



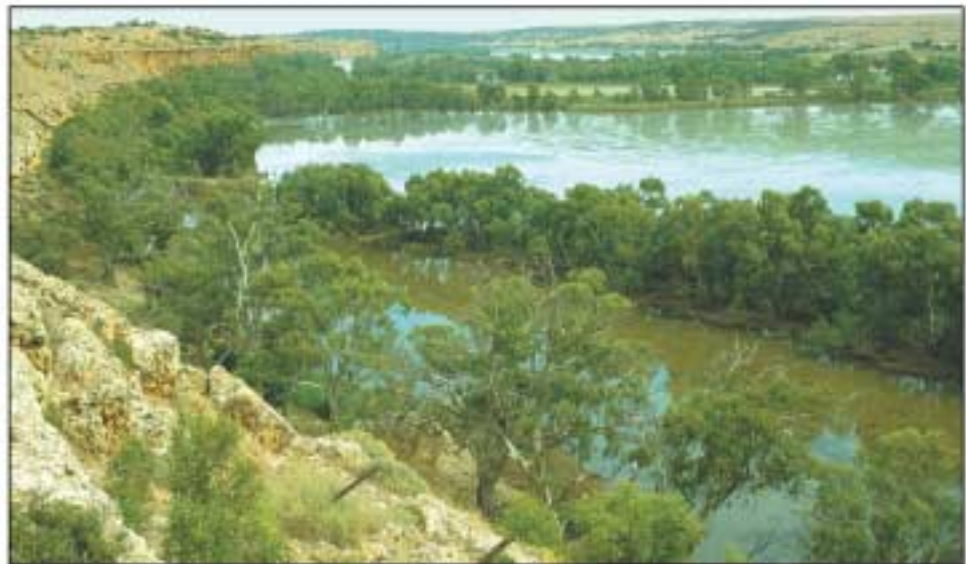
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## A case study of the Murray-Darling Basin

**FINAL REPORT** for the  
*International Water Management Institute*



Darla Hatton MacDonald and Mike Young

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August 2000  
**Revised February 2001**

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## EXECUTIVE SUMMARY

This case study was commissioned by the International Water Management Institute as part of an Asian Development Bank supported regional study on water management institutions. This case study is one of three case studies of advanced river basins (Murray-Darling Basin in Australia, Omonogawa in Japan and Brantas in Indonesia), and five other river basin studies in North China, West Sumatra of Indonesia, Philippines, Nepal and Sri Lanka.

The Murray-Darling River Basin in Australia provides some interesting lessons on how a resource that crosses many jurisdictional lines can be managed by balancing economic principles and ecological sustainability in a political context. Given the complexity of the situation that involves four States, a territory government, a federal government, many catchment boards and hundreds of local governments, it is amazing that the system functions and has evolved as well as it has.

The system grew out of a desire to develop an irrigation industry after World War II. This development era has past and the focus has shifted to the management of a scarce resource and the need to bring a set of environmental policies under control. There are elements in the present political arrangements that have encouraged the various jurisdictions to work towards management solutions. Jurisdictions must work in a context which is characterised by “over commitment” or, at least, “full commitment” of the Basins’ resources and serious water quality problems.

An important element in the present political arrangements is the National Competition Policy which is designed to encourage the States and Territories to participate in a process of reform. Water along with many other sectors has been undergoing significant change as a result of this policy. States have been given a financial incentive to undertake reform. A series of “tranche payments” in 1998-1999, 1999-2000 and 2000-2001 are dependent on the State or Territory meeting certain goals. In the area of water, the Council of Australian Governments (COAG) met and agreed upon a set of principles

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concerning recovery cost pricing, separation of water rights from land title, water trading and the inclusion of the State of the environment in policy development.

Second, the Commonwealth and the States of New South Wales, Victoria, Queensland and South Australia signed the Murray-Darling Basin Agreement in order to improve the use of the land, water and environmental resources of the Basin. In response to the declining health of the river system, a Cap on surface diversions was introduced and periodic monitoring and audits have been undertaken to ensure compliance. A process of extending the cap to cover ground water resources is under way. To facilitate development and improvement of existing conditions, water trading arrangements have been introduced.

Third, there has been a move by the States and Territories to separate the role of planning and regulation from the day to day operations of water delivery. As part of this process, States and Territories have been very conscious of the need to involve the various stakeholders in the Basin. Most of the jurisdictions have been moving towards models of skills based local boards who prepare planning documents regarding how water should be allocated. Responsibility for the day to day delivery of water has been devolved to corporations who have no direct role in policy development.

Fourth, States allow trading in salinity offsets and are in the process of negotiating valley based salinity targets to be achieved through the introduction of salinity trading and other related incentive mechanisms.

Today, the new policy reform issue is the development of strategies and policies to manage the expected impact of dryland salinity on the Murray and Darling River Systems. A related issue is the search for ways to improve river health. Although of initial importance, in this document, these issues are left until last because it is first necessary to understand how water quantity is managed.

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### PREFACE

This is a case study of the institutional arrangements in the Murray-Darling River Basin in Australia for the International Water Management Institute (IWMI) with the financial support of the Asian Development Bank. The main objective is to identify the key elements of successful water resource management, which are likely to transfer to the context of developing countries. The Murray-Darling Basin was chosen as an example of an advanced river system where resources are managed over a large geographic area and across several jurisdictions. The institutions in the Basin have evolved over more than a century of shifting priorities and jurisdictional conflicts.

In writing this report, we have sought to present the essential policy elements and the overall institutional framework that shape resource use in the Basin. In many instances, we will provide broad brush strokes covering basic information on a State by State basis and then as information permits, focus on the institutional arrangements which provide unique insights. Some States have more documentation available on particular issues of water management such as water pricing (New South Wales), water trading (Victoria and New South Wales) and community involvement (South Australia). Consequently, the focus of the paper will shift to the State or institution from which information and insights are most readily drawn.

In preparing the report we were mindful of the four key areas of the Asian Development Bank's Policy on Water which include:

- National level water policy and its basic framework (policies, guidelines and institutions of water resource management);
- Policies on integrated water resource management on the basis of river basins;
- Policies on service delivery of water resources by self-sustained service providers (separate from institutions engaged in resource management functions); and
- Policies on effective use and conservation of water.

This report is being written at a time when major reforms are underway across sectors of the Australian

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economy, including water. As a result, this report provides a snap shot of where the States, the Australian Capital Territory and the Commonwealth government are currently positioned in the reform process and, where possible, we will provide indications of where the process is expected to proceed.

We would like to thank the Murray-Darling Basin Commission for their permission to use some of their graphic images in this report. The MDBC is not liable for any loss or damage incurred through the use of the images provided.

In preparing the final report, sections of the report were sent to outside experts to check for accuracy. Remaining errors and omissions are the responsibility of the authors.

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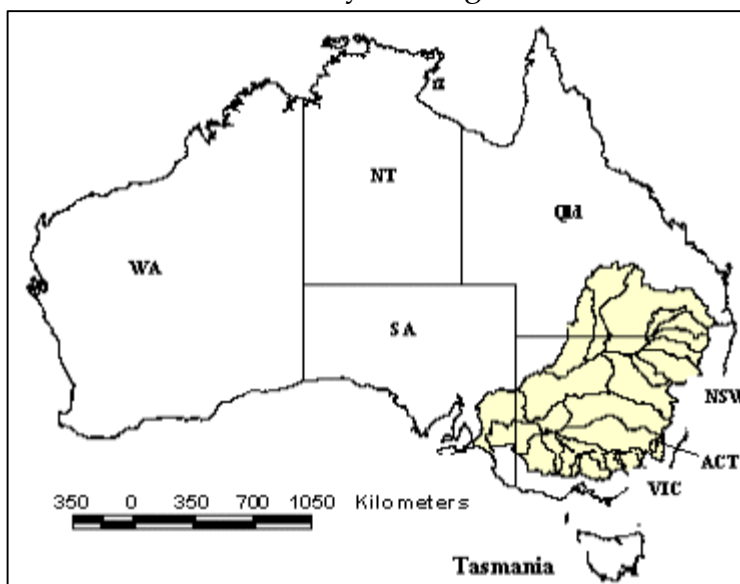
## 1. INTRODUCTION TO THE MURRAY-DARLING BASIN

### Overview of the Basin

The Murray-Darling River Basin comprises a large geographical area, approximately one million square kilometres or approximately one-seventh of the land mass of Australia. With a total length of 3 780 km, it is the fourth longest river system in the world. The total area is roughly equivalent to the area of France. An overview of the Murray-Darling River can be seen in Figure 1.1

Figure 1.1

Map of Australia with State Lines and the Outline of the Murray-Darling Basin



Legend: WA - Western Australia  
NT - Northern Territory  
Qld - Queensland  
VIC - Victoria  
NSW - New South Wales  
SA - South Australia  
ACT - Australian Capital Territory

Source: GIS map, CSIRO

The Murray-Darling River Basin contains half the Great Dividing Range and some of Australia's highest mountains. The high catchments provide a significant amount of water to the system. However, much of the basin is flat with extensive plains or low undulating areas less than 200 metres above sea level. The Basin covers 75% of the State of New South Wales, 56% of the State of Victoria, 15% of the State of

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Queensland, 8% of the State of South Australia and the entire Australian Capital Territory (Murray-Darling Ministerial Council, 1987)

To provide an overview of the geography of the Basin, a series of maps from the Murray-Darling Basin Commission have been assembled. Figure 1.2 below provides an indication of the location of communities and developments along the major rivers within the Basin.

Figure 1.2

Overview of the southern portion Murray-Darling Basin showing the 'Murray' system



Source: [http://www.mdbc.gov.au/river\\_murray/river\\_murray\\_system/river\\_murray\\_system.htm](http://www.mdbc.gov.au/river_murray/river_murray_system/river_murray_system.htm)

The River Murray system consists of the main course of the River Murray and all its anabranches, tributaries entering the River Murray upstream of Albury. A number of works have been put in place -

