

Context

The Agriculture, Fisheries and Forestry (AFFA) Portfolio is the Commonwealth Department responsible for water, soils and other natural resources. It plays a key role in assisting and encouraging Australian agriculture, food, fisheries and forestry industries to become more competitive, profitable and sustainable. To achieve those objectives, AFFA delivers research, policy advice, programs and services through its various groups and divisions.

Natural resource based industries – agriculture, forestry and fisheries – make an important contribution to the national economy. Gross Domestic Product in 1997-98 was \$16 818 million (ABS, 1999) and exports for 1998-99 are estimated at \$25 353 million (ABARE, 1999). The viability of these industries is closely associated with the viability of rural and regional communities in Australia.

Achieving sustainable management of the natural resource base is a key component of AFFA's responsibilities. The vision of AFFA's Natural Resource Management Policy Division is to provide sustainable use of Australia's land, water and vegetation resources for the well being of all Australians. The achievement of sustainable natural resource management depends on the development of national policies and programs that are underpinned by scientific and economic assessments, analysis and advice and linked to effective evaluation models to provide feedback mechanisms.

Natural resource management operates at international, national, local and farm levels. At the international level the pursuit of world trade liberalisation through the World Trade Organisation, and increasing demands for products in meeting ISO 14 000 environmental standards, are likely to require responses at regional and catchment levels. Consumers are also demanding products to be safer and healthier and to have environmentally sound production systems. Similarly, shifts in regional economies, such as the Asian crisis in 1998, with effects on export earnings of Australian commodities, have an impact on the capacity of landholders to invest in natural resource management. Australian policies in response to the Kyoto Protocol, adopted by the United Nations to control greenhouse gas emissions, will also influence the type and scale of land management practices, particularly as those practices affect carbon sequestration. The overall impact of these trends is that Australian farmers will need to continue to adopt improved natural resource management practices.

At the national level, governments have developed policy responses to achieve environmental sustainability within the context of those international developments. Strategies such as the National Strategy for Ecologically Sustainable Development and the National Strategy for the Conservation of Australia's Biological Diversity have had significant influences on land management practices in the rural sector. The Natural Heritage Trust is the government's major current initiative to conserve Australia's environmental infrastructure, improve the management of Australia's natural resources and encourage sustainable agriculture.

Box 1. Catchments and Catchment Management

A water *catchment* or watershed is an area of land bounded by natural features of hills or mountains from which all water run-off drains through a simple channel into a river, stream, lake, wetland or estuary. Essentially they are units based on the natural water cycle where water enters and moves through the system (Land and Water Management Council, 1997). Catchments scale upwards with spatial dimensions ranging from a few paddocks to thousands of km² and they can be linked according to a logical hierarchy.

Catchment management is the holistic management of natural resources within a catchment unit encompassing interrelated elements of land and water, managed on an ecological and economic basis and incorporating social systems (Natural Resources and Environment Department, 1999). It is a system that favours the integration of environmental policy across government, community, and industry sectors through partnerships and extensive stakeholder inclusion.

The Role of the Commonwealth

The Australian Constitution makes no specific mention of the environment, or responsibility for land use decision making. Therefore, the States and Territories have held prime responsibility for environment, conservation and land use matters. Nevertheless, sections of the Constitution give the Commonwealth trade and commerce power that can have significant implications for land use and land management practices.

The Commonwealth has become involved in land, vegetation and water degradation issues because of their significance to the national economy and environment, and because the government recognises that national involvement and leadership is required to ensure adequate and co-ordinated action.

Structure of the Submission

This submission is structured to address the terms of reference of the inquiry. These are:

1. The development of catchment management in Australia
2. The value of the catchment management approach
3. Best Practice Methods of preventing, halting and reversing environmental degradation in catchments, and achieving environmental sustainability
4. Role of different levels of government, the private sector and the community in the management of catchment areas
5. Planning, resourcing, implementation, cooperation and coordination in catchment management.
6. Mechanisms for monitoring, evaluating and reporting on catchment management programs, including the use of these reports for state of the environment reporting, and opportunities for review and improvement.

1. The development of catchment management in Australia

The catchment management approach had its beginnings in the environmental movement in the early 1900s. During that period public perceptions of environmental threats increased, mainly in recognition that rivers, in particular, were being used as dumping grounds for waste water, but at the same time were also water sources for human consumption and industry (Heathcote, 1979). In the period immediately following the First World War the environmental limits to increased production and further intensification of rural settlements began to be considered. Some people during that period fostered a wider community awareness of the dynamic interrelationships between land and water.

Box 2. The Natural Heritage Trust was established by the Commonwealth Government in 1996 and is a partnership of all Australians, bringing together efforts of individuals, communities and governments targeting environmental problems at their source. The goal of the Trust is to stimulate activities in the national interest to achieve the conservation, sustainable use and repair of Australia's natural environment.

The Commonwealth is investing \$1.5 billion over six years. AFFA promotes education and awareness at the national level and provides funding for community projects including strategic planning, on ground activities, community awareness, skill development and education. The Trust provides a catalyst that encourages all levels of government and the community to contribute resources and effort to environmental protection, sustainable agriculture and natural resources management in Australia.

