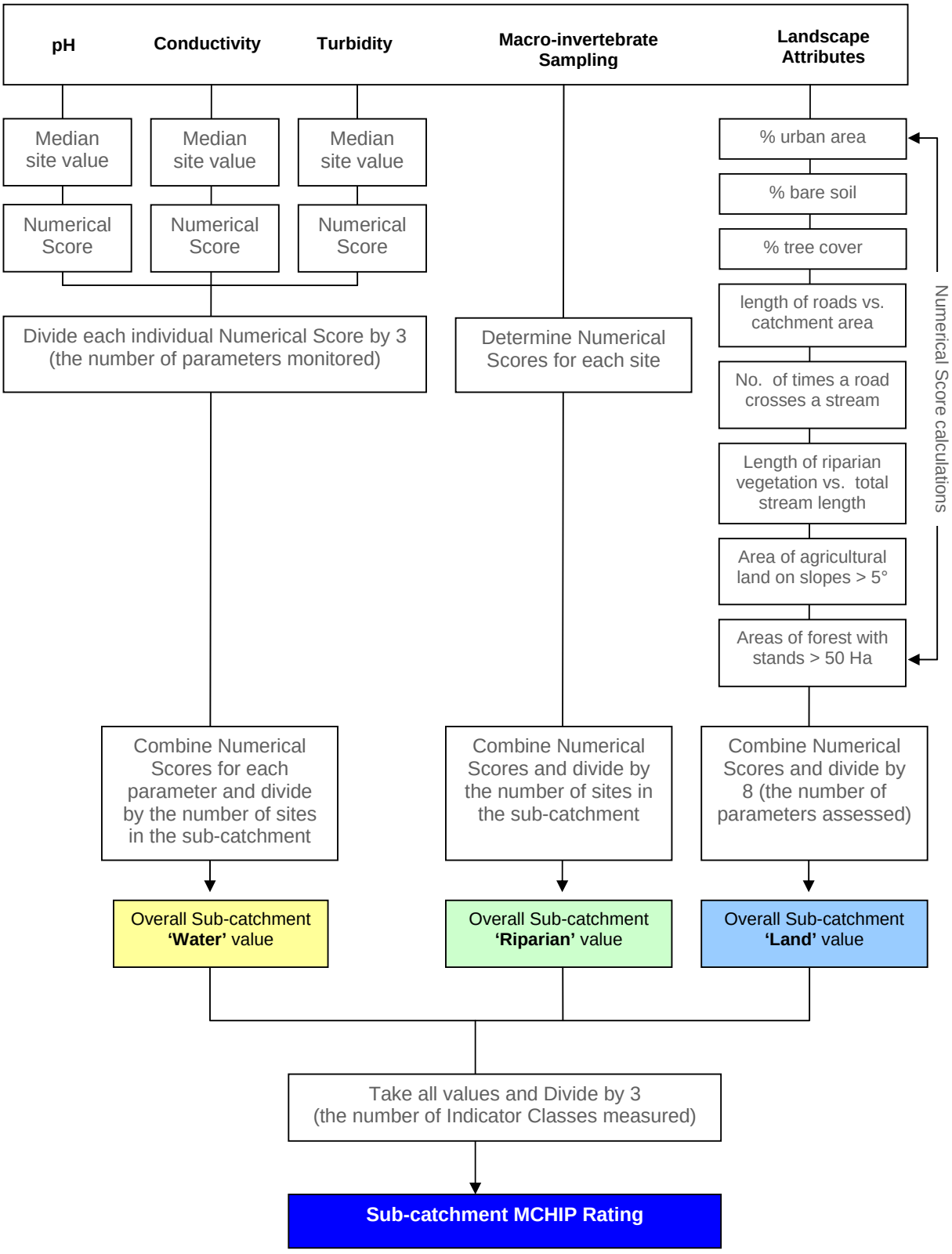
2) Where are the major sources of sediment in the catchment?

3) Where are the major sources of litter in the catchment?

4) Which areas in the catchment are most in need of weeding / erosion control / revegetation efforts?

5) How effective are the on-ground works of the Molonglo Catchment Group and member groups?

Figure 5: M-CHIP Methodology



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15. Appendix

15.1 Appendix 1: Threatened and important species and endangered ecological communities

(After Fallding M. (2002), *Planning Framework for Natural Ecosystems of the ACT and NSW Southern Tablelands.* Natural Heritage Trust, NSW National Parks and Wildlife Service and Land & Environment Planning.)