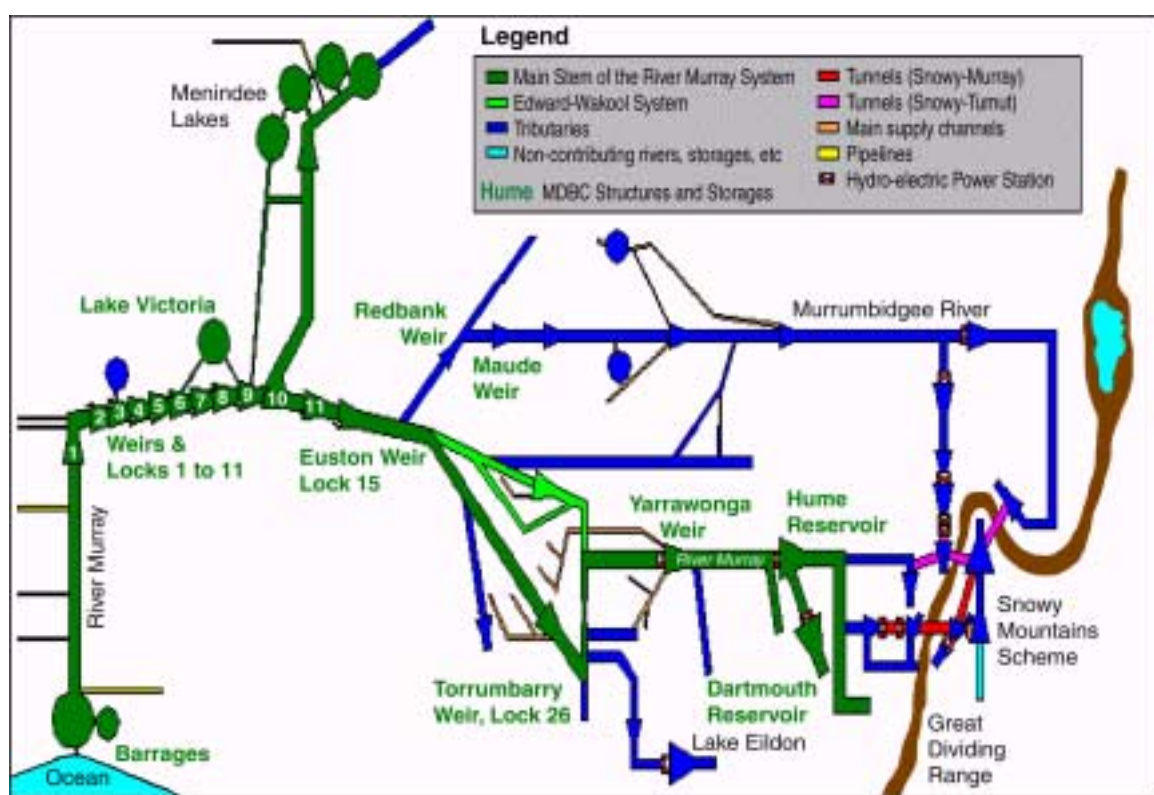
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Dartmouth Dam, Hume Dam, Yarrawonga Weir, Lake Victoria storage, the Menindee Lakes storage, the weirs and locks along the River Murray and lower Murrumbidgee, as well as the barrages near the mouth of the River Murray.

The Murray-Darling Basin has been transformed by the construction of major water storages on the rivers over the last 100 years. In Figure 1.3 the weirs, locks and storages are highlighted. As well the location of hydro-electrical power station (Snowy River Scheme) are indicated.

Figure 1.3

Overview of the Infrastructure in the Murray-Darling



Basin

Source: <http://www.mdbc.gov.au>

The total volume of water storage capacity in the Basin is just less than 35 000 million litres. The major storages, especially Dartmouth, Hume, Lake Victoria and the Menindee Lakes and other river regulatory structures have made it possible to store water during wet periods and release it as needed during summer or in droughts.



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Australian agriculture is evident by the fact that 43% of the total number of farms in Australia are in the Basin representing 45% of the crop area. (MDBC <http://www.mdbc.gov.au/tour/dryland.htm>). Within the agricultural sector, crops, pastures and grasses are the largest value component of agricultural production in the Basin, with a gross value of \$7.9 Billion (Australia Bureau of Statistics).

Within the Murray-Darling Basin there are areas where irrigation dominates the landscape. Irrigated crops and pastures in the Basin represent 72% of Australia's total area of irrigated land. Irrigation is essential for improved dairy, cotton, rice and horticulture (in particular viticulture).

(MDBC <http://www.mdbc.gov.au/tour/irrigation.htm>)

### **Water Resources in the Basin**

One of the more remarkable features of the Murray-Darling Basin is the variability that is observed.

Within the Basin, rainfall varies from 1400mm per year in the highlands to 300 mm in the northwest.

(Murray-Darling Ministerial Council, 1987)

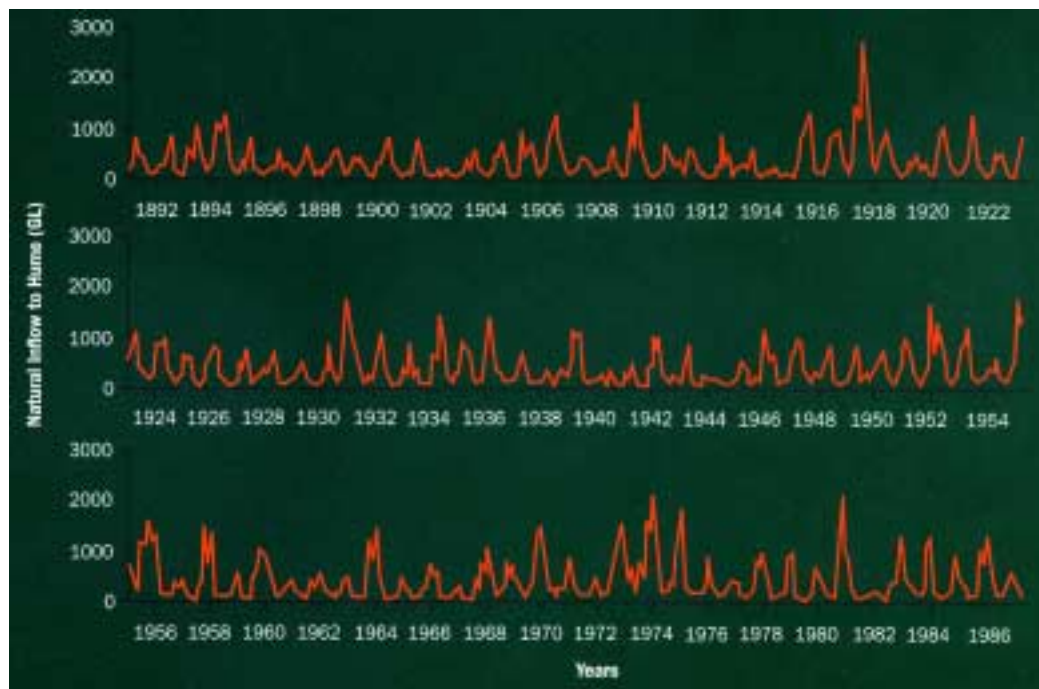
Australia's climate, compounded by the variability of its rainfall, means that virtually all of Australia's river systems are subject to considerable variability of flows from one year to another. According to Brennan and Scoccimarro (1998) annual variations from maximum to minimum flows range from 300:1 to 1000:1 in Australia. Extremes of 10000:1 have been reported for the Darling River. Figure 1.5 demonstrates with the Hume Reservoir how the natural inflows can vary from season to season but also year to year despite the fact that the Murray-Darling Basin is highly regulated. The Northern "Darling" system is essentially a summer rain fall system, while the southern "Murray" system is essentially a winter rainfall system.

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Figure 1.5

Natural inflows to the Hume Reservoir, 1891-1991, in GL per month



(Source: [http://www.mdbc.gov.au/education/Encyclopedia/Surface\\_Water/Surface\\_Water\\_Resources.htm](http://www.mdbc.gov.au/education/Encyclopedia/Surface_Water/Surface_Water_Resources.htm))

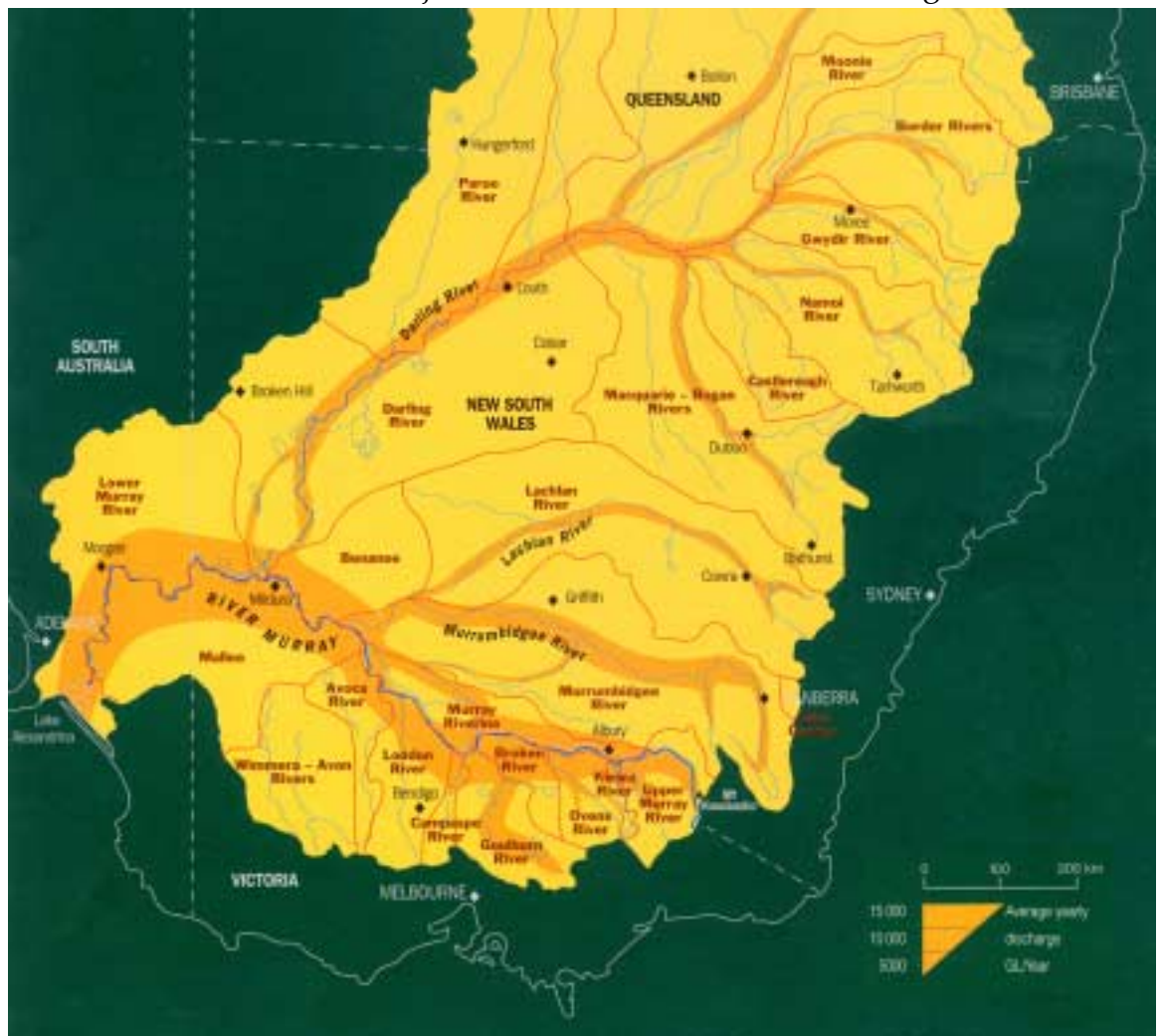
The Murray and Murrumbidgee Rivers experience relatively more reliable precipitation and as a result stream flow is much more reliable than in other parts of the Basin. The largest variability seems to occur with the Darling River and its tributaries where massive floods can occur as well as times when the rivers cease to flow.<sup>1</sup>

Diversion of water from the Snowy River Catchment into the Murray System is an important feature. This has enabled the development of a large hydro-electric power generation system during the 1950's much more irrigation than otherwise would have been the case. Controversially, people living in the Snowy Catchment are now arguing for some of this water to be returned to them.

<sup>1</sup> Water flow becomes an issue later in the report when we discuss security of water allocations.