By the 1930s and 1940s wind and water erosion had become widespread due to the combination of inappropriate agricultural practices and drought. The dust storms that resulted were devastating and caused extensive erosion of topsoil, choked rivers and rendered agricultural land unproductive in many parts (Heathcote, 1979). Following the Second World War the management of water resources became critical to development and it was recognised that the planning for the full use of water resources needed to consider each river valley as a whole. Australia had a number of champions for catchment approaches. A notable one was the late Ernest ('watershed') Jackson from Albury who became widely known for his dedication to the catchment management concept. He emphasised the importance of educating farmers in the integrated management of entire valleys and catchments (Powell, 1993).

Although agricultural productivity continued to increase, it became widely recognised that human activity had changed the natural resource base resulting in increasing wind and water erosion, dryland salinisation, reducing availability of ground water, deteriorating water quality and rising water tables. It also became evident that, agricultural production, with existing technologies was likely to be unsustainable.

By the late 1970s, soil conservation agencies in each state were moving closer towards embracing the concept of using whole catchments as practical natural resource management units. The seriousness and continuing nature of land degradation and impacts on agricultural production resulted in a series of government interventions commencing with the National Soil Conservation Program and Federal Water Resources Assistance Program in 1983 (Commonwealth of Australia, 1997). These programs focussed on equipping individuals and agencies to deal with specific problems in localised areas. By the late 1980s, with the stimulus of the Commonwealth's National

Soil Conservation Program, the management of land degradation was becoming more interdisciplinary in scope and displaying greater commitment to holistic management of land and water.

National developments in the early 1990s, including the Commonwealth and State Decade of Landcare Plans and the establishment of the National Landcare Program, contributed to the evolution of widespread awareness and understanding of the way natural systems work. Those programs emphasised the importance of addressing the causes of land degradation, rather than just the symptoms and recognised the interdependence of environmental and production systems. They also emphasised the importance of community involvement within a framework of Commonwealth, State and local government responsibilities.

The Murray-Darling Basin Commission was formed in 1988 by four participating governments (Commonwealth, New South Wales, Victoria and South Australia). It recognised the importance of promoting fundamental changes in the values and attitudes of Basin residents and providing leadership on natural resource issues across a wide and varied community in the Basin (Powell, 1993). In short, it was an effort to engage grass-roots interest and provide leadership and support for addressing land and water degradation issues. The Murray-Darling Basin Commission has allowed basin wide approaches to natural resource management to be effected. The implementation of the “cap” on water allocations in the Basin is an example.

Major shifts towards the catchment approach developed in response to significant changes in thinking towards addressing natural resource management. The most important of these was the shift towards integrating ecological and economic considerations, rather than considering these issues in isolation (Commonwealth of Australia, 1991).

Another major development in catchment management was the integration of land and water institutions and agencies within the Commonwealth and the States. That change reflected the need to develop initiatives that integrated the land and water elements to address natural resource management problems more comprehensively (Gardner, 1999). Separate Ministerial Councils for soil, water and agriculture amalgamated into a single Agriculture and Resource Management Committee of Australia and New Zealand. Further, a Land and Water Resources Research and Development Corporation was established within the primary industries portfolio. Within AFFA, soil and water programs were amalgamated and programs coordinated across Commonwealth Departments. Restructuring occurred similarly within the states. As an example, the former Department of Water Resources, a part of the Public Works Department and the Department of Conservation and Land Management were amalgamated in New South Wales to become the Department of Land and Water Conservation in 1995.

Since the 1980s greater emphasis has been given to the development of regions to promote sustainable growth. A benefit of this approach was to accelerate the widespread introduction of total or integrated catchment management. Catchment Management Authorities in Victoria were established in 1997 with legislation to facilitate the implementation and management of catchment units. Catchment-based frameworks were also established in New South Wales and Queensland. Those catchment frameworks integrated government, industry and community action focussed on the managing catchment resources.

The Commonwealth confirmed a commitment to catchment-based and regional approaches to natural resource management in establishing the Natural Heritage Trust (Trust) in 1997. Catchment-based initiatives have been supported through the National Landcare Program, for example, in the Swan-Avon and Blackwood catchments in Western Australia. The catchment approach continues to be implemented by many communities throughout Australia. The Agriculture, Fisheries and Forestry Portfolio is also currently leading the development of a Natural Resource Management Statement that looks towards managing natural resources at the catchment or regional scale. These scales provide an effective basis for responding to many natural resource issues.

Key observation 1: History has taught us that improved natural resource management depends on the integration of biophysical factors with social and economic factors that affect decision making. The catchment management approach enables this integration to occur.

2. The value of the catchment management approach

The principal value of the catchment management approach lies in addressing natural resource management problems that are associated with the natural water cycle. As many natural resource management problems are linked to imbalances in the water cycle, the catchment represents an appropriate scale for management.

The catchment approach allows us to understand and address the hydrological processes that operate. Our current appreciation of biophysical processes, such as soil formation, aquifer systems, nutrient cycling, and hydrological and atmospheric cycles, for instance, tells us that the use of soil, water and changes in vegetation can significantly alter the functioning of natural systems across surface and underground water catchments.

Catchment approaches also enable the interrelationships between various forms of degradation to be understood and addressed (see box 3). Policy or programs that target salinity, acidity or water erosion separately are unlikely to be as successful or efficient as more integrated catchment wide approaches.

Box 3. Interrelationships between biophysical elements in catchments.

