

13. Catchment Management

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Learning objectives

In the future you may find yourself as a land manager or natural resource professional seeking funds from or working in a catchment management organisation, depending on your position. It would be useful to understand the following and be able to:

- Define catchment management and to list the key principles and attributes that characterise the nature and scale of catchment management.
- Demonstrate an understanding of the history of catchment management, and some of its theoretical underpinnings.
- Provide a summary of the goals, difficulties, future needs and trends of catchment management based on activities over the last 20 years (mid 1980s to 2006).
- Describe the current structure of catchment management at the Federal and State Government level, with examples from NSW, Queensland, Victoria, WA and the Murray-Darling Basin.
- Give examples of catchment management in action using case studies that exemplify the ideals of catchment management, and its impact on soil, salinity, biodiversity and vegetation condition.

Key terms and concepts

Accountability, bottom-up, catchment action plans, catchment management, catchment management authorities, catchment targets, collective action, co-operation, conflict resolution, consensus building, cost-sharing, grass roots, group work, integrated catchment management, landcare, management targets, participation, public good, regional organisations, resource condition, governance, sustainable development, top-down, volunteerism.

Introduction to the topic

The need for Integrated Catchment Management (ICM) has been demonstrated by the rising levels of land degradation and escalating resource deterioration of soil, water and vegetation in Australia. This topic deals with ICM as a philosophy, a process and a product (Syme et al. 1994), and summarises the guiding principles that underpin catchment management as it has been adapted across Australia. An overview of the history of catchment management from the mid 1980s to early 2000s then follows for the States that have the majority stake in the Murray Darling Basin as well as Western Australia. Victoria probably has the longest established Catchment Management Authorities that have legally binding powers and are comparatively well-funded. In contrast Western Australia and Queensland have non-statutory authorities vested with catchment management responsibilities and each of these States has had varying degrees of success in implementation of catchment management goals. The next section details the goals and aspirations of catchment management and the types of functions and activities they are responsible for. This section then goes on to summarise from a number of different reviews the difficulties, future needs and trends in catchment management and its application to Australian conditions. After this section the next generation of catchment management bodies – regional organisations – are discussed in light of recent developments, since 2002, and this was largely compiled from information collated from the internet, although Ewing (2003) provides a reasonably current account of catchment management, with the exception of NSW, that now has Catchment Management Authorities, and no longer has Catchment Management Boards. The final section documents some case studies of catchment management in practice examining the application of catchment management principles to natural resource management problems such as salinity, biodiversity and revegetation.

13.1 Definition of catchment management

In the Report of Inquiry into Catchment Management (HRSCEH 2000) the definition of catchment management was based on the practice of managing natural resources within the natural boundaries of a water catchment system. A key feature of catchment management is to manage land and water resources by **integrating** ecological, economic and social aspects of NRM (natural resource management). Another aspect of catchment management is to manage resources in a **sustainable** manner, and to minimise **land degradation** within a river or drainage basin or other spatial framework (Conacher and Conacher 2000). A further aspect of catchment management is the type of policy and governance framework that seeks to increase the level of communication, collaboration and co-ordination between local, state and federal levels of government and community groups. Hence, the ethos of catchment management is one that provides for extensive partnerships between community and government in the application of policy and on-ground works.

On pages 7-9 in Bellamy et al. (2002) there are a range of definitions currently used in catchment management by State Governments and Federal agencies, and their origins.

Characteristics and guiding principles

An overview of Integrated Catchment Management (ICM) in Australia shows that each State and Territory has developed different conceptual models of catchment management with some formalised under Acts of Parliament, while others are operating under no direct legislation. Nevertheless, there are some principles which most models of catchment management aspire to, even if in reality they are difficult to attain. A list of catchment management principles is set out below for Victorian CMAs, but these principles are relevant to implementation of catchment management elsewhere in Australia.

Sustainable development

A whole of catchment approach to natural resource management seeks to deliver social, economic and environmental outcomes for the community and reduce our impact on the environment.

Community empowerment and engagement

Catchment management is a partnership between community and Government. Planning and implementation of natural resource management programs should maximise opportunities for community engagement. In addition catchment management organisations seek to provide community autonomy and responsibility in decision-making.

For the theory behind collective action, and the principles and practices of environmental stewardship a useful reference is Anna Carr's *Grass Roots and Green Tape* (2002) as well as Wondellick's and Yaffee's *Making Collaboration Work: Lessons from Innovation in Natural Resource Management* (2000).

Integrated management

Management of natural resources should recognise the linkages between land and water and between the economic and social systems dependent on biophysical systems, and that the management of one component can impact on the other.

Targeted investment

Government and community need to ensure that resources are targeted to address priorities and deliver maximum on-ground benefits.

Accountability

Those making decisions on natural resource management should be clearly accountable to government and the community, both in a financial sense and for biophysical outcomes.

The economic theory behind cost-sharing relationships between government and community groups is explained in depth with relevant examples in Marshall (2001, 2002, 2004, 2005).

Administrative efficiency

To maximise on-ground results, catchment management structures should facilitate efficient procedures and practices.