	Vegetation Status	Threatened & important species & endangered ecological communities
Canberra – Queanbeyan	Grasslands have been largely cleared and replaced by urban developments and infrastructure. Much of the surrounding Box-Gum Woodland remains, though part of this area in the ACT is occupied by rural land uses. Dry forests are largely intact. Within the ACT large proportions of Grasslands, Box-Gum Woodlands and forests are protected within nature reserves. No large reserves exist to protect these communities in the NSW section of the unit. There are: o Grasslands and Box-Gum Woodlands of considerable diversity including the Barton and Majura Grasslands, Ainslie-Majura and Mulligans Flat nature reserves, Queanbeyan Nature Reserve and Woodlands at the Gale Precinct; and o Many secure Grassland and Box-Gum Woodland sites, and their associated threatened species in the ACT.	**Plants**: Pale Pomaderris, Button Wrinklewort, Tarengo Leek Orchid, Small Purple-pea, Silky Swainson-pea, Ginninderra Peppercress, Golden Moths Orchid, Hoary Sunray (white form), Australian Anchorplant, *Caladenia tessellata* (a spider orchid)
		Mammals: Squirrel Glider, Spotted-tailed Quoll, Eastern Bent-wing Bat, Koala
		Birds: Blue-billed Duck, Latham's Snipe, Glossy Black-cockatoo, Superb Parrot, Swift Parrot, Grey-crowned Babbler (early records), Brown Treecreeper, Regent Honeyeater, Speckled Warbler, Olive Whistler, Hooded Robin, Diamond Firetail
		Reptiles and frogs: Pink-tailed Worm-lizard, Striped Legless Lizard, Grassland Earless Dragon, Rosenberg's Monitor
		Invertebrates: Golden Sun Moth, Perunga Grasshopper
		Vegetation communities: Natural Temperate Grassland, Yellow Box / Red Gum Grassy Woodland (ACT only), White Box – Yellow Box - Blakely's Red Gum Woodland (NSW only).
Captains Flat	Grasslands and Grassland-Woodland Mosaic are modified and partly cleared. The Forests are largely uncleared. There are: o Samples of Grasslands and Grassland-Woodland Mosaic of considerable diversity, including Captains Flat Cemetery and some roadside reserves.	**Plants**: Tarengo Leek Orchid, Golden Moths Orchid, Hoary Sunray (white form), Australian Anchor-plant.
		Mammals: Eastern Pygmy Possum, Spotted-tailed Quoll
		Birds: Powerful Owl, Regent Honeyeater, Brown Treecreeper, Speckled Warbler, Diamond Firetail, Hooded Robin.
		Vegetation communities: Natural Temperate Grassland.

Appendix 1 (cont.)

	Vegetation Status	Threatened & important species & endangered ecological communities
Bungendore	Grasslands and Box-Gum Woodlands are largely cleared or modified. The Dry Forest are partly cleared. There are several samples of Grassland and Box-Gum Woodland of considerable diversity.	**Plants**: Hoary Sunray (white form), Button Wrinklewort, Golden Moths Orchid, Buttercup Double tails, Australian Anchor-plant, *Euphrasia scabra* (an early record), *Wilsonia rotundifolia* (a wetland forb).
		Mammals: Spotted-tailed Quoll, Koala, Eastern False Pipistrelle.
		Birds: Australasian Bittern, Blue-billed Duck, Freckled Duck, Latham's Snipe, Superb Parrot, Powerful Owl, Diamond Firetail, Speckled Warbler, Hooded Robin.
		Reptiles and frogs: Striped Legless Lizard, Little Whip-snake, Green and Golden Bell Frog.
		Vegetation communities: Natural Temperate Grassland, White Box - Yellow Box - Blakely's Red Gum Woodland.
Royalla	Grasslands and Box-Gum Woodlands are highly modified and cleared. The Wet and Dry Forests are partly cleared. There are: o Samples of Grasslands and Box-Gum Woodlands of considerable diversity, including Royalla and Burra TSRs and a railway reserve.	**Plants**: Small Purple-pea, Silky Swainson-pea, Button Wrinklewort, Hoary Sunray (white form), Golden Moths Orchid, Michelago Parrot-pea.
		Mammals: Koala, Spotted-tailed Quoll, Little Bent-wing Bat, Eastern Bent-wing Bat.
		Birds: Latham's Snipe, Glossy Black-cockatoo, Diamond Firetail, Hooded Robin, Speckled Warbler, Brown Treecreeper.
		Reptiles and frogs: Pink-tailed Worm-lizard, Rosenberg's Monitor, Giant Burrowing Frog, Green and Golden Bell Frog (early records), Southern Bell Frog (early records).
		Vegetation communities: Natural Temperate Grassland, White Box - Yellow Box - Blakely's Red Gum Woodland.

Appendix 1 (Cont.)