Acid soils, salinity and water erosion may be interrelated. Agricultural practices that lead to increasing acidity of soils may impact on vegetation, reducing leaf area and causing lower transpiration rates through leaves with a resulting increase in accessions to the water table. Water tables may approach the ground surface and mobilise salt previously stored in the soil. Water and salt emerge on the ground surface and evaporation leads to a visible deposit of salt, a symptom of dryland salinity. Salinised soil is then prone to water and wind erosion and salt finds its way into rivers and streams reducing water quality for irrigation and urban users.

Social and economic dimensions of catchments are important as key drivers to address biophysical catchment issues. Socio-economic factors such as: attitudes, education, age, skill level, experience and financial position, strongly influence managers' decisions about production practices and changes in land use and natural resource management. Social networks and local economic units, however, are not always coincident with catchments. Communities of people and local economies frequently associate with, or influence, areas larger than a single catchment. Consequently the catchment management approach not only encompasses the physical catchment itself, but also encompasses social, economic and political elements.

Water cycle units provide an appropriate setting for managing a variety of different uses (agricultural, industrial, recreational, urban and environmental uses) within the same catchment. Each of those uses that interact through the water cycle, have differing requirements for the quality and quantity of water demanded. The very nature of the interaction between different users within a single catchment implies that effective resource management will involve shared responsibility between user groups. The management of catchments within the Murray-Darling Basin provides an example (box 4).

Box 4 The Basin Sustainability program - Murray-Darling Basin

The Basin Sustainability Program (Murray-Darling Basin) sets out key objectives, strategies, desired outcomes and performance indicators for the management of the natural resources of the Basin. It provides a framework for developing action plans to address land degradation, deteriorating water quality and rising groundwater that impacts on irrigation, cropping, pastoral and recreational uses. The program advocates that as far as possible all natural resource management initiatives in the Basin be incorporated into regional strategies and action plans to reflect the management focus on integrated catchment management. These regional and action plans include identification of problems, evaluation of options and recommendations for addressing problems (Murray-Darling Basin Commission, 1996 (1)).

Appropriate scales for managing natural resources

Natural resource issues can be managed at a range of scales from the paddock level, to the farm, catchment, regional, state and national levels. Soil structure decline and gully erosion, for example, are usually local scale issues and may be managed at the paddock or farm level. Other issues, such as weed and feral animal infestations can be broader scale and may therefore be more effectively managed at catchment, regional, state or national scales. At the catchment scale, the range of issues that can be addressed are those that relate to the natural water cycle such as dryland salinity, water quality, water quantity and soil erosion where there are potential off-site effects.

Managing natural resources in an integrated and sustainable way is a complex matter, even at the farm scale. At the broader scales, management of issues becomes increasingly complex because the interactions between social, biophysical and economic elements increases. Consequently management responses must be correspondingly more sophisticated to address the issues at these scales.

Therefore the catchment management approach can not be a universal solution for all natural resource management issues within catchments. There are realistic limitations including scale (discussed above) and geographic limitations. Those limitations need to be realised to avoid unrealistic expectations of the catchment approach.

Large sections of Australia, such as the arid zone, do not have well defined catchments. In that situation, management responses directed at the catchment scale would be ineffective. Moreover, in some areas of Australia groundwater movements do not reflect surface catchments. In these regions surface catchments are not the appropriate units for understanding and action.

Despite implementing catchment management for the last decade, water quality and quantity continues to decline in many of our major rivers: even where catchment management is practiced. Catchment management can provide an integrated framework for management: it has not been and can not be the universal solution.

Despite those limitations, however, the catchment management approach can deliver important gains particularly when action is matched at the other scales.

Other scales

Catchments are just one of a variety of geographic approaches for categorising natural resources. Two other regional characterisations include the Interim Biogeographic Regionalisation for Australia (IBRA) and agro-ecological regions.

Box 5 IBRA Regions

The IBRA Regions are terrestrial ecosystems that divide Australia into 80 biogeographic regions representing major environmental units. The regions provide information at progressively smaller scales on major vegetation structural types, vegetation communities and local topographic variations in communities. The ecosystems can be characterised in terms of distinctive biological and physical patterns and processes.

The IBRA regions are biological in origin. Their main purpose is to evaluate the state of ecosystem diversity in Australia. The strength of that approach is its focus on biological conservation. In the context of the State of the Environment Report, the IBRA regions have been used for pressure-state-response analysis based on the OECD approach (State of the Environment Report, 1996). That approach may have the potential to detract from the role of integrated management to achieve ecological and sustainable production. By contrast, catchment management approaches are more integrated and recognise the vital role of people and communities.

Agro-ecologic regions are based on aggregations of census collection districts and divide Australia into eleven different regions according to their climate, ecology and agricultural activities. They include, for example, temperate highlands, the arid interior and wet tropical coasts. The agro-ecological categorisation has been used for assessing the sustainability of Australian agriculture on a regional basis.

The information provided by these frameworks, such as relevant data, and knowledge of ecological and agro-ecologic interrelationships can be useful for catchment managers.

Key observation 2: Catchment approaches work best for those natural resource management issues based on the water cycle.