13.2 History of catchment management

The origins

The impetus for catchment management in Australia was initially soil erosion and loss of vegetation cover associated with gold mining. In the early decades of the 20th century the main issues were land use control, specifically controlling flooding, drainage and water supply. In fact, the first example of a catchment management organisation was in the Hunter Valley – Hunter Valley Conservation Trust – which was convened to co-ordinate water and land resource issues across the entire catchment (Burton 1992). The next wave of interest emerged in the early 1980s as continuing land degradation ensued and governments sought to resolve the fragmented approach to land management, and seek wider adoption of sustainable land management practices by land holders in the hope of addressing declining resource condition. The commencement of Landcare in the mid 1980s, most notably in Victoria, also paralleled the growth in catchment management across Australia.

Nevertheless, each State and Territory has chosen to follow different routes in their adaptation of catchment management principles. For NSW, Queensland, Victoria, and WA they are summarised below. For more extensive writings on all States and Territories refer to the following: Burton (1992), Conacher and Conacher (2000), Bellamy et al. (2002), Reeve et al. (2002), and Ewing (2003). It is worth noting that the States of Queensland, NSW and Victoria comprise the majority of the area known as the Murray Darling Basin (MDB).

The permutations

New South Wales

In 1987 the NSW Government released a policy for Total Catchment Management, and this was later formalised in legislation. NSW was the first State to legislate catchment management under the 1989 *Catchment Management Act*. The structure was through Catchment Management Committees (CMCs) which in turn were co-ordinated by a State Management Committee. The CMCs had broad representation and under the legislation were required to produce regional strategies with action plans to address vegetation, soil and water issues concerned with maintenance of quality and rehabilitation. The Department of Land and Water Conservation (DLWC) was the sole agency supporting CMCs, and by the mid 1990s there were 38 CMCs covering 80% of NSW (see Section 13.4 for an update). For a historical perspective on NSW's approach to Total Catchment Management (TCM), refer to Burton (1992).

Queensland

In Queensland, catchment management was operating under a State strategy from 1991, and has 30 Catchment Co-ordinating Committees (CCCs) that operate under a voluntary basis and with State and local government support. These CCCs have been formed to oversee the development of integrated catchment strategies. Two of these strategies have been developed and are being implemented, 27 strategies have been endorsed and await implementation, six strategies are in draft and three have yet to be developed.

By 1997, less than half of the CCCs had produced management strategies, and there was one regional strategy. In 1997, legislation was introduced (*Integrated Planning Act*) that consolidated 30 Acts of legislation to stream line the development and planning processes. Around the same time there was a new Landcare and Catchment Management Council which was overseeing the development of Regional Strategy Groups to integrate Landcare groups and CCCs. The State has been divided into 14 bioregions based on catchments, land, vegetation and socioeconomic factors (see Section 13.4 for an update). For a summary of the activity up to the mid 1990s, read Johnson et al. (1996).

Victoria

Victoria's regional approach to land and water management probably began in the 1960s when a number of farmer groups developed co-operative projects to tackle soil conservation issues with the State's Soil Conservation Authority. Arguably the advent of Landcare in 1986 in Victoria had a significant impact on catchment management in the State and marked an increasing emphasis on community and government working together to solve problems using an integrated, holistic approach (Ewing 1999). Inevitably, Victoria introduced Catchment and Land Protection Regional Boards in 1994 with the *Catchment and Land Protection Act* providing the framework to develop regional Catchment and Land Protection Boards (CALPBs) to cover the State in 10 regions. Within 2 years, each of the regions had developed a regional catchment strategy, based on previous planning cycles to develop, manage and conserve natural resources in the region. The other role of the CALPB was to provide advice on federal funding programs and State priorities for on-ground action in each region. In 1997, the functions of these boards and others with resource management responsibilities were consolidated in Catchment Management Authorities (see Section 13.4 for an update).

Western Australia.

Western Australia, like Queensland, has no specific catchment management legislation, but in 1987 adopted an ICM policy to link the activities of local governments and State agencies through community participation in local and regional structures. The umbrella group responsible for ICM policy was the Office of Catchment Management whose tenure was short lived, and lapsed after the creation of the Water and Rivers Commission in 1996. By 1995, 12 catchment groups had been established, but in 1998 four major regional groupings dominated (the Blackwood, Swan-Avon, Murchison-Gasgoyne and the South Coast) (see Section 13.4 for an update). For a case study of the Blackwood River refer to Ewing et al. (1999).

13.3 Review of catchment management achievements

In the early part of the 21st century there were a number of reviews of catchment management, under the auspices of the MDBC (Bellamy et al. 2002, Reeve et al. 2002), as well as examination of the various state models of catchment management by a parliamentary inquiry (HRSCHE 2000).

Goals and outcomes

What does catchment management hope to achieve? Below are the goals for the Victorian framework for catchment management. They are to achieve:

- Community involvement in and commitment to natural resource management.
- Ecologically sustainable development of natural resource-based industries.
- Maintenance and improvement in the quality of water and condition of rivers.
- Prevention and reversal of land degradation.
- Conservation and protection of the diversity and extent of natural ecosystems.
- Minimisation of the economic and environmental impacts of pest plants and animals.

Having read through the above goals one would be forgiven for being overwhelmed by the scope and magnitude of expectations on catchment management organisations to solve so many complex, interrelated environment problems. Are the above goals realistic, achievable and attainable? As Ian Reeve (pers comm., 11th January 2006) has said, 'ICM is like housekeeping it is never finished.'