Figure 1.6

## Major River Basin and Annual Discharge



(Source: [http://www.mdbc.gov.au/education/Encyclopedia/Surface\\_Water/Surface\\_Water\\_Resources.htm](http://www.mdbc.gov.au/education/Encyclopedia/Surface_Water/Surface_Water_Resources.htm))

Figure 1.6 provides an overview of the discharge from major rivers in the Basin. The Murray-Darling Basin has a relatively low mean annual discharge in comparison with the other river systems in the world; in fact it is a small one in terms of discharge or runoff.

### Geo-political Organisation of the Basin

The previous section highlighted the unique physical characteristics of the Murray-Darling Basin. Due to the geographic size of the Basin, it crosses the boundaries of States and one Territory. The Murray-Darling River Basin is managed by individual States but there are overarching bodies that coordinate many of the efforts of State and territory governments

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at the basin level<sup>2</sup>. It must be understood that Australia is a commonwealth of States and Territories. The Commonwealth Constitution says very little about water per say and thus it is largely under the jurisdiction of the States and Territory governments. Rather than amending the Constitution, a Murray-Darling Basin Commission has been formed to manage inter-jurisdictional processes and conflicts in an organised manner.

The Commonwealth (or Federal) government does participate in water and water resource management through other means such as legislative and executive capacity, including financial assistance to States and Territories as deemed appropriate by parliament under section 96 of the Commonwealth Constitution (Fisher 2000, p.35). Financial incentives must not be shown to discriminate between States. This is a form of cooperative federalism where the Commonwealth and State governments come to agreements (financial incentives may be involved) and the Commonwealth relies on the States to implement agreements within their respective jurisdictions.

As a result of the Constitutional framework, different bodies of legislation and institutional arrangements have evolved in each of the States. To follow the elaborate layers of committees, management groups and other arrangements that are necessary to manage the Basin (and other resources in Australia), it is necessary to introduce the key important bodies that shape Commonwealth, State and Territorial government policy. The institutional arrangements in the Basin are in a process of evolution as the States and Territories move towards market based systems of resource allocation.

An overarching policy, which affects most sectors of the Australian economy, is the National Competition Policy. The States, Territories and the Commonwealth have committed to a process of creating a level playing field for all by facilitating effective competition. The goal of this process is to promote economic efficiency and economic growth. The policies are articulated in what has become known as the Hilmer report on National Competition.

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<sup>2</sup> A river basin is defined as the area within which all surface water flows towards a common low point.

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In order to facilitate these competitive reforms, the Commonwealth government has placed funds in a pool to be distributed among States and Territories on the basis of progress of implementing reform (each step is known as a Tranche). Thus, States and Territories have a financial incentive to implement the policy framework. The size of payments promised varies among States. The payments are not large enough to finance reform but are sufficient to ensure that serious steps are taken to implement the reforms required.

### Council of Australian Governments

The Council of Australian Governments (COAG) predates the National Competition Policy. Cooperation among the States to achieve agreed upon goals has required that entities such as COAG exist. COAG is charged with implementing principles of the Hilmer Report, including water reform.

COAG is comprised of heads of Federal (Commonwealth of Australia) and State/Territory governments plus a representative from local government. Water is one of many sectors that come under the preview of COAG.

COAG has developed a national policy called the COAG Water Reform Framework for the efficient and sustainable reform of Australia's rural and urban water industries. In developing its framework, COAG adopted a position which required a consistent approach to water reform throughout Australia. The key elements of COAG's water reforms are:

1. All water pricing is to be based on the principles of full cost recovery and transparency of cross-subsidies;
2. Any future new investment in irrigation schemes, or extensions to existing schemes, are to be undertaken only after appraisal indicates it is economically viable and ecologically sustainable;
3. States and Territory governments, through relevant agencies, are to implement comprehensive systems of water allocations or entitlements, which are to be backed by the

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- separation of water property rights from land and include clear specification of entitlements in terms of ownership, volume, reliability, transferability and, if appropriate, quality;
4. The formal determination of water allocation entitlements, including allocations for the environment as a legitimate user of water;
  5. Trading, including cross border sales, of water allocations and entitlements within the social or physical and ecological constraints of catchments;
  6. An integrated catchment management approach to water resource management be adopted;
  7. The separation, as far as possible, of resource management and regulatory roles of government from water service provision;
  8. Greater responsibility at the local level for the management of water resources;
  9. Greater public education about water use and consultation in the implementation of water reforms; and appropriate research into water use efficiency technologies and related areas.

Source:<http://www.affa.gov.au/water-reform/facts2.htm>

Each State and Territory was given the flexibility to adopt its own approach to implementation depending on its own unique institutional and natural characteristics, but agreed that the full framework would be implemented by the year 2001. A package of diverse but interrelated requirements developed within the framework, and covering both urban and rural areas, is designed to generate an economically viable and ecologically sustainable water industry. A key feature of the COAG framework was a State and Territory agreement to a tranche payment system, where access to very large payments was conditional upon delivery of reform milestones.

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COAG Water Reform process is being further developed by the High Level Steering Group on Water. This group consists of the chief executives of water resource management agencies. The head of MDBC is not represented on the High Level Steering Group on Water but its members with a few exceptions, are members of the Commission.

### Murray-Darling Basin Ministerial Council

The Murray-Darling Basin Ministerial Council (MDBMC) was established in 1985 with amendments to the Murray-Darling Basin Agreement. Information flows between the Ministerial Council and the Council of Australian Governments as appropriate on matters relating to the implementation of the framework for water reform.

The Ministerial Council consists of the ministers responsible for land, water and environmental resources in each of the signatory or contracting governments, the Commonwealth, New South Wales, South Australia, Victoria, and Queensland, with each government limited to a maximum of three members. An Australian Capital Territory government Minister may participate in the deliberations of the Council but not in its decision-making. The chair of the Ministerial Council is traditionally the Commonwealth Agriculture Minister. The prime functions of the Ministerial Council are:

*generally to consider and determine major policy issues of common interest to the Contracting governments concerning effective planning and management for the equitable efficient and sustainable use of the water, land and other environmental resources of the Murray-Darling Basin; and to develop, consider and, where appropriate, to authorise measures for the equitable, efficient and sustainable use of such water, land and other environmental resources . (Murray-Darling Basin Agreement 1992, Clause 9)*

Being a political forum, the Ministerial Council has the power to make decisions for the Basin as a whole because of the presence of Ministers representing each of the States and Territory. Resolutions of the Council are usually through a consensus decision-making approach and in theory represents a consensus of governmental opinion and policy across the Basin.

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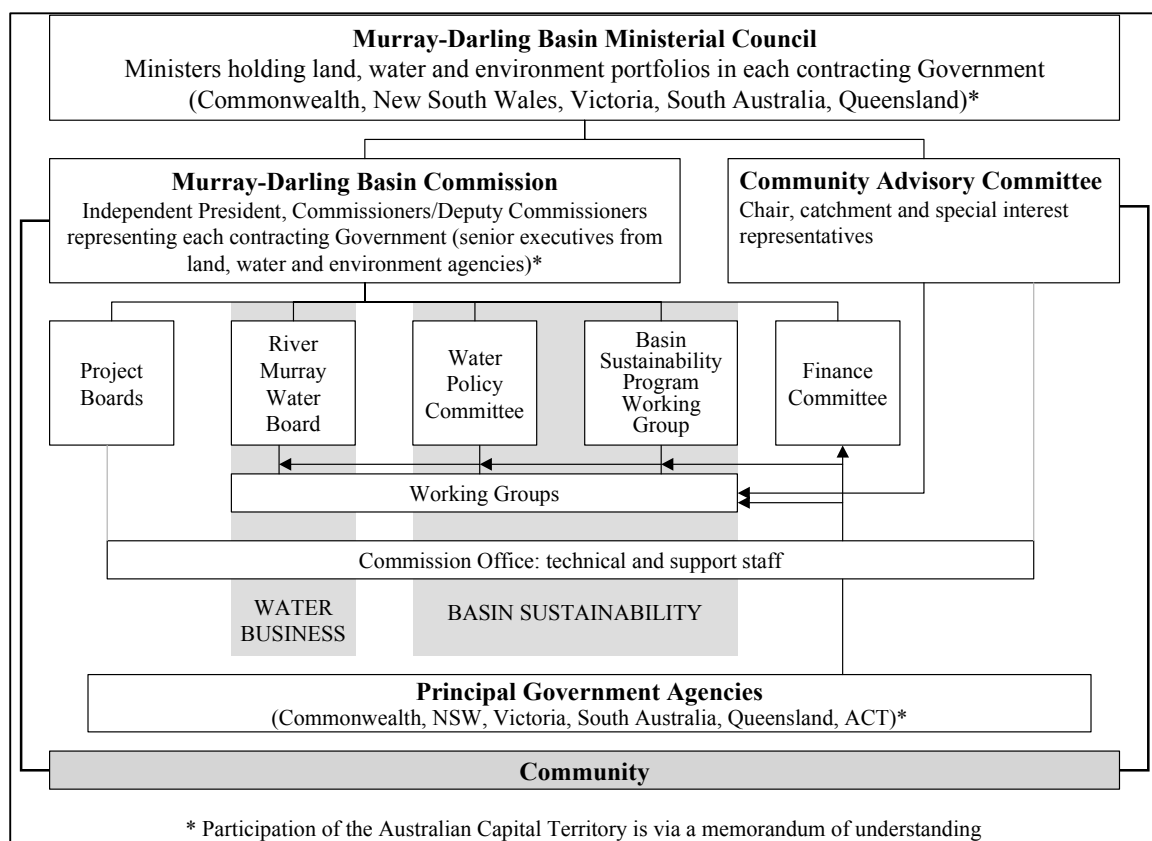
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However the Ministerial Council relies on the States to implement any decisions taken.

An overview of the high level organisation of Murray-Darling Basin can be seen in Figure 1.7. The Murray-Darling Basin Commission is discussed in some detail below. This organisational chart highlights how the State and Commonwealth governments coordinate their efforts to provide a high level structure that is responsible for the Basin. However, within this high level structure there is still a place made for a Community Advisory Committee. The committee serves as a two way communication channel between the Ministerial Council and communities living in the Basin. This is a consistent feature of most of the resource management bodies in Australia (MBDC 2000).

The first two tiers of the structure have been stable for many years, but the third tier of project boards, policy committees, etc, changes regularly. The Commission's staffing structure was changed radically in 1999.

Figure 1.7  
Overview of the Organisation of the Murray-Darling Basin



Source: <http://www.mdbc.gov.au/about/governance/overview.htm#fig1>



The Commission is the executive arm of the Murray-Darling Basin Ministerial Council. It also works cooperatively with the States. The Commission is responsible for managing the River Murray and the Menindee Lakes system of the lower Darling River and advising the Ministerial Council on matters related to the use of the water, land and other environmental resources of the Murray-Darling Basin.

The Commission is an autonomous organisation equally responsible to the governments represented on the Ministerial Council as well as to the Council itself. It is a rather unusual entity in that it is neither a government department nor a statutory body of any individual government. A history of the Commission is in Appendix I.

The Commission has a couple of key functions that include:

- advising the Ministerial Council in relation to the planning, development and management of the Basin's natural resources;
- assisting the Council in developing measures for the equitable, efficient and sustainable use of the Basin's natural resources;
- coordinating the implementation of, or where directed by Council, to implement those measures; and
- giving effect to any policy or decision of the Ministerial Council.