- ***Policy or programs that target salinity, acidity or water erosion separately are unlikely to be as successful or efficient as more integrated catchment approaches.***
- ***The very nature of the interaction between different users within a single catchment implies that effective resource management will involve shared responsibility between user groups.***
- ***Managing natural resources in an integrated and sustainable way is a complex matter, even at the farm scale.***

3. Best Practice Methods of preventing, halting and reversing environmental degradation in catchments, and achieving environmental sustainability

Best Management Practices for addressing natural resource management within catchments can be characterised into six key themes. They include the development of a shared vision, encouraging community empowerment, the provision of a supportive environment, implementing best knowledge, a commitment to research and development and feedback mechanisms (Commonwealth of Australia, 1999).

a. Shared vision

The development of a shared vision is the driving force behind the co-operative efforts of the community and government in addressing natural resource problems. The vision can be the basis of a commitment towards raising the long-term productivity and sustainability of natural resources to ensure a future for rural industries and their associated rural and regional communities. Within catchments, the encouragement of a shared vision has provided an important tool for developing strategies, action plans and agreed outcomes. Evidence from catchment projects implemented under the Natural Heritage Trust indicates that successful management of catchments is more likely to be achieved if a clear vision is established and goals, objectives and strategies are clearly set out for catchment projects. Catchment planning is as much about the process of community interaction and commitment, as the physical documents.

At another level, a partnership between the participating governments (Commonwealth, South Australia, New South Wales, Australian Capital Territory, Victoria and Queensland) within the Murray Darling Basin have established a shared commitment towards natural resource management at a broader scale as well as at the catchment scale.

b. Community empowerment

The Commonwealth has sought to empower communities, through its various programs, by promoting active participation of landholders in addressing land, water and vegetation management. This approach is epitomised in the Landcare model that the Commonwealth began funding in 1984-85. That approach harnesses the expertise, skills and knowledge of local landowners. Moreover, it develops a sense of commitment to, and ownership of problems that affect the catchment community, and the solutions to these problems and their implementation. Catchments are sufficiently small to develop community ownership, engaging several landcare groups, and sufficiently large to achieve substantial results. The combination of these factors makes catchments an appropriate unit for empowering the community and developing a sense of ownership.

c. Support

Best practice management at the catchment level has been underpinned by a supportive environment from government, the community, industry, relevant organisations and business. The Commonwealth and State governments, for instance, through the Natural Heritage Trust have

provided policies and programs aimed at increasing the productivity of Australia's land, water and vegetation resources. The Commonwealth has made significant investments in community projects by providing catalytic support to improve awareness and education, provide training and strategic plan development to encourage sustainable development, particularly through the National Landcare Program. Support has also been provided for integrated research and development programs covering scientific, technical, economic and social aspects of catchment management. Other support includes financial assistance for understanding the state of the resource base. Under the National Rivercare Program, for instance, national biological river health assessment is undertaken by refining river health indicators and providing a decision support system for determining appropriate environmental flows (Commonwealth of Australia, 1999).

d. Best knowledge

Despite continued efforts to maintain and collect data and improve knowledge, the reality is that we will never have complete knowledge of how natural systems operate. Adaptive management based on catchment condition and continued monitoring of impacts of management decisions provides a practical approach. The use of the precautionary principle is also important in this context. It enables a range of management options to be identified, assessed based on best knowledge, and implemented (Rogers and DeLacy, 1995). An important precondition for this is the need for improved natural resource data. The National Land and Water Resources Audit will provide condition and trend data on catchments to facilitate best practice approaches and adaptive management.

Box 6 The National Land and Water Resource Audit

The National Land and Water Resource Audit, a Natural Heritage Trust Program, will provide nationwide assessments of Australia's land, vegetation and water resources to support sustainable development. The objectives of the Audit are: to provide a clear understanding of the status of, and changes in, the nation's land, vegetation and water resources and implications for their use; provide an interpretation of costs and benefits of land and water resource change and any remedial actions; develop a national information system of compatible and readily accessible resource data; produce national land, vegetation and water assessments; ensure integration with, and collaboration between, other relevant initiatives; and provide a framework for monitoring Australia's land and water resources in an ongoing and structured way.

Science is central to the sustainable management of natural resources within catchments. It increases our understanding of our natural resources and evaluation of impacts of human activity; provides technological and innovative management solutions; devises decision support systems and provides a factual basis for government and industry policies, among other things (Prime Minister's Science, Engineering and Innovation Council, 1999). By facilitating cooperative efforts between research organisations, government agencies, catchment management authorities and rural communities we will be in a better position to learn more about degradation problems, and to plan and implement strategies for remediation and sustainable management.

e. Research and development

Research and development is critical to optimising the utilisation of river catchment resources in a sustainable manner. The learning cycle which includes acting – observing – understanding – planning – acting and so on, is as applicable at the catchment scale as any other. A number of research agencies have been engaged in activities directed at achieving more sustainable management practices within catchments. These research agencies include the AFFA portfolio

(including the Land and Water Resources Research and Development Corporation), Commonwealth Scientific Industrial Research Organisation (CSIRO), , Cooperative Research Centres and the Australian Geological Survey Organisation.

The knowledge and understanding gained through research and development is central to improvements and innovation in catchment management. It provides a sound scientific basis to make more informed decisions and it provides new technologies and opportunities to optimise and reconcile production, economic, social and environmental objectives.

There is now greater scientific understanding of the complex environmental, economic and social interrelationships involved in landscape alteration and degradation and in management approaches to our natural resources. Science helps decision-makers by providing the tools and understanding to assess trade-offs involved in changing land use and land management practices (Prime Minister's Science, Engineering and Innovation Council, 1999).