	Vegetation Status	Threatened & important species & endangered ecological communities
Tinderry Range	Forests are largely uncleared, except along the edges of ranges. There are: o Large areas protected within Tinderry Nature Reserve.	**Plants**: Pale Pomaderris, Golden Moths Orchid.
		Mammals: Koala, Spotted-tailed Quoll, Eastern Pygmy Possum, Eastern False Pipistrelle, Eastern Bent-wing Bat.
		Birds: Barking Owl.
Lake George Range	Box-Gum Woodlands and Grasslands are largely cleared or modified. Dry Forests are cleared in places. There are: o Reserves, including the extensive area surrounding Googong Reservoir and several newly proclaimed nature reserves in the Queanbeyan area; and o Samples of Box-Gum Woodlands and Grasslands of considerable diversity, including various sites on private land.	**Plants**: Pale Pomaderris, Silky Swainson-pea, Small Purple-pea, Button Wrinklewort, Hoary Sunray (white form), Golden Moths Orchid, Australian Anchor-plant, *Senecio macrocarpus* (a ragwort).
		Mammals: Koala, Spotted-tailed Quoll, Eastern Pygmy possum, Eastern Bent-wing Bat, Little Bent-wing Bat, Eastern False Pipistrelle.
		Birds: Barking Owl, Superb Parrot, Latham's Snipe, Diamond Firetail, Hooded Robin, Speckled Warbler, Brown Treecreeper, Regent Honeyeater, Painted Honeyeater.
		Reptiles and frogs: Pink-tailed Worm-lizard, Rosenberg's Monitor, Green and Golden Bell Frog (early records), Southern Bell Frog (early records).
		Invertebrates: Golden Sun Moth.
		Vegetation communities: Natural Temperate Grassland, White Box - Yellow Box - Blakely's Red Gum Woodland.

15.2 Appendix 2: Performance Indicators

Action	Implementation date						Performance Indicator
	2005	June 2005	2006	June 2006	2007	June 2007	
1.3							Water strategy developed.
3.48							No. of participants in workshops.
3.49							No. of plans developed in X sub-catchments.
1.1							No. of sites established. No. of volunteers engaged.
1.2							No. of schools engaged.
1.6							Kms of stream reach assessed.
1.17							No. of Piezometer sites established.
2.23							No. of volunteers ChemCert accredited.
2.29							Fund established. Ha of sites sprayed.
2.30							Plans developed for X km of stream reach.
2.33							Revegetation guide produced for X sub-catchments.
2.41							No. of sites identified.
4.62							No. of new schools involved in Waterwatch.
4.67							Trailer fitted out and No. of times utilised.
4.69							Cross border meetings facilitated. No. of joint projects initiated.
4.70							No. of MOU's developed.
1.4							Amount of investment secured. No. of maps produced.
1.5							No. of maps and data sets produced.
1.7							No. of urban wetland sites identified.
1.11							No. of urban wetlands developed.
1.14							No. of maps produced.
1.15							No. of reports, data or maps produced.
1.19							No. of bore meters established.
1.21							Amount of investment secured. No. of maps produced.
2.26							Strategy developed.

Action	Implementation date						Performance Indicator
	2005	June 2005	2006	June 2006	2007	June 2007	
2.27							Amount of investment secured. No. of maps produced.
2.34							Amount of investment secured. No. of maps produced.
2.39							No. of times EACT & NSW Fisheries consulted.
2.40							Amount of investment secured. No. of maps produced.
2.44							No. of plans developed for X sub-catchments.
3.50							Amount of investment secured. No. of maps produced.
3.53							No. of landholders enrolled.
3.54							Information package developed and delivered to X landholders.
3.59							No. of trial sites established.
4.60							Plan developed. No. of contacts listed.
4.63							Film developed. No. of groups involved.
4.65							No. indigenous groups engaged.
4.68							No. of consultations attended by X volunteers.
4.71							No. of projects initiated.
4.73							No. of additional maps produced.
4.74							No. of landholders engaged at X sites.
4.75							No. of landholders engaged at X sites.
1.8							Kms of willow / weeds removed.
1.10							Kms of stream fenced. Ha of trees planted.
1.16							Groundwater use program developed. No. of household copies delivered.
1.18							Groundwater map developed.
1.22							Ha of perennials & trees established. Ha remnant vegetation protected.
2.25							No. of workshops hosted.
2.28							No of management plans developed.
2.31							Kms of willow removed from streams.
2.32							Feral animal strategy developed.