The Commission must balance equity considerations as well as manage and distribute the water resources of the River Murray in accordance with the Murray-Darling Basin Agreement.

The Commission began with a mandate to manage water quantity that has gradually extended to include water quality issues and, to a limited extent, related land resource management issues. In the late 1980's, it was given a mandate to initiate, support and evaluate integrated natural resources management across the Murray-Darling Basin.

The Commission comprises an independent President, two Commissioners from each contracting government (ie the Commonwealth, New South

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Wales, Victoria, South Australia and Queensland) and a representative of the Australian Capital Territory government. Each contracting government also has two deputy Commissioners and the ACT has one deputy representative. Apart from the President, Commissioners are normally chief and senior executives of the agencies responsible for management of land, water and environmental resources.

The Commission must work in cooperation with the partner governments, committees and community groups to develop and implement policies and programs. This cooperative approach reflects the Constitutional reality and the importance placed on Government-community partnerships and brings to participants and end-users the benefit of shared concerns and expertise, jointly developed and integrated solutions, and avoids duplication of effort. ([http://www.mdbc.gov.au/about/about\\_mdbc/the\\_commission.html](http://www.mdbc.gov.au/about/about_mdbc/the_commission.html))

### *PERU* Other Committees Involved in Water Reforms

There are a couple of key ministerial committees<sup>3</sup> that have been charged with putting the policy framework in place in each State and territory in line with COAG reforms. Two groups in particular, Agriculture and Resource Management Council of Australian and New Zealand (ARMCANZ), Australian and New Zealand Environment and Conservation Council (ANZECC), have provided policy directions in relation to water needs for agriculture and the environment. These Ministerial committees are supported by Standing Committees of senior officials whose main task is to advise the Ministerial Committees and supervise working groups, etc who develop policy proposals. Standing Committee members are usually heads of department although they sometimes need to send a representative. The key standing committees are the:

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<sup>3</sup> Under the Australian system of government, ultimate responsibility for policy implementation rests with a Minister. To be a Minister, one must first be elected to Parliament and then selected for a position in Cabinet. Departments are constrained and guided by legislation and are subject to the direction and control of a Minister.

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- Standing Committee on Agriculture and Resource Management (SCARM);
- Standing Committee on Environmental Protection (SCEP);
- Standing Committee on Conservation (SCC).

Very few significant changes in water policy occur without at least, informal discussion at SCARM.

Working together these two bodies have put forth guidelines on how these needs should be met in the broader context of water allocation. The goal for providing water for the environment is to sustain and where necessary restore ecological processes and biodiversity of water dependent ecosystems. The principles are as follows:

1. River regulation and/or consumptive use should be recognised as potentially impacting on ecological values.
2. Provision of water for ecosystems should be on the basis of the best scientific information available on the water regimes necessary to sustain the ecological values of water dependent ecosystems.
3. Environmental water provisions should be legally recognised.
4. In systems where there are existing users, provision of water for ecosystems should go as far as possible to meet the water regime necessary to sustain the ecological values of aquatic ecosystems whilst recognising the existing rights of other water users.
5. Where environmental water requirements cannot be met due to existing uses, action (including re-allocation) should be taken to meet environmental needs.
6. Further allocation of water for any use should only be on the basis that natural ecological processes and biodiversity are sustained (i.e. ecological values are sustained)
7. Accountabilities in all aspects of management of environmental water provisions should be transparent and clearly defined.
8. Environmental water provisions should be responsive to monitoring and improvements

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in understanding of environmental water requirements.

9. All water uses should be managed in a manner which recognises ecological values.
10. Appropriate demand management and water pricing strategies should be used to assist in sustaining ecological values of water resources.
11. Strategic and applied research to improve understanding of environmental water requirements is essential.
12. All relevant environmental, social and economic stakeholders will be involved in water allocation, planning and decision making on environmental water provisions.

ARMCANZ and ANZECC are forums for government ministers to coordinate efforts. The High Level Steering Group on Water, which consists of department heads, provides the ties between government agencies and the policy setting committees such as ARMCANZ and ANZECC. There are a number of other committees which involve lower level government officials where the details concerning how to implement these policies are worked out. The committees have been key in implementing reforms concerning full cost pricing and the creation of the environment for the competitive provision of water.

### **Coordination of Various Agencies**

Coordination is achieved via a constellation of Councils and inter-related bodies. There are links between COAG, ARMCANZ and ANZECC through the ministers who are members of cabinet. Agreements entered into by the States will necessarily reflect approval by the Ministers who sit in Cabinet.

The Murray-Darling Basin Commission is also an important point of coordination. Each year, each State develops a three-year rolling plan that outlines the outcomes to be achieved against Basin sustainability objectives in the management regions. The management regions correspond to the catchments in New South Wales, Victoria and South Australia. A consolidated three-year rolling investment plan, based on State plans, then provides a

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summary of the investments being made across the Basin. This allows for some evaluation of progress towards goals.

### **KEY HIGHLIGHT**

Even though the Basin crosses numerous jurisdictions, forums can be set up for high level officials to come together and make decisions for the Basin. In Australia, there is a recognition that States must work together on resource management issues. The process works because the institutions have evolved especially to resolve issues.

Characteristically, new agenda issues are approached by setting a vision and then negotiating the detail once the vision is agreed. A second feature, not transparent to the lay observer, is the complex web of people involved. It is common for many of the Commissioners to Chair subcommittees, sit on the High Level Steering Group for Water, and be the head of a natural resource management department. These same people also interact through Committee processes, like ARMCANZ, ANZECC, etc.

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## 2. WATER POLICIES

### How to Share the Water

In the Murray-Darling River Basin of Australia, water is used for passive, environmental and consumptive purposes. Consumption includes household use, irrigation and water for livestock. Historically, access to the Murray-Darling Basin began with a framework that enabled virtually who ever wanted to use water for consumptive purposes to do so. Moreover, most of the infrastructure used to deliver water was paid for by governments and supplied at subsidised prices.

The combination of drought and water quality has become a significant issue for waters users throughout the Basin. Events such as droughts, algae blooms and increases in salinity provided impetus for renegotiating how to share the water in Murray-Darling Basin. Views on the situation are coloured by location in the Basin. Queensland, New South Wales, Victoria are “upstream States” and South Australia is a “downstream” State.

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#### Priorities amongst Users

In general across States, the consumption of water by people and animals is the highest priority followed by agriculture. Most water licences and legislation indicates that water needed for domestic purposes and livestock production is a prior right. That is, people may not interfere with the rights of people to do this in a reasonable manner.

The importance of the environment has been acknowledged by the Council of Australian Governments. News releases, as reported by Marsden Jacob Associates (1999), indicate the Commonwealth government’s plan is to continue the water reform process by:

*...legislating to ensure that flows needed to restore adequate river health continue to have a prior right over provision of water for consumptive use. (MJA p.27)*

However, where in the list of priorities the environment is actually placed is not always well defined. An example is the Corporatisation of the Snowy Mountains Hydro-electric Authority, Draft Environmental Impact Statement (EIS) released by the Commonwealth (Industry, Science and Resources).



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The EIS outlines how water levels in the Snowy River might be restored through water savings in the Murray-Darling but

*[r]ather than recommending specific trade-offs between economic and environmental interests, or between competing environmental interests, the EIS has sought to compare and contrast the various advantages and disadvantages for each group of stakeholders of reducing water releases to the Murray-Darling Basin in order to provide increased flows in the Snowy River.*

(p.2 Draft EIS)

This reluctance indicates the difficulties that governments, communities and businesses face in placing the environment in a list of priorities. COAG through the High Level Steering Group on Water has released draft guidelines on the allocation of water to the environment.

However there have been steps forward. The Barmah-Millewa Forest now has its own environmental allocation. The Barmah section of the forest is a Ramsar wetlands indicating that this is a site of international importance. (MDBC 1999). In October 1998, the Murray-Darling Basin Commission released 97 GL of water from the Hume Dam to achieve environmental benefits for Barmah-Millewa Forest and to supplement flows from the Owens River to promote tree growth and improve bird and fish habitat

All levels of government have committed themselves to an Inter-Governmental Agreement on the Environment. This agreement commits them to a set of principles designed to ensure that all resource use and development in Australia is ecologically sustainable. Further, the Commonwealth and State governments endorsed the National Strategy for Ecological Sustainable Development in 1992 which has three core principles:

- to enhance individual and community well-being by following a path of economic development that safeguards the welfare of future generations
- to provide for equity within and between generations
- to protect biological diversity and maintain essential ecological processes and life-support systems.

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In summary, governments have begun to express a need to give greater priority to the environment and are now trying to implement this objective. Indicative of this change in emphasis, the New South Wales government recently reduced most irrigation allocations by 10% so that “allocations” to the environment could be increased. The City of Adelaide, outside the Basin, also has priority. Adelaide receives about 40% of its drinking water from the River Murray. As yet, the City has not had to purchase any additional amount over its allocation to meet its water needs.

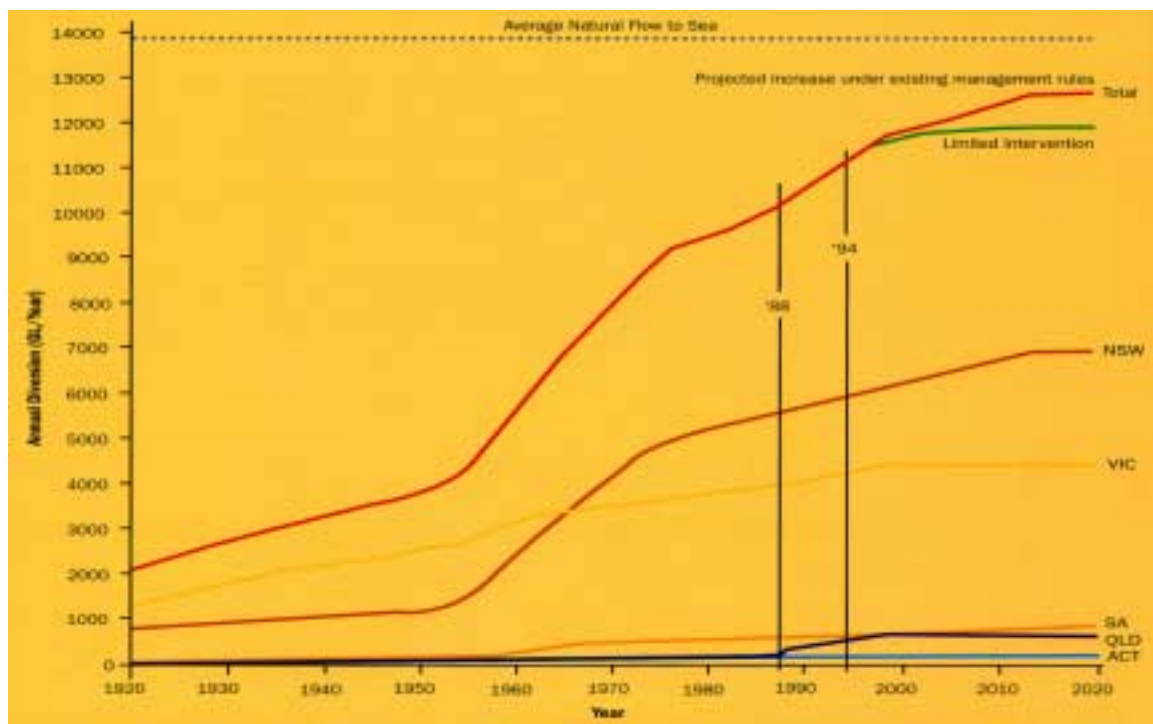
Finally in the list of priorities, there is some industrial use of water in the Basin. Examples of industrial use include food and beverage processing, textiles and tobacco. As well, there is some mining that occurs in the Basin.