As an example of the role and functions of catchment management groups the following section will examine the issue of monitoring catchment condition using activities undertaken in NSW, and has been updated from a research paper (Lobry de Bruyn 2003, retrieved 10 Oct 2006 from <http://www.regional.org.au/au/asa/2003/c/19/lobrydebruyn.htm#TopOfPage>).

Catchment monitoring is designed to provide data on present condition and trends describing the state of the catchment, either from an environmental, social or governance perspective. This information should provide timely feedback on progress towards the implementation of management solutions. This was a point stressed by Murray Darling Basin Ministerial Commission (MDBMC 2000) that 'Targets at the Basin and catchment scales for resource condition will translate to targets for improving management at a property scale.'

We will need to evaluate the links between targets at different scales, so that we can be confident that on-ground actions will lead to overall improvement in Basin health.' Nevertheless, the dilemma of catchment monitoring is that there may be 'suitable' indicators identified to monitor targets (Walker and Reuter 1996, SCARM 1998) yet they are either relying on individuals at the property level to record the data, or data is recorded by other organisations at a scale that is irrelevant to decision making at the property level. Either way the aforementioned situation is problematic for effective implementation of catchment management plans, especially as governments are increasingly focusing attention at this scale in order to achieve environmental benefits. Finally the monitoring of catchment health should allow all 'partners' (communities and governments) to agree on how healthy our catchment should be (goal), knowing the full costs involved with achieving the proposed goal.

A Catchment Target as defined by the then Department of Land and Water Conservation (DLWC 2000):

'is a precise definition of an acceptable condition of a natural resource or combination of resources at a given point at a given time, providing a broad indicator of catchment health ... They should integrate the environment, social and economic outcomes communities want, but should be expressed in biophysical terms.'

Examples of targets, including management targets are:

- 80% of banks stable for all 1st and 2nd order streams by 2020
- at least 40% of farmers located in the slopes area of the catchment using opportunity cropping to reduce deep drainage by 2010.

It was the role of the CMAs to identify the key natural resource issues, targets (catchment and management), and actions (management strategies) required to achieve the targets. Arising from their efforts have been Catchment Action Plans. Management targets are being set for all Catchment Targets of CMAs in NSW relating to water quality (salinity and nutrients), water sharing (environmental flows and consumption), terrestrial biodiversity (vegetation area), and riverine ecosystem health. As yet there is no agreed suite of performance indicators that would assess whether catchment/management targets have been reached, and minor emphasis has been given to soil health issues such as erosion, soil acidity or soil structural decline.

Monitoring and evaluation were mentioned in all these Action Plans, but specific strategies to engage farmers in monitoring were not identified any more specifically than in terms of raising awareness, and providing incentives and education. It has been reported in the National Land and Water Resources Audit that monitoring of soil, vegetation and water tables are measures of the level of landholder adoption of sustainable management practices, yet the proposition that farmers will collect, store and transfer 'data' on natural resource condition that can be used by CMAs to monitor progress towards Catchment Targets has yet to be tested. Also the present level of, and nature of, natural resource condition monitoring by farmers is largely unknown. Nevertheless, a recent proposal by the Environmental Management Systems (EMS) Working Group (discussion paper at: <http://www.daff.gov.au>) suggests that the implementation of an EMS framework will provide the 'linkages with key agencies to ensure actions by individual landholders on their own properties can align with regional targets and contribute to larger scale environmental outcomes. ... while EMS may be a valuable tool for translating broad regional strategies into practical on-farm actions.'

Difficulties, future needs and trends

In Conacher and Conacher (2000) there was an extensive list of future needs for ICM, landcare and the ability or capacity to integrate both into regional organisations as the 'new generation' of natural resource management organisational or governance focus (see Section 13.4). A summary by Industry Commission (IC) (1998), Conacher and Conacher (2000), HRSCHE (2000), Beilin (2001), Bellamy et al. (2002), and Ewing (1999, 2003) concerning future needs has been set out below, as well as some personal insights into the catchment management process and outcomes. Many of the points below deal with the difficulties of how to maintain in the long term the principles outlined in Section 13.1 or the goals of catchment management summarised in the previous page.

Institutional and structural arrangements

- Catchment management organisations need legitimacy by being formally recognised by governments and agencies under statutory arrangements, even though some States seem to be operating reasonably well without legislation, Queensland for example.
- A central office is required, such as Victorian Catchment Management Council (VCMC), as a focus for providing information, for meetings, conferences and co-ordination of State efforts, such as the environmental condition and management of Victoria's land and water resources through the VCMC Catchment Condition Report.
- Devolution of responsibility to CMAs is often seen as the fourth, 'pseudo' tier of government, and often agencies responsible for supporting regional CMAs are concerned about overlap of responsibilities and lack of community support.
- Agency support for catchment management groups in some States is fractured, and fragmented, as in WA where there are six agencies responsible for various components of ICM policy and 77 Acts of legislation (HRSCEH 2000), and this has led to distinct separation of tasks. Instead of co-ordinating roles and functions between agencies to deliver integrated programs, there is competition and jostling between agencies for superiority.
- Inadequate funding for catchment management groups to carry out their duties, and an over-reliance on volunteers to participate in catchment management organisations, diminishes their performance, and threatens their survival.