Innovation in natural resource management, and catchment management in particular, is vital to managing and using our natural resources in a sustainable way. Innovation will continue to be a foundation for sustainable agricultural production and management of our natural resources within catchments. Our successful farmers have been those who have embraced change and the new technologies and opportunities available in the market environment. Utilising new technologies and innovative management approaches has the capacity to allow the most suitable management choices to be made for the best production and natural resource outcomes.

However, while many farmers are adopting the new technologies and new opportunities, it is clear from the magnitude and extent of resource degradation within many catchments, that current approaches and solutions will not be sufficient in some cases, and continued research and development will be essential to develop improved management responses. The need for innovative responses to dryland salinity is a good example where management approaches within catchments have had some success, but major landscape change is required to address the extent of the problem (Prime Minister's Science, Engineering and Innovation Council, 1999).

f. Feedback mechanisms

Feedback mechanisms are designed to establish how involving on-ground actions and changes in catchment management are affecting the condition of the natural environment. They provide: an avenue to improve the focus and procedures of a project as it proceeds; develop the skills and understanding of people involved in a project; provide information for planning a new project; justify and promote a project to the wider community; provide accountability to agencies funding projects; contribute information to broader scale monitoring and evaluation, such as regional, state and National projects and programs (Robins and Woodhill, 1998).

Changes reflected by sustainability indicators can be identified through monitoring and evaluating the impacts of particular management practices. At the catchment level sustainability indicators should be capable of assisting managers to understand the interplay between environmental, social and economic factors involved in management decisions. Consideration also needs to be given to the relevance and consistency of indicators used. At the catchment scale, indicators should be appropriate to evaluate issues relevant to that scale. Equally, indicators need to be harmonised across scales –local, catchment, regional, state, national – to provide resource management indices that cascade and can be compared, across the various scales.

Key observation 3: Best practice approaches to catchment management include six key elements: shared vision, community empowerment, support, best knowledge, research and development, and feedback mechanisms.

4. Role of different levels of government, the private sector, the community and the individual in managing catchments

Role of government, the community and the individual

The Commonwealth Government does not have any formal constitutional responsibilities for natural resource management. However, the Commonwealth has powers in the areas of trade and commerce which can have significant impacts on land use and land management practices that affect the rural resource industry sector. The Commonwealth role could be described as providing the policy and economic framework that will enable catchment management to be effective. The Commonwealth provides leadership and policy direction, funding, research and development, public awareness, supports education, information exchange and intergovernmental coordination which support catchment level activity. Some examples include the Council of Australian Governments (COAG) Water Reform Framework and the National Water Quality Management Strategy (NWQMS).

The COAG water reform framework is an integrated package of measures that reflect the complexity and the interrelated nature of the reform elements, particularly those relating to pricing, entitlements, trading water rights and water for the environment (Australian Academy of Technology, Science and Engineering, 1999). It represents a nationally co-ordinated strategic approach involving both Federal, State and Territory governments in implementing agreed reforms based on a common strategic vision. Local management of the water reform is an important element, with individual State and Territory governments implementing their jurisdictional water responsibilities under the broader framework.

The NWQMS also provides a consistent and coordinated approach to water quality management through the implementation of agreed guidelines developed under the auspices of COAG. At the catchment level those guidelines provide direction for managers in selecting environmental values for their catchments and pursuing their achievement.

The Regional Forest Agreements provide a framework for Commonwealth and State Governments to reach agreement on the long-term management and use of forests for industry and conservation. They are designed to streamline and coordinate the various decision making processes necessary to meet government obligations and interests in relation to forest use. One of the recommendations to the New South Wales Regional Forestry Agreement Steering Committee is the need for strengthened catchment management planning to incorporate the role of forest management on water yield and water quality (New South Wales Government, 1998).

State and Territory Governments have the main constitutional responsibilities for managing and controlling natural resources within their jurisdictions. In managing catchments, their role

encompasses developing legislation, implementing programs and policies to address land management issues, and participating in activities and programs that form part of the national effort. Some States, such as South Australia, Western Australia and Victoria have made institutional changes that reflect catchment boundaries to assist with resource management.

Local government can facilitate community involvement in land conservation and has an active role in implementing state derived environmental and planning legislation. However, traditionally, local government has focussed on "roads, rates and rubbish". In the last decade councils have become increasingly involved in environmental matters, mainly in response to state legislation. Many councils have engaged in catchment management processes as a tool in planning for the diverse interests within their jurisdictions. It provides a framework for addressing water quality and quantity issues, particularly for water supply and effluent disposal. Despite this it would be fair to say that many councils are not engaged in natural resource management, beyond the very basic level of involvement.

Given that 60 percent of Australia's land area is privately owned or leased by farmers, pastoralists and indigenous groups, the primary responsibility for natural resource management should reside with those landholders. They have a 'duty of care'¹ to take all fair and reasonable measures to ensure that they do not damage the natural resource base. However, landholders will in practice balance their perception of their duties to care, with economic and other pressures. A major function of government policy is to foster ecologically and economically sustainable management practices.

Individuals, particularly farmers, are principal agents in managing the natural resource base. Effective policies to address natural resource degradation not only need to have a catchment focus but also an individual focus. Various instruments of policy such as taxes and skill development are examples of instruments that, while having catchment-wide effects, need to be applied and delivered at the individual level. It will require a mix of policy instruments directed at different scales to achieve solutions to natural resource management problems within catchments. The rationale is that it is often more effective to address resource degradation problems at the source – on farm, particularly where there are off-site impacts. Government intervention in this case is aimed at providing public rather than private benefits.