### Historical Use of the Basin

The basis for allocating water across States is largely the product of historical use. New South Wales and Victoria have engaged in intensive agriculture since the turn of the century and the pattern of use can be seen in Figure 2.1.

Figure 2.1

Historical Use of the Murray-Darling Basin by the States Projections as of 1995 without a Cap



Source: MDBMC (2000)

## Sharing Water among States

Through the 1980s, the amount of water being diverted from the Basin began to increase significantly. In 1993, a decision was made by the Murray-Darling Basin Ministerial Council (MDBMC) to prepare a water audit. The audit would:

- Establish water use in the Basin;
- Describe current level of development;
- Document recent trends; and
- Assess the implications of those trends.

The MDBMC was concerned about the health of the Basin. Water salinity was increasing, algal blooms were occurring more frequently and biodiversity appeared to be declining. For the downstream State of South Australia, the situation was thought to be becoming serious.

It was acknowledged by the MDBMC that water usage could not continue to increase within the Murray-Darling Water Basin. As a result, an overall Cap on water diversions has been introduced, limiting the volume of water to what would have been diverted under 1993-94 levels of development. This does not mean that the amount of water is capped at 1993-94 levels but:

*...rather, the Cap in any year is the volume of water that would have been used with the infrastructure (pumps, dams, channels, areas developed for irrigation, management rules, etc.) and management rules that existed in 1993/94, assuming similar climatic and hydrological conditions to those experienced in the year in question. Thus, the Cap provides scope for greater water use in certain years and lower use in other years. (Murray-Darling Basin Ministerial Council 2000 p.3)*

Perhaps, the most dramatic impact of the Cap has been an increase in water trading and, also, the value of water.

### The Cap on a State by State Basis

#### New South Wales and Victoria

For New South Wales and Victoria, the Cap is set at the volume of water that would have been diverted under 1993/94 levels of development. In the NSW

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Border Rivers valley, the Cap allowance for enlarged Pindari Dam has not been determined. The Cap allowance for the Lake Mokan development has not been determined. Although Cap targets vary from year the long term cap is about 6000 GL for New South Wales and about 4000 GL for Victoria.

### South Australia

In contrast to New South Wales and Victoria, South Australia has opted for a lower but more secure level supply of water. The Cap in South Australia is defined in terms of components:

- A fixed allocation of 50GL per year for country towns
- A five year non-tradeable, rolling allocation of 650 GL for metropolitan Adelaide

An average 524 GL per year allocation for irrigation including private, industrial, recreation, environment, stock and domestic purposes. South Australia has effectively capped State consumption to the allocation levels in 1992.

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### Queensland

Cap limits for Queensland have yet to be determined. The State is in the process of preparing water allocation management plans (WAMPs) and water management plans (WMPs) for the catchments in the Murray-Darling Basin. There is a moratorium on issuing new licences while the concerns of Queensland are being negotiated and plans are being put in place. The amount of water being diverted is relatively small in comparison to New South Wales and Victoria.

### Australian Commonwealth Territory

A proposal on Cap limits for the Australian Commonwealth Territory and a proposal for water trading with New South Wales is forthcoming. The ability to trade water is necessary for the Australian Commonwealth Territory to be confident in establishing a Cap limit.

MDBMC (1996)

#### **Accountability**

Through the Murray-Darling Basin Agreement and the agreements by COAG, there are periodic audits of

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compliance to the Cap on water diversions. Water allocation plans are becoming statutory documents that are prepared at the local level. States are held accountable for these decisions made. For this reason, there are links all the way up through the administrative layers.

The National Competition Policy has required State and Territories to demonstrate compliance with reforms (including water reforms) as agreed by the COAG. In order to receive Tranche payments, States and Territories have had to report on their progress in introducing reforms. The State of Queensland faced a reduction in their second Tranche payment. Last minute negotiations and a commitment to reform resulted in Queensland receiving the full payment.

### **Threats to the Cap**

The Cap limits by State represent what could be negotiated at the time. It is still not clear how the developments such as the enlarged Pindari Dam and the Lake Mookan development will fit under the Cap. Negotiations to get the Australian Commonwealth Territory and Queensland to agree to diversions under the Cap are considered important, as exemption of either of these institutions would undermine the public perception that all parties were subject to limits. This has the potential to lead to water users questioning why they must adhere to limits. Industry organisations opposed to the Cap have been running a “Zap-the-Cap” campaign.

There is a difficult trade-off when setting a Cap in an environment of cooperative federalism – comprehensiveness versus length of negotiations. In order to obtain agreement on the Cap, contentious issues such as ground water and farm diversions (farm dams) were not included. Since the introduction of the Cap, there has been an increase in farm dams and increased pressure on ground water stocks. It is hoped that the Cap may be extended and agreement achieved with the States and Australian Capital Territory on these issues.

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### KEY HIGHLIGHT

Setting aside water for the environment is probably the most difficult aspect of setting priorities for water use. Experience in the Basin is revealing that a formal cap on water use is a necessary step in the development of efficient and sustainable water use policies. Experience is also showing the importance of allocating water to the environment or clearly defining allocation rules well before the quantity of water available for consumptive use is fully committed.

“Loopholes” in the comprehensiveness of a Cap on diversions has the potential to undermine confidence in the system. When commitment is less than complete, water users start to question why they must adhere to limits.

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### 3. WATER LAWS

Within the Commonwealth of Australia, each State and Territory has responsibility for legislation concerning water resources. Each State in the Murray-Darling Basin has been moving towards defining property rights regarding water and separating water rights from land title. The purpose of this process is to facilitate the development of trade in water within and among States and the Australian Commonwealth Territory. There is considerable variation among States regarding property rights in water and some differences are given as examples below.

#### **Water Legislation concerning Different Sources of Water**

Surface water is the most important source of water for users in the Basin. Potential problems with groundwater are less visible but are emerging as an issue in various States. As a result, initiatives such as the New South Wales Groundwater Policy Framework will be considered here because it is interesting and innovative.

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#### New South Wales

New South Wales has recently passed new legislation for water resource management. The new act will replace the Water Administration Act 1986, the Water Act 1912 and other pieces of legislation. New South Wales issued a white paper and went through an extensive process of consultation with this legislation.

The use, flow of and control of surface water, groundwater, coastal waters and water in the water works system comes under this new Act. The Water Management Act is concerned with setting out the rules for catchment management in contrast to the Water Act of 1912 that was designed to facilitate rural agricultural development.

New South Wales has issued The NSW State Groundwater Policy Framework Document. Groundwater can be found in most areas of NSW but it varies widely in terms of quality, its recharge potential, vulnerability to pollution, and its connection to surface waters and other systems. The policy framework States that development of groundwater resources must occur on an ecologically sustainable basis. Further as much is unknown about

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groundwater resources, the precautionary principle will prevail. The precautionary principle is:

*Where there are threats of serious or irreversible environment damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.*

(Department of Land and Water Conservation 1997, p.13)

In New South Wales, the development of Groundwater Management Plans will provide the policy framework for how groundwater should be accessed. In locations where there are conflicting interests or the resource is vulnerable, stakeholder involvement will be used to resolve the trade-off between economic, social and environmental objectives.

The functions of the Minister are largely carried out by the Department of Land and Water Conservation.<sup>4</sup> Access to surface water and groundwater is regulated by way of licences in New South Wales. Private individuals and government agencies must apply for a licence under the Water Management Act 1986.

The importance of setting the rules carefully with respect to ground water can be demonstrated with an example. Over much of New South Wales, new licenses were issued for "unused water" without cancelling undeveloped licenses. In retrospect, this has proved an administrative disaster because the total volume of licences issued is well in excess of estimated sustained yield in a number of areas. In one of the worst cases, the Namoi Valley, a complicated process is now underway to work out how to equitably introduce water trading in areas where large allocations of water have never been used. In one zone over 50 GL of water have been allocated, average use is around 20 GL and estimated sustained yield is 12.5 GL. Those with large unused allocations are calling for a pro-rata cut across all allocations. Irrigators who have been using "all" their allocation regard this as extremely inequitable. Most users tend to be of the view that government is responsible for the errors made and should be forced

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<sup>4</sup> Ultimate responsibility remains with the Minister under the Australian system of governance.

to compensate irrigators for water that is not or no longer available to them.

Victoria

Under the Water Act 1989, the Crown has the right to the use, flow and control of all water in a waterway and all groundwater. Under the Act, an Authority can apply for a licence for a bulk entitlement to groundwater, surface water or water in the works of another Authority, etc.

South Australia

In South Australia, areas are prescribed when intense development occurs and closer management is deemed to be appropriate. Once an area is prescribed, taking groundwater or surface water requires a licence under the Water Resources Act 1997. Water Allocation Plans have been or are in the process of being prepared for each prescribed area. Formal provisions for the environment are to be made in the water allocation plans. South Australia, differing from other States, has devolved much responsibility for water management to catchment boards with powers to levy water users and, to a limited extent, regulate land and water use practices.

Australian Capital Territory

The right to use and control all sources of water is vested with the Territory. Generally, a licence is required to take water but there are some leases and interests in land where licences are not required. (Fisher 2000, p.101) The Territory is very small and only a very small area is irrigated. Virtually, all water is used for domestic purposes.

**Water Legislation concerning different Uses of Water**

Hydro-electric Power

The Snowy Murray Development diverts water from the upper Snowy River through two power stations, through a pondage and then down the River Murray into a dam where it is then released for irrigation purposes. Approximately 1200 GL is released into the River Murray on average.

The right to water released from the reservoirs rests with New South Wales and Victoria which in turn

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provide property rights to users through licences with varying degree of security. The Snowy Murray Development does hold the right to “time” the release of water subject to a series of operating rules. In order to generate power for a commercial electricity market, the storage and ability to release water at particular times is of critical importance.

### Irrigation

New licences for irrigation water will be granted under the Water Management Act 2000 in New South Wales. The Water Administration Ministerial Corporation, a trust, a privately managed scheme, or an irrigation corporation may provide water for irrigation.

In Victoria, under the Water Act 1989, bulk entitlements are granted to water authorities which have specific functions and responsibilities within districts. There are four types of districts (water supply, sewage, waterway management and irrigation) of which irrigation is one. The irrigation district receives water from the water authority. The irrigation district provides and operates works for the purposes of delivering water for irrigation. Individual irrigators, however, are free to sell water within their district. Trading among districts and interstate is being trialed.

In South Australia, to access water for irrigation purposes in a prescribed area, the irrigator must have a license granted under the Water Resources Act 1997.<sup>5</sup> Much of the irrigated land in the Murray-Darling Basin in South Australia is in a prescribed area. This requires that a catchment management plan and a water allocation plan be prepared.