Process and human dimension issues (e.g. social capital)

- Leadership needs to be effective and provide groups with good guidance, skills in communication, conflict resolution and consensus building as well as commitment to the program and networking skills.
- Lack of clear roles, responsibilities and goals for catchment management groups means that catchment management is too complex and needs to be 'too many things to too many people'. As the adage goes, 'you can't please all of the people all of the time', but catchment management is in danger of pleasing no-one.
- Maintaining community interest and involvement in catchment management is under threat especially as many land managers are lacking the resources or ageing or lacking enthusiasm or over committed to other causes
- Scale of catchment management boundaries and size of catchment groups need to be considered in terms of community involvement and relevance. On the one hand, too large a region may lose contact with its constituency, while smaller regions may have difficulty building a critical mass to gain recognition.
- Representatives on CMAs are usually appointed by the Minister on the basis of skills, merit, and local knowledge of the region rather than being elected. This has led to friction, with some organisations believing CMA representation is too heavily weighted to agricultural producers or elitist and not inclusive enough of all members of the community.
- Support staff for CMAs are often seen as inappropriately trained, lacking skills in conflict resolution or group facilitation, expertise in computing such as GIS, and experience (sometimes straight from university). Nevertheless, they also may lack employment security, being employed under short-term contracts.
- Funding of CMAs is largely driven by Federal Government initiatives such as the, National Heritage Trust (NHT) and National Action Plan for Salinity and Water Quality (NAP). The NAP delivers programs through CMAs or regional organisations, and they have to first have their programs accredited before the funds are made available. Hence CMAs require sufficient funds, capacity and resources to deliver such targets. At this stage, Victoria and NSW have CMAs that are well-funded and have formalised structures.

Information and learning needs

- The scientific basis for making credible decisions within CMAs is taking place in a knowledge vacuum.
- There is an absence of data or data of insufficient detail for making management decisions at the regional or local level.
- There is a lack of agreement at many levels on the type of indicators required for monitoring catchment condition, and data paucity on most established catchment condition indicators. Hence, informed debate about the current state of catchment health and the ability to prioritise funding for on-ground works based on real natural resource management problems (as opposed to perceived)

is difficult. Even the prioritising of funding for landcare projects in terms of positive outcomes for the environment is difficult to determine if the nature and scale of land degradation remains unquantified over time.

- There is a lack of information on the impact of catchment management programs on resource condition to provide feedback to planning cycles, and evaluation of present programs, which leads to accusations by funding bodies that community groups are not accounting for their activities.

Among the emerging trends identified by Bellamy et al. (2002) were the:

- Widening of issues being considered under the auspices of catchment management bodies.
- Increasing devolution of responsibility to regional organisations such as catchment management, the local level of government and to the community.
- Increasing emphasis placed on governments to form partnerships with community groups and other agencies in solving problems.
- Current inadequacies of biophysical knowledge (e.g. not current or specific enough) being used in the decision-making process, yet science has yet to explore the possibility of incorporating other forms of knowledge such as local experience.
- Loss of community participation and the claim that catchment management groups are becoming a 'top-down' approach to elicit community support without genuine community involvement (Ewing 2000).

To these can be added the economic trends noted by Marshall (2001):

- An increasing tendency for government funding for local land resource management to require local funding contributions (including in-kind contributions).
- Increasing formalisation of these funding arrangements in partnership agreements.
- Growing concerns about improving accountability. Strengthening accountability measures can lead to further costs through discouraging innovation in project design and implementation. As observed by Carr (2002 p.150), this effect arises from the conventional 'preoccupation with things numeric' in accountability arrangements, such as 'length of fence lines established or number of trees planted'. Factors that are difficult to measure but important for project success tend to be sidelined as a result.

13.4 Present situation: Beyond catchment management committees to regional organisations

Driving the structural changes in catchment management has been the funding arrangements between State Governments and the Federal Government, especially through two main environmental programs:

- The National Action Plan for Salinity and Water Quality (NAP). The Commonwealth and State/Territory Governments have invested a combined \$1.4 billion to address salinity and water quality issues in priority catchments in Australia through the NAP over 7 years.
- In its 2001 budget, the Commonwealth extended the NHT for a further 5 years, from 2002-03 to 2006-07, by contributing an additional \$1 billion. NHT addresses a broader range of NRM problems than the NAP, and consists of four programs: Landcare, Bushcare, Rivercare and Coastcare.

Both NAP and NHT are seeking investment at three levels – National/State, regional and local – with regional investment to be the principal delivery mechanism, and utilising regional authorities or CMAs as the partners to deliver the investment against accredited plans. Investments will be targeted to priorities identified through the development of integrated natural resource plans by the community, working in partnership with government. In the NAP priority regions, delivery of NHT and NAP funds will be integrated subject to meeting separate auditing and evaluation requirements for the two programs. There are 64 NRM regions across Australia.

Queensland

The aim of planning for natural resource management on a regional basis is to integrate all planning within a catchment, and to include targets for action and investment strategies.

The plans are developed by the community (with agency and local government cooperation) or more correctly by members of the CMAs (formerly CCCs) under the NAP and NHT initiatives. Queensland has been divided into 14 regions, or super-catchments, based on shared interests or common problems for the collection of individual catchments or CMAs that comprise a region. In addition, the boundaries of the larger regions were also selected with a view to building on existing social cohesion. Each of the 14 regions is in the process of developing its own plan. The plans - Regional Natural Resource Management Plans - are advisory and have no statutory force. Nevertheless these Plans can be linked to and incorporate outcomes of various 'Forms of Planning' under Federal and State Acts, such as the *Integrated Planning Act 1997*.