Action	Implementation date						Performance Indicator
	2005	June 2005	2006	June 2006	2007	June 2007	
2.36							Ha of remnant vegetation protected.
2.38							Kms of fence erected. Total investment $ allocated to X landholders.
2.45							No. of stock watering points established.
3.51							Program developed. No. of sites assessed.
3.52							No. of works initiated. Amount of Investment allocated to X landholders.
3.55							No. of site surveys complete in X sub-catchments.
3.57							No. of field days in X sub-catchments.
4.61							Guidelines developed. Copies held by X groups.
4.64							No. of trial revegetation sites established.
1.9							% of sub-catchments maintaining 90% groundcover
1.12							No. of meetings held. No. of participants.
1.13							Strategy developed. No. of seminars held.
1.20							Awareness program developed.
2.24							No. of projects initiated with succession planning emphasis.
2.35							No. of maps produced for X sub-catchments.
2.37							No. of revegetation projects assessed for species suitability.
2.46							Kms of stream fenced from stock.
2.47							No. of snags re-introduced in X km of stream.
3.58							Area of X sub-catchments surveyed
4.66							No. of projects initiated. No. of new partners. $ of sponsorship invested.
4.72							Communications process developed.
2.42							No. of control options developed.
2.43							Guidelines developed.
3.56							No. of landholders involved in LandScan in X sub-catchments.

15.3 Appendix 3: Community Consultation

Stakeholders at the local level were consulted through a series of 4 workshops conducted throughout the catchment. Together with the planning coordinator, the host Landcare groups/organisations were encouraged to invite a mix of people involved in NRM to reflect the issues of their area. A call for public involvement in the planning process was issued in the local media and websites. Appendix 3 presents a summary of the outcomes from the workshops.

Attendees at the workshops were asked to list and prioritise the issues as they saw them within their local area. The issues were then assigned a score according to its "popularity". The tables below present the issues raised and their scores.

PRIORITISATION: New and Existing issues

Venue	Stoney Creek		Queanbeyan		Narrabundah		Royalla	
Existing Issue	**Score**	**Rank**	**Score**	**Rank**	**Score**	**Rank**	**Score**	**Rank**
Stormwater Management	24		30		21		0	
Waste Management – Dumping	17		4		0		0	
Water Quality	67	2	59	2	25	5	61	
Tree Decline	42	5	27		16		37	
Feral Animals	7		27		0		22	
Weeds	88	1	42	3	26	4	73	3
Vandalism	0		4		3		0	
Public Land Management – State and Council Coord	43	4	28		3		57	
Fire Risk – Management	9		16		7		35	
Air Quality	0		0		0			0
Regrowth	5		3		6			13
Erosion – All its forms	56	3	23		0		35	
Sedimentation	32		6		8		0	
Willows	10		22		1		3	
Planning & Development – Rural Subdivision issues	38		80	1	32	1	49	
Cultural Sites Management	0		9		0		0	

Venue	Stoney Creek		Queanbeyan		Narrabundah		Royalla	
New Issue	**Score**	**Rank**	**Score**	**Rank**	**Score**	**Rank**	**Score**	**Rank**
Roadside Vegetation Management	8							
Communication of NRM / Rural Living issues	35							
Whole of Landscape issues	10							
Water use and sustainability	38							
Vegetation Management – laws and regulations	2							
Commercial Forestry – Clear felling natives	0							
Management of Biodiversity	22							
Promotion of Landcare and the Catchment Group	29							
Recreation and its Pluses and Negatives	12							
Enhancing native fauna habitat	1							
Water supply			28					
Biodiversity improvement			29					
Planning for climate change			14					
Holistic farm management			21					
Equity – Mobilising urban resources			10					
Native Vegetation Management			35	4				
Salinity			32	5				
Commercial Forestry			0					

Venue	Stoney Creek		Queanbeyan		Narrabundah		Royalla	
New Issue	**Score**	**Rank**	**Score**	**Rank**	**Score**	**Rank**	**Score**	**Rank**
Aesthetics – Landscape			2					
Groundwater supply and quality			12					
Identification and protection of wildlife corridors			19					
Agency cooperation and coordination			16					
Landuse implications of cash crops			0					
Limiting chemical use – Management of chemicals			6					
Appropriate revegetation citing, techniques, species selection, education					21			
Local community environmental awareness					12			
Fire risk and management in urban areas					5			
Engaging the decision makers					15			
Cross border communication of whole of catchment issues					29	2		
Engaging the community to promote the Landcare Ethic					16	3		
Accessing technical advice					16			
Land management and grazing							9	
Groundcover management							103	1
Sustainable use of Groundwater							82	2
Increasing water use in peri-urban areas							53	
Groundwater Quality							27	
Education of NRM							48	
Dissemination of NRM information							17	
Wildlife corridors – establishment, mgt, protection							41	
Riparian Restoration							72	4
Defining riparian rights							22	
Fire succession management							22	
Biodiversity management and enhancement							70	5

Top Fives

Queanbeyan	Stoney Creek	Royalla	Narrabundah
Planning and Development	Weeds	Groundcover management	Planning and Development
Water Quality	Water Quality	Sustainable use of Groundwater	Cross Border Issues
Weeds	Erosion	Weeds	Promoting the Landcare Ethic
Native Vegetation Management	Public Land Management	Riparian Restoration	Weeds
Salinity	Tree decline	Biodiversity management & enhancement	Water Quality