In Queensland, licences for irrigation are granted under the Water Resources Act 1989. However, there is currently a moratorium on new licences in Queensland until catchment plans are in place.

As a general rule, water is more fully allocated in New South Wales than in Victoria or South Australia. One of the reasons often articulated for this is that

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<sup>5</sup> South Australia is reviewing whether activities which might effect recharge will require a licence for water. Forestry plantations, as an example, would be required to hold a licence.

there are more permanent irrigation plantations, etc, in South Australia and Victoria.

### Consumption

In New South Wales (Water Management Act 2000), Victoria (Water Act 1989) and Queensland (Water Resources Act 1989), the occupier of land is able to take and use water for domestic consumptive purposes without a licence. Consumptive purposes also includes watering stock and irrigating home gardens or land for non-commercial purposes less than two hectares.

South Australia (Water Resources Act 1997) has taken a different approach. Under the Act, there is a prohibition against taking water from a prescribed area without a licence even for domestic purposes. The Australian Capital Territory has the same rules as New South Wales regarding consumptive use of surface water but all groundwater extraction requires a licence. (Fisher 2000) All States are now in the process of introducing rules to control the size of farm dams that prevent water flowing into the Murray-Darling and other systems.

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### Environment

To this point, water for the environment is vested with the Minister responsible for Water in each of the states. Linkages between licences and other aspects of environmental protection are provided for through requirements for information to be exchanged between various government departments.

In New South Wales, the new Act will provide a means for the Minister to adjust water entitlements to achieve particular environmental or health outcomes. Thus water for the environment will no longer be residual but will have a prior right.

In Victoria, the bulk entitlement process is being used in regulated systems to convert poorly defined access rights to water of existing users to well defined rights consistent with the Water Act 1989. Water authorities (this includes the major irrigators) apply to convert an existing use into a bulk entitlement. This provides an opportunity to negotiate environmental flows. Victoria reported to the High Level Steering Group recently that in 73 bulk entitlement applications, enhanced environmental flows were negotiated in



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87% of the cases (High Level Steering Group on Water, undated). As well, when a bulk water entitlement is sought, the Minister responsible for the Water Act forwards a copy of the application to the Minister responsible for Conservation, Forest and Lands Act 1987 and Planning and the Environment Act 1987. This ensures coordination between departments.

In South Australia, section 6 of the Water Resources Act 1997 States that development should occur only on an ecologically sustainable basis. Where water resources are overcommitted, the Act gives the Minister the power to reduce water allocations of license holders.

In all States, there is interest in allocating formal rights to the environment and then using market mechanisms to improve environmental outcomes.

### **Linkages between Water and Water Related Resources**

In each State and Territory there is body of legislation affecting the management of the environment and the resources within it. Most aspects of water management are covered by the respective pieces of water legislation. However, there will be instances where other pieces of legislation come into effect. In South Australia for instance, the following Acts have implications for water resource management:

- Environment Protection Act 1993 sets out the activities which require an environmental licence and examples include chemical storage and warehousing, sewage treatment and activities that produce particular types of waste. The Environmental Protection Agency considers the impact that these activities are likely to have on the surface and groundwater systems.
- Under the Native Vegetation Act 1991, the Minister may enter into a heritage agreement with a landowner to protect native vegetation from clearing. This Act protects important ecosystems on private land.
- Under the Soil and Landcare Act 1989 - Soil conservation boards prepare plans regarding the classes into which the land falls, the preferred and actual uses of the land, the nature, causes, extent and severity of land degradation and the measures

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that should be taken for rehabilitation of each particular type of degradation. The board also encourages the property owners in the district to prepare property plans to deal with degradation.

- Local Government Act 1999 sets out the authority for local governments for such things as the construction of drainages through private land and makes provisions for flood management. The Act sets out the power for the Governor to grant water reserves to Councils (local governments).
- The Development Act 1993 sets out the key elements of a Planning Strategy which may include planning principles relating to natural or constructed environments, ecologically sustainable development, the management or conservation of land, buildings, heritage places and heritage areas as well as the management, conservation and use of natural and other resources.

As well, the Commonwealth government passed a package of legislation under the Environment Protection and Biodiversity Conservation Act 1999.

### **Property Rights in Water**

Australia inherited a body of English common law regarding water rights. Historically, property rights generally evolved in an ad hoc manner in reaction to specific circumstances and problems. As settlement occurred and the need for comprehensive water law was required, the States began introducing legislation covering surface and ground water.

Australia is in the midst of significant policy reform regarding property rights in water. As a result, all States are in the process of changing legislative arrangements associated with water use and allocation. It is useful to review who the water users are in the Basin as the aspects of property rights which are valued tend to revolve around the use of the water. There are four main uses of water in the Murray-Darling Basin including:

- Consumptive uses such irrigation, urban water supply, stock and domestic purposes in rural areas
- Hydro-electric power
- In-stream flows for the health of the river system

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- Dilution flows which maintain water quality for downstream users

Each State and Territory is at a different step in the process of defining property rights to water. One of the important goals of the process is to facilitate more efficient trade in water so that adjustments by users under the Cap are made easier. If this occurs then, it is reasoned, water will continue to be applied to its highest and best use. The first step in this process involved separating the right to water from the land title. In order to establish an effective market in water rights, careful definition of property rights with respect to water requires that rights be clearly delineated in terms of volume, security or reliability, transferability and quality. Rights are typically defined for a period of years with an arrangement to facilitate their renewal before the old right expires.

Defining property rights is complicated by several factors, some of which may be peculiar to the Murray-Darling Basin. The variability of water flows (due to season and periodic drought) in the Basin results in property rights that are not readily defined in volumetric terms (Brennan and Scoccimaro, 1998). In practice, the rights issued represent an entitlement to take a proportional share of water available for consumptive use within a defined security class.

In all States, licences issued under each jurisdiction reflect the thinking at the time they were first issued. As a result, there is considerable inconsistency in licence conditions, rights, obligations and community perceptions. All States are now in the process of modifying this situation so that trading is simpler. Separation of water from land title is also raising complex issues about ownership. In some cases, the registered land title holder is not the same person or party as the holder of the water licence. At present, legislation gives little guidance as to the most appropriate way to resolve such issues.

The mechanisms for water delivery do not provide for perfect excludability and as a result there are potential problems with externalities created by users within the Basin. For instance, irrigation may result in salinity as a result of excess water being used and the rising water tables bringing salt to the root zone and or the surface.

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To this point, formal rights for the environment have not been clearly defined. Ministers in each State and Territory have been able to divert water for the health of a river or ecosystem but these rights have been residual to other uses.

An over view of the property rights or entitlements framework is provided below.

### Entitlement Framework in New South Wales

The Water Management Act was recently passed in New South Wales and represents an innovative framework for water rights. The Act will provide clarification of water rights. An integrated approvals administration system will apply to regulated and unregulated surface water and ground water systems. Generally there will be a separation of water rights and land rights. The new framework will tighten up the provision for extraction and use of water in New South Wales. Landowners will continue to hold a basic right water for domestic and stock purposes. The Minister may introduce special management arrangements for domestic and stock use in "sensitive areas". Access Entitlements will be categorised as follows:

Category 1 - Local and Major Urban Water Utilities - These are high security fixed volume 20 year renewable licences.

Category 2 - High Security Regulated River Entitlements - these high security entitlements were created in the past to provide virtually guaranteed access to water for permanent crops such as grapes and fruit trees. These guarantees tend to be far in excess of what is actually required and future reviews of these entitlements have been foreshadowed. There are severe difficulties with water availability and over commitment of water resources in some category 2 areas.

Category 3 - Low Flow Unregulated River Entitlements - The low flow entitlement (Class A) would provide the highest security in unregulated rivers.

Category 4 - General Security Regulated River and Groundwater Entitlements - this category will include the general security irrigation and groundwater licences.

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### Category 5 & 6 – Medium and High Flow

Unregulated River Entitlements – These entitlements (Class B & C) will provide access to water from an unregulated stream when the river flow exceeds a specified percentile flow level or other trigger level.

The access rights described above can be traded subject to conditions and Ministerial approval.

The proposed Water Management Act will allow for trades in water entitlements to occur intervalley and interstate.

### Entitlement Framework in Victoria

The State of Victoria was the first State to emphasise the need to define property rights precisely as a prerequisite to market trading and to achieve efficient allocation. The Water Act 1989 converted the rights of existing users who held existing licenses into bulk entitlements that specified the volume to be harvested, its security and the rate of harvesting (Cumming et al. 1995).

Considerable efforts have been made to clarify the water entitlements in the State. Bulk entitlements to water are being clarified for all the regulated water supply systems. These quantify the rights and obligations of water supply and power authorities to divert water, including rules for operating reservoirs and stream flows. In Victoria, Goulburn-Murray Water is seeking to further define the property rights of water retailers. The process aims to provide choice in reliability of supply for farmers, to simplify the water trading market, and to remove unused entitlements from the marketplace.

### Entitlement Framework in South Australia

Preparation of the Water Resources Act 1997 in South Australia coincided with the policy reforms being proposed by the Council of Australian Governments (COAG). The Act contains many of the key features agreed upon by COAG and is designed to show that the State is complying with COAG requirements. In particular, there is

- Separation of the roles of water resource management, regulation and monitoring from the role as service provider. All water users fall under this one Act.

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- Separation of water rights from land title.

Water licences are fully transferable (permanently or temporarily) within ecological or other constraints.

### **Pollution Control**

For reasons of public health, the legal system in Australia has protected water quality. There is a general prohibition against permitting or causing activities resulting in the pollution of water without a licence. In some instances, this may be treated as a criminal matter. However, as part of the development of environmental protection legislation, a range of approaches to protection and enforcement are being employed. New South Wales has set out the most recent body of legislation through the Protection of the Environment Operations Act 1997. This Act provides an integrated framework in:

- the creation of environmental protection policies, including standards,
- the licensing processes and
- the issuing of environmental protection notices as an enforcement mechanism.

(Fisher 2000 pp.286-7)

One of the purposes of the legislation in New South Wales is the prevention of pollution, promotion of cleaner production, reduction of discharges that are likely to be harmful to the environment and promotion of progressive environmental improvements. Contained in the legislation are the standards that are taken into consideration in approving a licence to pollute. Licences may be granted subject to a series of conditions being met. The Environment Protection Act in Queensland represents a more traditional approach to pollution control. Environmental harm is given a generic approach where there is an adverse effect on environmental quality whether it is ecological health, public amenity or safety. (Fisher 2000 pp.288-9)

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**KEY HIGHLIGHT**

The States have all moved towards separating title from land and water. It is not a precondition to trade in water but well defined rights reduce transaction costs.

Automatic renewal of licences over time has proven to be a problem in most jurisdictions in Australia. The individual licences reflect the policy environment at the time. The inconsistencies have proven to be a significant issue for water trading.

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#### 4. WATER TRADING

Trade in water has been occurring in Victoria and New South Wales since the early 1980s. Trading became particularly important and widespread with droughts, diminished supplies, the Cap on water and in some areas, decreases in water allocations.

Water trading in the Murray-Darling Basin is complicated by the variability of water flows. As discussed in the introduction, the annual variability of flows means that the security of the property rights is going to be a major issue.