'Bottom up' verses 'top down'

Catchment management occurs at the interface between individuals, communities and the governments. In practice there are tensions between the relationship between 'bottom up' and 'top down' interests.

A combination of 'top down' and 'bottom up' approaches has been successful in the Murray-Darling Basin and may provide the key to future government/ community involvement. The administrative arrangements in the Murray-Darling Basin reflect the governments' commitment to providing strategic direction at the regional level through policy, institutional and legislative support and community coordination activities (Murray-Darling Basin Commission, 1996(1)). The community is responsible largely for developing and implementing their own plans, providing input to basin wide issues and undertaking on ground works. This unique arrangement that combines strategic and participatory models has been successful.

The National Landcare Program has also targeted and facilitated the development of structured approaches to natural resource management across Australia. This has evolved from an initial

engagement of individuals and groups through community based projects, leading to a shifting focus from local to more integrated catchment wide approaches and finally to the initiation of more comprehensive regional scale approaches.

¹ 'Duty of care' in relation to natural resource management has been defined by the Standing Committee on Agriculture and Resource Management as the common law duty of care, which applies to everyone who may harm another as a consequence of their actions. The Standing Committee suggests that natural resource managers should have the responsibility to exercise their duty to take all reasonable and practical steps to prevent their actions causing foreseeable harm to the environment.

Institutional change

Another major challenge is in overcoming the institutional impediments to delivering natural resource management activities within catchments. Political and government agency boundaries, for instance, do not necessarily reflect catchment boundaries; often resulting in numerous agencies and organisations having interests within a particular catchment. This creates organisational and communication difficulties, and in particular a confusing environment for community involvement.

In response, some states have established cooperative arrangements within catchments as the central focus for land and water management. The Victorian Government, for instance, has established nine Catchment Management Authorities to coordinate the various institutions and activities at the catchment level. Those Authorities provide a coordination unit for farmers, Landcare groups, industry, catchment groups and government (Natural Resources and Environment Department, 1999). The range of specified outcomes include: sustainable development of natural resource based industries; improvement in the quality of surface and groundwater and the condition of rivers; prevention and reversal of land degradation; minimise impacts of pest plants and animals; protection of natural ecosystems and minimise damage to public and private assets from flooding and erosion.

Similar organisational changes have occurred in South Australia with the establishment of Water Catchment Management Boards. Those boards have devolved responsibility to the local communities to manage their own water resources and raise revenue to implement works programs within their catchments. Queensland adopted its catchment management program in 1992, but has not yet achieved legislative status. The concept of total catchment management in New South Wales, was enacted in legislation (1989). Legislation provided for a network of Catchment Management Committees and Trusts to co-ordinate the catchment approach.

These models represent co-ordination mechanisms to implement 'hands on' water resource management, with some bodies having the ability to raise revenue to develop and implement plans of action to address water resource issues. While these approaches have made considerable headway in implementing the catchment approach, catchment management in some jurisdictions is still ad hoc and there is a need for more systematic approaches to identify, prioritise and address issues. It is likely that no single model will achieve this, moreover, each state must develop unique approaches that can identify and deliver lasting outcomes.

Catchment management to date has largely been dependent on facilitation processes and voluntary actions characterised by the Landcare movement, but these may not be sufficient arrangements for the future. Greater degrees of intervention may be needed. The trend towards regional organisations, underpinned by catchment and sub-catchment management, with accountability and responsibility devolved to those scales, could provide a basis for the way forward.

Key observation 4:

- ***Public and private resource managers, owners and local communities are responsible for the sustainable management of catchments. Governments can foster community self-reliance and facilitate catchment sustainability.***
- ***Governments can promote the development of institutional frameworks in which regional organisations can provide strategic direction, coordination and support to catchment level management. This will assist in addressing conflicts between ‘bottom up’ and ‘top down’ approaches.***
- ***Establishment of robust institutional arrangements will enable effective administration of activities within catchments. The approach of the Catchment Management Authority in Victoria to institutional coordination has strengths that may be useful elsewhere.***
- ***As individuals are the principal agents of change, policy instruments targeting individuals will be an important component of enhancing catchment-wide solutions, complementing instruments encouraging small and large scale group activity.***

5. Planning, resourcing, implementation, cooperation and coordination in catchment management

Effective catchment planning is a prerequisite for catchment scale responses. There has been a significant move towards the development of catchment plans during the life of the Natural Heritage Trust with catchment planning well advanced in many regions. At the Commonwealth level, catchment planning has been supported by funding the National Landcare and the Murray-Darling 2001 programs. In some states there has been systematic and institutional support for such approaches.

Catchment plans establish a level of common understanding on what is intended to be achieved and who is expected to do what. The catchment is the level at which activities at different scales - the farm, local, catchment and regional levels - can be integrated and aligned. It is also the scale at which effective land use planning can occur. Identifying constraints and opportunities to development based on an understanding of catchment processes will greatly assist planning for land uses in appropriate locations.

Catchment scale plans can also provide an appropriate unit for planning water quantity and quality. It is likely for instance that land uses within the same catchment will require differing quantities and quality of water, which cannot be met. The catchment scale plan provides a framework to identify needs, negotiate 'trade offs' and implement agreed actions.

Catchments strategies identify the roles and responsibilities of individuals, groups, organisations and how they relate to the responsibilities of the Commonwealth, State/ Territory and local governments.