For an overview of the Regional Approach being used in Queensland please read as a pdf on CD: *Prospectus Version 1 – Product and Services available to regional management bodies*, by the Department of Natural Resources and Mines (Anon. 2003).

NSW

In December 1999, the NSW Government announced that the community-government partnership in natural resource management would be strengthened by the establishment of new catchment management boards (formerly Catchment Management Committees) across New South Wales. Nineteen CMBs were established under the *Catchment Management Act 1989* and the *Catchment Management Regulation 1999*. Board members represented the community, industry and government, in the following categories: nature conservation interests, primary producers/water users/natural resource users, local government, Aboriginal interests, and State Government.

The Boards had five specific functions:

- Identify the critical opportunities, problems and threats associated with the use of natural resources so as to support rural production and to protect the environment.
- Identify the critical first order objectives and targets for the management of natural resources, having regard to any legislation or relevant Government policy.
- Develop management options, strategies and actions to address the identified objectives and targets.
- Assist in developing a greater understanding within the community of the issues identified and action required to support rural production and protect the environment.
- Initiate proposals for projects to achieve these functions and assess projects submitted for funding under Commonwealth and State natural resource management grant programs having regard to targets identified by the Board.

The Board had to develop, catchment action plans, which are 10-year advisory plans for integrated catchment management. There were 21 action plans covering the whole of NSW. They were endorsed by the NSW Government in late 2002. The agenda remains the same, but has been reduced to 13 Catchment Management Authorities (CMAs) covering in some cases amalgamated areas. The new CMAs are governed by the *Catchment Management Authorities Act 2003* (URL: http://www.austlii.edu.au/au/legis/nsw/consol_act/cmaa2003316.txt accessed 24 March 2004). Under the new CMAs, selection and appointment of Chairs and Board members are guided by the following operating principles: The Board of a CMA is to consist of such members (being not less than five and not more than seven) as are appointed by the Minister. The members of the Board of a CMA are to be persons who together have, in the opinion of the Minister, skills and knowledge in the following areas:

- primary production
- environmental, social and economic analysis
- State and local government administration
- negotiation and consultation
- business administration
- community leadership

- biodiversity conservation
- cultural heritage
- water quality

The Minister is to ensure that, as far as practicable, the persons appointed as members of the Board of a CMA reside in the area of operations of the CMA. The Minister is to appoint one member of the Board of a CMA as the chairperson of the Board and another member as the deputy chairperson of the Board.

Victoria

Victoria has the longest history of autonomous Catchment Management Authorities (CMAs). In 1997, the functions of these Boards and others with resource management responsibilities were consolidated in Catchment Management Authorities. Victoria could be said to have proceeded further than other States and Territories in its attempts to establish funding stability and autonomy for its Catchment Management Authorities

The Victorian Catchment Management Council (VCMC) is the State Government's peak advisory body on catchment management. The Council is independent of government agencies, Catchment Management Authorities and non-government organisations, and is able to take a long term view and influence change in working towards its vision for catchment management:

Victoria will have healthy rivers flowing through ecologically sustainable and productive catchments.

VCMC takes a state-wide view on land, water and biodiversity issues and priorities related to catchment management. It facilitates integrated and coordinated catchment management through Victoria's Catchment Management Framework.

The major statutory roles of the VCMC include:

- To advise the Minister for the Environment, and any other Minister as requested, on land and water management issues.
- Report annually on the operation of the CALP Act 1994.
- Report every 5 years on the environmental condition and management of Victoria's land and water resources through the VCMC Catchment Condition Report.

The VCMC works particularly closely with the Department of Sustainability and Environment (DSE), Department of Primary Industries (DPI) and Environment Protection Authority Victoria (EPA). In addition, the Council encourages cooperation between the major sectors of local government, community conservation and environment organisations, industry, State and Federal agencies and regional catchment management authorities by facilitating communication through various projects and forums.

The Council has a unique relationship with Catchment Management Authorities (CMAs). It is not responsible for the operation of CMAs, nor does it oversee their work. However, the Council must be receptive to issues which emerge from the regions in developing a State-wide position. It also provides the opportunity for CMAs to contribute to the policy and strategic picture at State level. Effective communication is critical to this process.

The basic structure of a CMA is designed to maximise community involvement in decision-making. This structure comprises:

- The Board who are directly responsible for the development of strategic direction for land and water management in the Region. They set priorities, evaluate the effectiveness of outcomes, monitor the external and internal environment and identify opportunities.
- The Implementation Committees (ICs) are the conduits for local community input, and are responsible for the development of detailed work programs and the oversight of on-ground program delivery for specific issues or sub-catchments.
- The Staff are there to support the Board and ICs, oversee development and implementation of programs and liaise with the community, government and other catchment-focused organisations.

Western Australia

Since 1996, regional teams have been providing natural resource management information to catchment groups. This process had produced 26 focus catchment plans by 2002. While the Department of Agriculture Western Australia (DAWA) is the lead agency for Rapid Catchment Appraisal (RCA), other government agencies were also involved including: Conservation and Land Management (CALM), the Department of Environment and CSIRO. Approximately 30% of Western Australia (WA) is managed using integrated catchment management (ICM) approaches.