South Australia and New South Wales have legislation in place that clearly separates title to land and water and allows licences to be traded either permanently or temporarily (complete transfer versus a lease of the water for a specified period). It is now possible for a person who owns no land to hold a water license as an investment and sell water on an annual basis to any interested party. Thus a system of well defined property rights is not a requirement for water trading though it certainly facilitates more efficient trade.

There are basically two types of entitlements<sup>6</sup> in the Basin:

- High Security – a licence for which the water will be provided except in severe drought conditions
- Low Security (or general security) – a licence for available water which can vary from year to year.

The South Australian system of rights allows only for high security water.

##### **Water Trading within States**

All States and Territories are committed to the principle of using water according to its highest and best use within social, physical and ecological constraints. To facilitate moving towards efficient use of water States and Territories have been separating land and water entitlements. This allows the owner of water rights to sell surplus water without selling the land. The development of markets for water is well established in some States such as New South

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<sup>6</sup> Entitlements are the volume or share of water which a person is authorised to take under a licence.

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Wales and Victoria. Internet trading has begun and can be viewed at [www.watertrading.com.au](http://www.watertrading.com.au) and [www.waterechange.com.au](http://www.waterechange.com.au).

In New South Wales in 1997-98, water trading was active and total sales amounted to 11% of total entitlements to consumptive users. Much of the trade involves temporary transfers or leases of water. Until the new legislation was passed, land and water licences were not separate in New South Wales. Permanent transfers required cancellation of the licence of the transferor and the issuing of a new licence to the transferee. Temporary trades were much simpler and can be described as “leases” of the licence. As a result of the availability of low security water and/or water for lease<sup>7</sup> in most years, rice is one crop that is amenable to the uncertainty that is inherent in the New South Wales system. In South Australia, the situation is considerably different where the irrigation of grapes requires a very secure source of water. Most trades in South Australia are permanent.

As a general rule, permanent trades are subject to the consent of the water allocation authority and are rarely made without reference to a quasi-environmental impact assessment process.

In Victoria there are efforts being made to enhance the market for temporary and permanent trades. According to Goulburn-Murray (a major irrigation scheme), efforts are being made to provide better information on the trading performance. There are continuing efforts to streamline trading in water. For example, it may be possible to trade retail entitlements in the future. It is anticipated that there will be future efforts on trade between different supply systems and different reliabilities of supply.

In setting up markets for water, there are numerous hydrological issues to consider prior to allowing trade between surface water and groundwater. For instance, water banking has been used in South Australia as one means of dealing with this issue.

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<sup>7</sup> Depending on the timing in an irrigation season, this water might be high security or low security. Low security water is announced each year based on water flows.

Victoria is also considering how to physically move the water between different systems.

In Victoria and the other States, there are significant issues to resolve with respect to third party impacts. The States have been allowing trade to expand slowly in order to assess the impact on environmental health and water quality. There are also costs associated with allowing water to leave an area. Irrigation schemes and communities are struggling with this issue.

### **Permanent Inter-State Trade Pilot Project**

Under a two year pilot project, 9.8 GL of water was traded in the Mallee Region of South Australia, Victoria and New South Wales. The geographic area covered is the Murray River between Nyah and the Barrages at the mouth of the Murray and the licences from the Darling River which are supplied from Lock 10, near the junction of the Murray and Darling rivers.

The Mallee region was selected largely because the region is relatively homogeneous in terms of security of entitlements. As well, the same type of agricultural activity irrigated production of fruit, vegetable and grapes for wine is prevalent in the region and the price per megalitre (ML) of water is relatively uniform throughout the region.

Only high security entitlement holders engaging in the permanent transfer of water are allowed to participate. This includes holders of private high security licences in New South Wales, holders of water licences granted under the Water Resources Act of 1997 in South Australia and private diversion licences and pumped districts in Victoria.

Even within this region, trading may have an impact on water supply as interstate trades can have an effect on other users. If water is coming from a different source such as another reservoir or another river then there will be transmission gains and losses along a system. As water moves down the rivers and channels there are more options for storage and therefore there is increased security. To reflect these security issues, a set of exchange rates have been developed. There is an exchange rate of 1.0 assigned to trades between New South Wales and Victoria (10 ML in NSW = 10 ML in Victoria) as there is little effect on security.

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Transfers upstream from South Australia to either New South Wales or Victoria are assigned an exchange rate of 0.9 (10 ML in SA = 9 ML in NSW or Victoria). All interstate exchanges are subject to the Cap exchange rate of 0.9. In a trade between South Australia and New South Wales, the SA cap on water would decrease by 9 ML (10 ML \* 0.9 interstate exchange rate) and New South Wales would increase by 8.1 ML (0.9 interstate exchange rate \* 0.9 Cap exchange rate). The environment is thus compensated for the reduction in flow that occurs due to an upstream draw-down.

### Critical Issues in Inter-Region Trade

Water will not necessarily be used according to its highest and best use because of restrictions on trade, nevertheless, some increases in efficiency will occur. Unused water has moved to expand production of horticultural products and wine grapes within the pilot region.

- There are significant transaction costs associated with inter-state trade. There are the brokerage fees, the opportunity cost of time associated with buyer and seller connecting (whether through personal contacts or through an intermediary) and the costs associated with the trade gaining approval by the State of origin and the State of destination and the Murray-Darling Basin Commission.
- A review of the two year pilot by Young et al (2000) concluded that many of the difficulties experienced during the pilot project (ie. high transaction costs) could be overcome by the dedication of the States and the MDBC.
- Young et al also concluded that arrangements needed to be put in place for strengthening the long term commitments to mitigating the environment impacts of trade. For instance, a system of registering salinity obligations associated with the trade would need to be put in place.

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## KEY HIGHLIGHTS

Water trading has resulted in some movement of water to higher value agriculture especially viticultural and horticultural crops. As a general rule, it is moving away from low value irrigated pasture. Water trading has resulted in an increase in water use efficiency.

Water trading is a source of conflict for irrigators within some irrigation schemes. Water leaving an area is viewed as a major threat to the viability of the irrigation scheme and/or community.

Water trading between jurisdictions requires coordination of trading rules.

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## 5. WATER QUALITY

In this section of the report, we focus on water quality issues. Water quality issues can be usefully divided into those associated with

- irrigation salinity;
- nutrient contamination that results in algal blooms;
- change in river flow regimes and supply of water to associated wetlands;
- dryland salinity.

The Commission in consultation with States and Territories is in various stages of developing strategies to deal with each of these issues. A set of National principles for the provision of Water for Ecosystems (environmental flows) was developed in response to criticisms of the early COAG water reform statements. Critics suggested that there was a lack of awareness of the potential impact of water trading on the environment in early COAG documents.

The resultant ARMCANZ/ANZECC principles express a goal of providing water for the environment which will sustain and where necessary restore ecological processes and biodiversity of water dependent ecosystems.

The principles are as follows:

- River regulation and/or consumptive use should be recognised as potentially impacting on ecological values.
- Provision of water for ecosystem should be on the basis of the best scientific information available on the water regimes necessary to sustain the ecological values of water dependent ecosystems.
- Environmental water provisions should be legally recognised.
- In systems where there are existing users, provision of water for ecosystems should go as far as possible to meet the water regime necessary to sustain the ecological values of aquatic ecosystems whilst recognising the existing rights of other water users.

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- Where environmental water requirements cannot be met due to existing uses, action (including re-allocation) should be taken to meet environmental needs.
- Further allocation of water for any use should only be on the basis that natural ecological processes and biodiversity are sustained (i.e. ecological values are sustained).
- Accountabilities in all aspects of management of environmental water provisions should be transparent and clearly defined.
- Environmental water provisions should be responsive to monitoring and improvements in understanding of environmental water requirements.
- All water uses should be managed in a manner which recognises ecological values.
- Appropriate demand management and water pricing strategies should be used to assist in sustaining ecological values of water resources.
- Strategic and applied research to improve understanding of environmental water requirements is essential.
- All relevant environmental, social and economic stakeholders will be involved in water allocation, planning and decision making on environmental water provisions.

### **The Murray-Darling Basin Initiative**

In 1982, following a long series of studies on salinity problems in the Murray Valley, the River Murray Agreement was extended to take account of water quality issues and then in 1984 further extended to give more but not total consideration of environmental responsibilities. This resulted in 1985 in a Ministerial agreement to form a Murray-Darling Basin Initiative that would result in the effective management of the Basins natural resources and its environment.

### **Natural Resources Management Strategy**

In 1990 a Natural Resources Management Strategy was adopted by the Murray-Darling Basin Ministerial Council after a four-year process which included assessing the Basin's environmental resources. The

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Natural Resources Management Strategy established two fundamental 'pillars' for handling natural resource management in the Basin. The first 'pillar' was the philosophy of integrated catchment management, recognising the linkages between various biophysical processes, which affect or are affected by water, its movement and its uses. The second 'pillar' was the community/government partnership, recognising that neither party working in isolation can protect the Basin's natural resources.

The Natural Resources Management Strategy outlined resource management objectives for land, water and other environmental resources, and cultural heritage resources. The strategy specified broad responsibilities for governments, communities, the Murray-Darling Basin Commission and Ministerial Council and the Murray-Darling Community Advisory Committee. It also contained actions necessary to implement the strategy, including the development and implementation of community-based action plans for improving on-ground management.

In late 1999, the Commission commenced the development of a new Integrated Catchment Management Framework for the Basin for the period 2001 to 2010.

### **Basin Sustainability Plan**

The Basin Sustainability Plan provides the framework for the co-ordination of planning, monitoring, evaluation and reporting of natural resources management in the Murray-Darling Basin. It was prepared in 1996 to focus the development of programs required to accelerate implementation of the 1990 Natural Resource Management Strategy. Following consultation with key groups, the objectives of the Basin Sustainability Plan were reviewed and updated in 1999 to ensure their relevance to priority natural resource management issues across the Basin.

The Basin Sustainability Plan contains long-term Productivity and Resource Condition objectives for sustainable agriculture, water quality, nature conservation and cultural heritage. For each of these priority 'thematic' areas, specific objectives apply to irrigated and dryland regions of the Basin and to its riverine environments. Reporting against these

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objectives is designed to show short-term achievements (empowerment), medium-term achievements (implementation) and long-term outcomes (resource condition).

The Plan also contains Direction Setting and Management Implementation objectives which focus on people and management arrangements. These objectives are designed to help ensure that the arrangements for natural resource management enhance the partnership between community and government, and help the managers of land and water to protect the Basin's catchments.

### Salinity Trading

One of the key documents associated with the Basin Sustainability Plan is a salinity and drainage strategy. A key observation in the strategy is that salinity is too large a problem to be solved by one government; it requires coordinated interstate action and community cooperation. The central planks of the strategy are:

- salt interception schemes;
- changed operating rules for several lakes with a view to reducing evaporation and, hence, salt concentration;
- a suite of land management policies and programs jointly funded by the States and the Commonwealth.

One of the unique features of this Strategy is the Victorian and New South Wales governments agreement to manage water resources within agreed limits. These States cannot construct or approve any proposal that would increase salinity by 0.1 EC or more in the River Murray at Morgan unless they have access to salinity credits.