It is also important that government and community view planning as a process of continuous improvement. Planning is a framework for actions that need to be responsive to changing circumstances and greater knowledge. Catchment planning is not a one-off activity or application to secure government funding but rather, needs to be seen as an important part of ongoing improvement in managing natural resources. It is expected that regional strategies and project priorities would be modified through time in light of experience or new information identified through monitoring, evaluation and strategic planning.

Fundamental to the success of catchment and regional approaches will be the development of strategies and action plans that are practical and relevant to people in the region. Property management planning is an example of practical and relevant planning for whole farm systems that could provide input into catchment level plans.

Planning deficiencies and opportunities

Despite national, state and community efforts to address land and water degradation problems, there are continuing declines in the quantity and quality of water in our major rivers. Consequently there is a need for tangible solutions to those problems.

We require a straightforward system that is able to take existing information about our land and water resource base, consider existing land uses, demonstrate other potential land uses and facilitate allocation of these land uses to both optimise existing uses and environmental benefits.

Matching land use to land capability technology offers land managers a planning tool that will indicate land suitabilities at regional and district levels and, where data is available, down to catchment and actual farm level. The National Land and Water Resources Audit may provide some detailed catchment level information, although other relevant information is available from a range of state and Commonwealth agencies.

Also land use monitoring might be linked to financial assistance. Tangible regional benefits of catchment management can be measured by using performance indicators to evaluate effectiveness. That might be linked to continued program support from the Commonwealth.

Facilitating greater linkages between property management plans, catchment plan and regional strategies might encourage more active use of strategies. Linking of plans might also provide greater strategic coordination and give investors (government or private sector) greater confidence that beneficial outcomes will be achieved.

Other Policy Approaches

Alternative policy options may be categorised as economic instruments, regulatory approaches or suasive measures. These instruments can provide impetus to management change and are highly complementary to catchment based approaches and a brief assessment is provided below.

Sitting behind these approaches is an array of policy instruments including taxes, subsidies, non-compliance fees, tradable permit schemes etc. These are discussed in more detail in the Industry Commission's report (1997b) and the work ABARE is currently undertaking on behalf of the Natural Resource Management Policy Taskforce and are not covered in this submission.

Economic instruments

Economic instruments can provide the opportunity to internalise the costs of environmental damage that the actions of producers or consumers impose on others in the community by attaching a price to environmental impacts through imposing charges, taxes or subsidies. Industries and communities then respond to the modified market signals and adopt a resource use or management practice which offers them the greatest benefit, and if effective, will lead to a better resource management outcome (Industry Commission, 1997b).

Economic instruments may be beneficial in addressing natural resource management at the catchment level. They can, for instance, be effective for dealing with upstream polluters causing downstream impact where the source of pollution can be readily identified. Costs imposed on upstream polluters can lead to behaviour changes including using alternative practices,

environmental remediation or relocation. Also upstream users can compensate downstream users for any damage they cause.

Apart from price instruments as discussed above, quantity based instruments such as tradable quotas can be useful to catchment management. Quantity based instruments create a market in the rights to engage in an activity by restricting the total level of activity and allocating rights to participate in the activity. An efficient allocation of rights is then determined through the market mechanism. That may provide the opportunity to set environmental targets on factors that are likely to cause major adverse impacts on rural industries and the environment, such as salinity, water quality and environmental flows, and may provide an opportunity to set limits on land use activities, such as land clearance. It might also provide a useful framework for incorporating sustainable environmental limits for ocean-based industries and a useful model for carbon sequestration. The Murray-Darling Basin Commission is currently developing a model to provide global basin targets for electrical conductivity (a measure of salinity) as a framework for setting individual catchment targets.

The effectiveness of economic instruments in dealing with a problem however, will depend on the nature of the problem. The diffuse nature of many forms of pollution can make it difficult to identify those who lose and those who impose costs on this. Economic instruments will have limited applicability in such cases.

Regulatory Instruments

Regulatory instruments typically are approaches where specific controls are implemented, compliance is monitored, and non-compliance is penalised. Controls can include restrictions on land use activities, or management practices that must be used such as closed drainage and effluent management systems on feedlots. The advantage of regulatory instruments in catchment management is that there is a high level of control over the behaviour of those using the resource. However, this may disempower the community, causing distrust and ill feeling. Regulatory instruments in isolation from other measures are also unlikely to be the least cost method of achieving environmental objectives. They do not provide incentives for ongoing innovation to reduce environmental damage. This approach is often associated with high costs of administration and compliance. The regulatory approach also has limited scope at the Commonwealth level, it is a more appropriate mechanism for implementation at the local and state government levels.

The implementation of a cap on water diversions within the Murray-Darling Basin is an example of regulatory measures implemented at a large catchment scale in response to a voluntary agreement. The Murray-Darling Basin Ministerial Council endorsed the implementation of a “cap” to set the volume of water diversion in rivers to the 1993/94 levels. The aim was to maintain and improve existing flow regimes and achieve sustainable consumptive use by developing and managing Basin water resources to meet ecological, commercial and social needs. Regulatory measures have been developed in response by each of the participating states to comply with the “cap” limits. While different regulatory measures between the states have been adopted, they have recorded successes in reducing water diversions (Murray-Darling Basin Ministerial Council, 1996).

Suasive measures

To date the main focus of AFFA in addressing land use sustainability has been through suasive measures with Commonwealth funds directed towards community education, awareness, project planning and implementation.