The RCA began initially to support the State Salinity Strategy of April 2000, and its original charter was to provide information on salinity - the current extent, future risk/threats to agricultural land and public resources and infrastructure, and management options for reducing the risk and threats - for all farmers in the south-west of Western Australia within 5 years. It soon was expanded to include all significant land-degradation risks, not just salinity. The current aim is to report on the status of the natural resources, assess the risks of degradation arising from agricultural activities to both farming land and public assets (soils, water, vegetation and infrastructure), identify changes in agricultural practices to reduce these threats and estimate the benefits and costs (economic, environmental and social) of implementing these changes. The reports are also to include a guide to further, related information and advice for farmers, catchment managers, shires, and personnel working in natural resource management.

The south-west portion of Western Australia is now divided into six Natural Resource Management (NRM) regions which operate with an Australia-wide framework for regional natural resource management. They are in WA: South West, South Coast, Swan, Avon, Northern Agriculture and Rangelands.

The South West Catchments Council (SWCC), of which the Blackwood Basin Group is one of six sub-regional groups and is expected to:

- Provide leadership on NRM matters within the region.
- Coordinate partnerships between the community and all levels of government to share responsibility for NRM.

To undertake these roles the SWCC undertakes the following functions:

- Supporting communication and information sharing within the region.
- Advocating and brokering support for improved NRM.
- Co-ordinating implementation of State and Commonwealth NRM policies and programs relevant to the SW region.
- Co-ordinating the development of a targeted, strategic approach to NRM.

MDBC

The Murray-Darling Basin Initiative is a cooperative arrangement between the Commonwealth and five State/Territory Governments (Queensland, NSW, Victoria, ACT and SA) and the community. It covers an area of over 1 million km². The main focus of the Initiative has been management of the shared water resources of the Basin using a whole-of-catchment approach, taking into account the relationships between natural systems, including land, water and other environmental resources.

In 2001, the Murray-Darling Basin Commission released a strategy to achieve ICM in the Basin: *Integrated Catchment Management in the Murray-Darling Basin 2001 – 2010* (MDBMC 2000). The strategy recognises that ICM needs to be carried out at the catchment level for effective outcomes since:

- The health of the Basin depends on the aggregate health of its catchments.
- Catchments are an appropriate scale for many management actions.
- Catchment communities are more likely to act if they make their own resource management decisions.

The outcomes sought through ICM in the Basin will differ from catchment to catchment, however all aim to protect assets at risk from continuing degradation, including environmental assets (e.g. wetlands, fish, birds and native vegetation). The document states that during the next 10 years, 2001-2010, targets will be set across the Basin to ensure the health of each catchment, and the health of the Basin as a whole, for:

- water quality
- water sharing
- riverine ecosystem health
- terrestrial biodiversity

Two of the areas identified for target setting, namely water sharing and riverine ecosystem health, give special consideration to wetlands. The target to achieve water sharing aims to establish flow regimes that provide an appropriate balance between consumptive and in-stream, wetland, floodplain, riparian and estuarine water requirements (consumptive use includes: irrigation, stock and domestic use, and urban water supplies). The target set to achieve riverine ecosystem health seeks to maintain or re-establish viable populations of native species and the integrity of ecological communities throughout their range within floodplain, wetland, riparian, in-stream and estuarine ecosystems. The document also states that targets for catchments can be set in specific locations in order to protect valuable assets, such as significant wetlands.

The following elements of the policy are designed to bring about change:

- the focus on making difficult choices about the balance between the use of resources for production and the need to protect environmental health
- stronger institutional arrangements for catchment management, with clear roles and responsibilities, and increased accountability
- integrating land use planning and catchment planning
- more targeted use of market based mechanisms to drive change
- accreditation of catchment strategies and plans
- reporting to the Murray-Darling Basin Ministerial Council and the Australian public

13.5 Case studies: Catchment management of soil, water and vegetation

Case study 1: Soil and water management - salinity in Western Australia

A total of \$6 million will be spent developing salinity management demonstration projects in four Western Australian catchments which will guide farmers to address salinity. This was the first joint funding commitment for WA under the NAP bilateral agreement between the State and Commonwealth Government. The WA Government, the Commonwealth and regional NRM groups are combining to demonstrate viable salinity management systems as part of the NAP.

The Catchment Demonstration Initiative (CDI) aims to:

- demonstrate combinations of salinity management practices to recover saline land.
- restrict its development.
- allow profitable uses of saline land and water.

The outcomes will be delivered in partnership with NRM Regions by co-investment in targeted, large-scaled, catchment-based demonstrations of integrated salinity management practices. Please see the reading Kington and Smettem (2000) for more information.

Case study 2: Biodiversity

Fitzroy Basin Association (www.fba.org.au) is one of the 13 regional organisations in Queensland developing regional plans. The Great Barrier Reef has significant world heritage and biodiversity value is parallel to much of the coastline of Queensland. *The Central Queensland Strategy for Sustainability – 2004 and Beyond* (CQSS2) (Christensen and Rodgers 2006) is the regional plan for the management of the natural resources and environments of the river catchments of the Central Queensland region. The plan seeks to protect the region's assets through addressing key pressures.

The CQSS2 (Christensen and Rodgers 2006) is an example of a regional plan produced through community consultation with the people of Central Queensland through the Fitzroy Basin Association (FBA) over at least a year (2004 and 2005). In terms of protecting coasts, wetlands and riparian areas the FBA and CQSS2 have targets of enhancing 100 ha of regionally significant coastal wetlands, estuaries (and fringing riparian areas), 50 ha of State and Nationally significant ecosystems, 2400 m of foreshore, and monitoring programs established for migratory birds, turtles and seagrasses. For greater detail please refer to: Christensen, S. and Rodgers, C. 2006, *Central Queensland Strategy for Sustainability 2004 and beyond*, Fitzroy Basin Association Ltd, Rockhampton, Qld, 235 pp. Each chapter is available as a pdf from: http://www.fba.org.au/plan_investments.htm.

In Western Australia the work of the Blackwood Basin Group on vegetation biodiversity has been summarised as a case study: <http://www.deh.gov.au/biodiversity/publications/case-studies/pubs/blackwood.pdf>.

The Blackwood Basin is situated in south-west of Western Australia extending from Augusta on the coast to Kukerin in the wheat belt covering 2.35 million ha. The Basin is home to 40 000 people and contributes \$550 million to the Western Australian economy. More than 60% of the catchment area is used for some form of agricultural production.

The aim of the Blackwood Biodiversity Program is to:

- Protect and enhance as many bush areas as possible within the Blackwood catchment that are of high biodiversity value.
- Work in conjunction with existing Government, natural resource professionals and community networks to identify both individual sites of high biodiversity value, as well as piloting landscape level biodiversity conservation.
- Educate landholders on the benefits of incorporating biodiversity into their current land management system.

The core of the program is the strategic targeting of funds available by prioritising bush areas identified as potentially being of high biodiversity value. A model was developed by the WA Department of Agriculture to rank the 24 000 patches of bush over 1 ha, existing within the Blackwood catchment.

Case study 3: Vegetation

The Heartlands initiative aims to improve land use in the Murray-Darling Basin thereby preserving land and water resources and sustaining commodity production (<http://www.clw.csiro.au/heartlands/overview/index.html>).

Heartlands combines a research program directly with the implementation of on-ground works such as tree planting, protection of remnant vegetation, establishment of perennial pastures and erosion protection measures. The research guides the on-ground works to ensure maximum environmental benefit from the works expenditure. The close linkage with on-ground implementation ensures that the research remains relevant and well focused.

The project teams in Heartlands are working in four different catchments within the Murray-Darling Basin. They are investigating new land management options that will be effective in repairing and preventing environmental damage. These strategies for careful, targeted land use change will address the economic and social objectives of people living in the Basin.

The Heartlands team will measure the effectiveness of re-vegetation options to ensure their success, and support local communities in implementing improved management of their farms and catchments.

In particular, Heartlands focuses on:

- integrated catchment management strategies
- salinity
- water quality
- water yield
- biodiversity
- carbon sequestration potential
- commercially viable systems of farm forestry and mosaic agriculture.

Simmons Creek was a case study as part of the Heartlands Project (CSIRO) and features in Chapter 5 of the publication below.

Cresswell, H. (ed.), 2004, *Heartlands Planning for Sustainable Land Use and Catchment Health*. Report No. HL9-04 Retrieved 10 Oct 2006 from: http://www.clw.csiro.au/heartlands/publications/tech_publications.html.

In Victoria, the Woody Yaloak Catchment Group (<http://www.woodyyaloak.com.au/>) was one of the earliest Landcare groups using a catchment focus. In 1992, the Pittong, Werneth, Rokewood and Misery Moonlight landcare groups (in Victoria's Western district) joined forces to form the Woody Yaloak Catchment (WYC) Group. The groups' focus was to tackle land degradation in a whole catchment. The initial project involved 80 landholders in the 120 000 ha catchment area from Haddon to Cressy, south west of Ballarat. The community established a five year plan, managed by a local committee, to establish 3500 ha of deep-rooted perennial pastures, plant 135 000 trees and decrease the rabbit population. This was achieved within a 4 year time frame. The mission of the WYC Project committee's is to promote productive catchment management.

The 10 year history of the WYC Group is summarised in the 2003 Annual Report (<http://www.woodyyaloak.com.au/pdf/ar2003.pdf>). Currently, the Woody Yaloak Catchment involves about 170 landholders and has on average 65% participation per year. There are three important publications that summarise the work of the Woody Yaloak Catchment. They are:

- Alice Knight and Cam Nicholson, *A Journey in Catchment Management Landholder Experiences from the Woody Yaloak Catchment*, International Landcare 2000. <http://www.woodyyaloak.com.au/pdf/lccmar2000.pdf>
- Cam Nicholson and Alice Knight, *Auditing 10 years of landcare in the Woody Yaloak Catchment - How are we progressing along the triple bottom line?* National Landcare Conference, Darwin 2003. <http://www.woodyyaloak.com.au/pdf/10yearaudit.pdf>
- Cam Nicholson, *Corangamite Regional Case Study, the Woody Yaloak Catchment Project*. National Landcare Facilitator Community Conference. LANDCARE - Linking Science to Paddocks. 2005. <http://www.woodyyaloak.com.au/pdf/National%20Landcare%Conference%20%20paper2005.pdf>