The success of the community Landcare movement where 33 percent of landholders are members demonstrates the potential benefits of suasive measures (Walker, 1999). The Landcare approach to behavioural change is predicated on a model of community ownership and empowerment where the role of government is to support rather than direct behavioural change. Behavioural change requires three ingredients: motivation, capacity and confidence. Suasive approaches which target these three ingredients are likely to be effective.

Concluding comment

No one-policy approach of itself, however, will achieve effective catchment management. A mix of policy approaches involving both the private and public sectors, directed at various stakeholder groups and at various scales, including individuals, landcare and catchment groups, is needed. Supplementing these approaches are regulations, mainly implemented by the states in areas such as vegetation clearance, land use planning, water use and soil conservation, and supported by the Commonwealth through its policies and programs. The Partnership Agreements provide the framework for these co-operative arrangements.

Resourcing

Governments have a role in facilitating changes in management practices and production systems. This is because there are significant public benefits accruing from the maintenance of a more sustainable and productive natural resource base in rural Australia, and significant public costs to be borne if we do not do so.

Some authorities have levied rates for resource management where there is a clear physical link between the natural resource problems and the resource managers, such as within a catchment. The Catchment Management Authorities in Victoria have the ability to levy rates from local landholders within identified catchments.

Under the Natural Heritage Trust, cost sharing arrangements agreed between the national and State/ Territory governments for partnership projects attempted to reflect a shared responsibility but with the specific roles of the States being clearly recognised. The national government contributes funding where there is significant public benefit and only to a level sufficient to trigger the necessary investment towards self correcting, self perpetuating natural resource management systems that operate effectively. So while there will be a case for some government investment in catchment management in the public interest, it is important not to develop a dependency on government funding. It is far better for local stakeholders to make trade offs than continually expect governments to solve their problems. Users of resources should expect to pay for the protection of those resources.

Key observation 5: Catchment planning is neither a one-off activity nor a means to secure government funding; it is a part of an ongoing process of improvement in managing natural resources.

Key observation 6: Governments have a role in natural resource management to provide institutional arrangements that return the highest net benefit to society over time.

- *These may be economic instruments, regulatory instruments or the fostering of suasive measures.*

6. Mechanisms for monitoring, evaluating and reporting on catchment management programs, including the use of these reports for state of the environment reporting, and opportunities for review and improvement.

Information systems that enable decision-making to be made with the benefit of relevant and comprehensive data is a requirement for catchment scale planning and management. Although data is available about biophysical, social and economic aspects of the environment, much of which is neither integrated, collated at the appropriate scale or directed at decision making for natural resource management.

Appropriate information is fundamental to evaluate the success or failures of particular management approaches or techniques. Relevant catchment scale data however, can be difficult to obtain because it can only be aggregated from paddock, farm or local level to the catchment level. Relevant catchment scale data cannot be disaggregated from the national or regional level. While scale problems still exist, there is no doubt that a new era has been entered with the availability of geographic information systems (GIS). While GIS has been in use at higher scales for some years, development has now brought them within reach of catchment communication.

Catchment monitoring and evaluation will also rely on data that is continuously updated and accessible to catchment evaluators. It is important that regional based information on trends in natural resource condition, industry outlook and social factors are available and accessible to local decision makers. Governments can assist local access to catchment information and data by facilitating regional capacity building.

There is an increasing demand at the catchment level for the development of synoptic frameworks that enable long term monitoring and assessment; provision of integrated data to support decision making, build on current investments in data gathering and information systems, and are comprehensive in their approach (ACLEP, 1999).

The National Land and Water Resources Audit is an example of such a synoptic framework with a focus at the catchment level. It will provide information and monitoring systems to assist decision making at the broader regional and catchment level. As part of the audit, land use data sets are being developed at varying scales to undertake nationwide assessments of Australia's land, vegetation and water resources to support sustainable development and provide a clear

understanding of the status and changes in those resources and implications for their sustainable use (ACLEP, 1998). It will also provide an interpretation of costs and benefits (economic, environmental, social) of land and water resource change and will be an important model in assessing the impact of any remedial actions within catchments (ACLEP, 1998). Land use information will be a key input to State of Environment Reporting and the carbon accounting system being developed by the Australian Greenhouse office.

Key observation 7: Governments can assist to enhance the capacity of regions by providing data and information relevant to the needs of catchment managers. This could include:

- ***Regional based information on trends in natural resource condition, industry outlook and social factors;***

Conclusions

The Commonwealth has invested significant resources, particularly through the Decade of Landcare, the National Landcare Program and the various Murray Darling Basin Commission programs, in raising community awareness, identifying the causes of land and water degradation, encouraging the development of plans at appropriate scales, and encouraging and empowering individuals and communities to change management practices.

Currently, under the Natural Heritage Trust, there is a significant impetus for implementing natural resource management at the catchment scale and this has focussed attention on the need to fully integrate economic, social and biophysical elements. In some areas communities and states are at a level of understanding and preparedness to move forward to larger integrated scale regional approaches, although this is not uniform.

Catchment management will continue to be an important component of total efforts to achieve sustainable natural resource management. It should be viewed as having a part to play and not be loaded with unrealistic demands and expectations.

There is scope for the further development of the catchment (and indeed the regional) model to improve the targeting of public and private investment in natural resource management through more effective regional organisations taking greater responsibility for planning and delivery of natural resource management outcomes.

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