Readings



The following readings are provided on CD:

1. Anonymous 2003, *Prospectus Version 1 – Products and services available to regional natural management bodies*, Queensland Department of Natural Resources and Mines, Brisbane.
2. Anonymous 2005, *Annual Report 2004-2005*, Victorian Catchment Management Council, p. 50.
3. Barr, N., Ridges, S., Anderson, N., Gray, I., Crockett, J., Watson, B. and Hall, N. 2000, *Adjusting for Catchment Management: Executive Summary*, Murray-Darling Basin Commission, Canberra, ACT.
4. Bellamy, J., Ross, H., Ewing, S and Meppem, T. 2002, *Integrated Catchment Management: Learning from the Australian Experience for the Murray-Darling Basin, Overview Report*,

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- CSIRO Sustainable Ecosystems, Canberra, ACT.
5. Kington, E.A. and Smettem, K.R.J. 2000, Evaluation Of Policy Approaches To Dryland Salinity Management In The Kent River Catchment, *SEA News*, Issue 7, Agricultural and Resource Economics, University of Western Australia.
 6. Murray-Darling Basin Ministerial Council (MDBMC) 2001, *Integrated Catchment Management in the Murray-Darling Basin 2001-2010*, Murray-Darling Basin Commission, Canberra, ACT.
 7. Reeve, I., Frost, L., Musgrave, W. and Stayner, R. 2002, *Overview Report, Agriculture and Natural Resource Management in the Murray-Darling Basin: A Policy History and Analysis*, Report to the Murray-Darling Basin Commission, Institute for Rural Futures, Armidale, NSW.
 8. Reeve, I., Marshall, G. and Musgrave, W. 2002, *Resource Governance and Integrated Catchment Management*, Issue Paper No. 2, Murray-Darling Basin Commission Project MP2004, Institute for Rural Futures, Armidale, NSW.
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Activities



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Summary

The need for integrated catchment management has been demonstrated by the rising levels of land degradation and escalating resource deterioration of soil, water and vegetation in Australia. This topic deals with the integrated catchment management as a philosophy, a process and a product (Syme et al. 1994), and summarises the guiding principles that underpin catchment management as it has been adapted across Australia. The major principles are to apply the concepts of sustainable development, community empowerment and engagement, integrated management, targeted investment, accountability, and administrative efficiency.

An overview of the history of catchment management from the mid 1980s to early 2000s then follows for the States that have the majority stake hold of the Murray Darling Basin as well as Western Australia. Victoria, probably has the longest established Catchment Management Authorities that have legally binding powers and are comparatively well-funded. In contrast Western Australia and Queensland have non-statutory authorities vested with catchment management responsibilities and in each of these States they have had varying degrees of success in implementation of catchment management goals.

The next section detailed the goals and aspirations of catchment management bodies. The types of functions and activities they are responsible for will depend on the type of framework, and whether the outcomes are legally binding. Normally, catchment management bodies will be responsible for creating a plan of management for the catchment and setting resource condition and management targets and strategies to achieve those targets. They are responsible for supporting community groups, allocating funds for on-ground works and reporting on funding outcomes. This section then goes on to summarise from a number of different reviews the difficulties, future needs and trends in catchment management and its application to Australian conditions. Most notably is the institutional and governance structure design needs of catchment management bodies that will ensure their survival, and the continued support and involvement of the community.

The current generation of catchment management bodies – regional organisations – is discussed in light of recent developments, since 2002, and largely from material collated from the internet, although Ewing's review (2003) is reasonably up to date with the exception that NSW now has Catchment Management Authorities. There are 64 NRM regions in Australia, with regional

organisations developing and implementing integrated regional NRM strategies with the support of the Commonwealth Government through the Natural Heritage Trust (NHT). These strategies with their accompanying Investment Plans will provide potential partners with indicators of how their investment is going to target priorities and deliver resource condition change. Once these Plans have been accredited by the State and the Commonwealth Governments, they will provide a targeted framework for funds from the NHT Extension program and the NAP.

The final section documents some case studies in catchment management examining the application of catchment management to natural resource management problems such as salinity, biodiversity and revegetation.

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Glossary of terms

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| Catchment | The geographical area which catches and drains water to a given point or points. |
| Catchment group | A stakeholder group (including local and State Government, industry, business, and community members) that works together in a plan to implement ICM. |
| Catchment plan | A management plan devised to manage land, its environmental and social resources on a catchment basis. |
| CQSS2 | Queensland Strategy for Sustainability – 2004 and Beyond |
| CMAs | Catchment Management Authorities |
| Environmental values | All the natural resources and ecological processes in a region |
| ICM | Integrated Catchment Management |
| Integrated Catchment Management | The planning and management of natural resources on a river or ground water catchment basis to achieve sustainable use which provides social and economic benefit. |
| MDBC | Murray Darling Basin Commission |
| NAP | National Action Plan for Salinity and Water Quality |
| Natural resource management (NRM) | Ecologically sustainable management of land, water and biodiversity resources (does not include mineral or marine resources). |
| NHT | Natural Heritage Trust |
| Stakeholders | Community members, businesses or Government authorities who have a stake in an issue or are affected by a project. |
| VCMC | Victorian Catchment Management Council |