Under the salinity credit scheme, the New South Wales and Victorian governments received salinity credits of 15 EC each for their contributions to the costs of the interception schemes. States can earn more credits by financing schemes that reduce the expected salinity load at Morgan. The Murray-Darling Basin Commission (MDBC) maintains a register of works undertaken and the salinity credit and debit impacts. The salinity impact of any proposed irrigation scheme must offset by acquitting credits in the register. The share of these annual costs

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borne by individual land-holders is based upon a formula that takes into account an assessment of the size of the drainage benefits enjoyed by the landholder.

According to MDBC (1999), in the Murray-Darling Basin, and in particular the Murray Valley, the Salinity and Drainage Strategy has:

- Increased awareness of the downstream salinity impacts of activities in upstream catchments;
- Established the ground rules for cost effective works to protect irrigation areas from land degradation;
- Initiated community debate on salinity and drainage issues;
- Reduced salinity in South Australia; and
- Protected the River from inappropriate development.

### Dryland Salinity

The salinity and drainage strategy's focus was on irrigation salinity. More recently, it has become clear that the major and more serious salinity problem is dryland salinity caused by water tables rising into saline soils because annual crops and pastures use less water than the "recently" cleared trees.

Realising the potential significance of this, the Murray-Darling Basin Commission organised a salinity audit which aimed to establish expected future salinity levels in the Murray in 2020, 2050 and 2100. Key features of this Audit include observations that:

- without significant change, average salinity levels in the lower River Murray will exceed the 800 EC threshold for drinking water in the next 50-100 years;
- the main source of this salt in the river system will come from dryland areas;
- by 2020 Adelaide's water supply from the Murray will exceed 800 EC more than 50% of the time;
- by 2100 many irrigation areas will no longer be able to grow crops.

As a direct result of this Salinity Audit, the Commission with the States have been given a

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mandate to develop a new salinity strategy. While not yet released in draft form and typical of the Commission's style of operation, it is widely known that this will strengthen the above salinity trading scheme and attempt to put in place a trading and investment framework that will force each sub-catchment to make the changes necessary to remain within salinity targets to be set for each valley.

### **KEY HIGHLIGHT**

Developing a system for dealing with salinity is a major achievement within the Basin. The approach has been incremental and some might say has not moved fast enough but the system was developed in the spirit of cooperative federalism.

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## 6. WATER ADMINISTRATION

In this section of the report, the administrative structure in the Murray-Darling Basin will be considered in some detail. There is considerable variation from State to State depending on how far along the reform process the individual State has progressed. Some States and Territories have been moving towards models of community involvement over the last decade and thus have developed considerable expertise such as South Australia. Meanwhile States such as New South Wales and Victoria have considerable experience in cost recovery pricing.

### State Level Authorities

Under the constitution, States and Territories within Australia are responsible for the management of natural resources. While the overall framework for water management is set by the Council of Australian Governments (COAG), the details of implementing principles fall on the individual States and Territories. Government departments provide the policy framework and management principles for the States and Territories. Implementation is then taken down to the operation level (irrigation scheme, catchment board, water utility etc). The separation of regulation and operation of the water resources is an ongoing process within States and Territories at this point in time.

As stated in the introduction the Murray-Darling extends over a large geographical area. The Murray-Darling Basin extends over three-quarters of New South Wales, more than half of Victoria, a portion of Queensland and South Australia, and includes the whole of the Australian Capital Territory (excluding Jervis Bay).

A map of the Basin is provided in Figure 6.1. A series of maps are provided for the administrative areas under the jurisdiction of each of the States. The maps provide a spatial outline of how water administration is organised in Murray-Darling Basin. Geographic areas of administrative jurisdiction, water catchment and groundwater systems will not necessarily coincide.

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Figure 6.1

Map of the Murray-Darling Basin with State Lines



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source: <http://www.mdbc.gov.au>

As a result of the constitutional arrangements in Australia and the devolution of authority to the community, there are a variety of complex arrangements in place across states, catchments and subcatchments. As a result, it may be useful to consider specific examples of institutional arrangements following an overview of how water administration is organised in each State.

New South Wales

In New South Wales, the Department of Land and Water Conservation is responsible for water. The website is

[www.dlwc.nsw.gov.au](http://www.dlwc.nsw.gov.au)

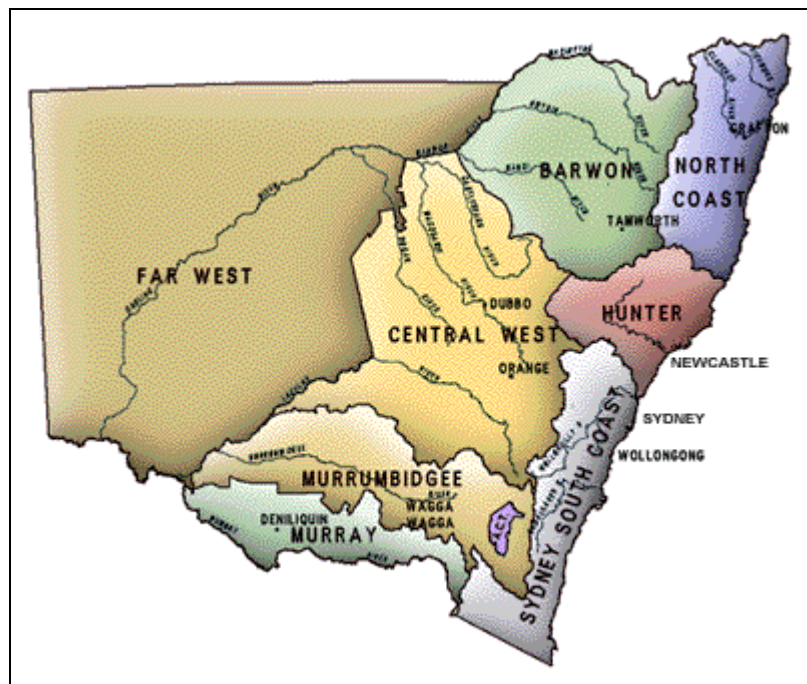
The State government provides the high level planning and operating principles for the management of water resources.

A map below in Figure 6.2 outlines the regions for purposes of water administration in New South Wales. The Far West, Murrumbidgee, Murray, Central West and Barwon are in the Murray-Darling Basin.

Within the regions there are catchment river management committees which are responsible for planning within the catchment.

Figure 6.2

Regions in New South Wales



source:<http://www.dlwc.nsw.gov.au/regions/index.html>

The Murrumbidgee catchment is a major subcatchment of the Murray-Darling Basin. The Murrumbidgee River flows for 1 600 km and contains 14 major dams and 8 large weirs. The Snowy Mountains Hydro Electric Scheme assists with

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regulations of water flow. There are over 10 000 km of irrigation channels.

Land use varies from sheep and cattle grazing, conservation reserves and expansion of residential areas in upper catchment to irrigated agriculture, horticulture, dryland cropping and grazing and forestry in the mid and lower areas of the catchment.

The Murrumbidgee catchment is one of the most densely populated regions in rural Australia with a population of over 520 000 people. It contains the Australian Capital Territory with population of approximately 305 000 people.

For practical purposes the Murrumbidgee catchment can be divided into upper, mid and lower regions (moving from northeast to southwest on Figure 6.2). There is limited irrigation in the upper region, some irrigation in the mid region and the most intensive in the lower region where irrigation areas are undertaking comprehensive planning and management through the development of Land and Water Management Plans. The intensive nature of irrigation farming has the potential to contribute to salinity and waterlogging, water quality decline, poor quality land area drainage, buildup of soil contaminants and soil structural problems. In many cases native vegetation is completely removed from the area, resulting in a change from deep to shallow rooted vegetation with consequent water balance problems. Integrated management of these issues is required on individual properties and on a regional basis. Irrigation salinity is addressed as a separate issue because of its importance to sustainable irrigation.

The Murrumbidgee Valley was first identified as an ideal site for large scale irrigation in 1891. The valley contains three main irrigation areas, Yanco, Coleambally<sup>8</sup> and Mirrool, and many large scale river pumpers along the entire length of the Murrumbidgee River. It also includes irrigation districts of Benerembah, Wah Wah and Tabbita. The Hay Private

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<sup>8</sup> Colleambly Irrigation Limited will be used as an example of conflict resolution in section 7.

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Irrigation District (HPID) is a smaller area than the other operations. At the lower end of the system, the extensive floodplain contains the Lowbidgee Flood Control and Irrigation District. Other water systems such as the Coleambally Outfall Drain and Western Wah Wah schemes have emerged due to the availability of water through drainage, stock and domestic supplies. Set up to use surplus drainage water, these schemes have developed from stock and domestic use to become crucial parts of grazing and cropping operations.

Source: <http://www.murrumbidgee-catchment.org.au/>

### Victoria

More than 4.8 million megalitres of water is used in Victoria each year with approximately 90% coming from surface water sources and 10% from groundwater. Water use in Victoria is dominated by irrigation which uses approximately three quarters of the total volume of water extracted each year. Most of the land under irrigation is supplied by the Goulburn and Murray rivers, north of the Great Dividing Range.

About 570 000 hectares of farmland is irrigated in Victoria with 500 000 hectares supplied by public irrigation systems and the remaining 70 000 hectares irrigated through private diversions from waterways.

In the State of Victoria, the Department of Natural Resources and Environment and the website is <http://www.nre.vic.gov.au>

There are nine catchment water authorities in Victoria. Catchment Management Authorities, which have responsibility for the coordination and management of floodplains, rural drainage (including regional drainage schemes), water quality, Crown frontages and heritage rivers outside of national parks. They are also the major advisory body to government regarding funding priorities for catchment management.

In Victoria, there are five catchment management authorities in the Murray-Darling Basin, which are responsible for the management of the water resources. These include the catchment of Mallee,

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Figure 6.3

Catchment Authorities in the State of Victoria, Australia



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Source: <http://www.nre.vic.gov.au>

Rural Water Authorities manage and operate the Irrigation Districts as well as the Stock and Domestic system, and administer the diversion of water from waterways and the extraction of groundwater. An example of a large water management authority is the Goulburn-Murray Water which covers major water storages and the major gravity irrigation areas in Victoria as well as pumped irrigation and waterworks districts. Goulburn-Murray Water's region covers 68 000 square kilometres of Victoria's northern plains - from the Great Dividing Range north to the River Murray, from Corryong in the east, downriver to Nyah near Swan Hill. This region includes the State's major irrigation districts divided into six management areas: Shepparton, Central Goulburn, Rochester-Campaspe, Pyramid-Boort, Murray Valley and Torrumbarry, as well as three Waterworks Districts and ten river basins.

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Within its region Goulburn-Murray Water provides rural water and drainage services to approximately 24 000 properties and is responsible for

- the management of the major water systems within its boundaries;
- provision of bulk supplies to (Non-Metropolitan) Urban and Rural Water Authorities;
- and the delivery of irrigation water, domestic and stock supplies, and drainage services.

Ten public irrigation districts are defined by statute. Within these districts, entitlements to water are governed by a special set of arrangements. Under the Water Act 1989, a bulk volume of water is allocated to each Irrigation District. This water is then apportioned among irrigators within the District by:

- an allocation for stock and domestic water supply to each rated property;
- a provision for estimated losses in the system;
- the allocation of the remaining water for irrigation.

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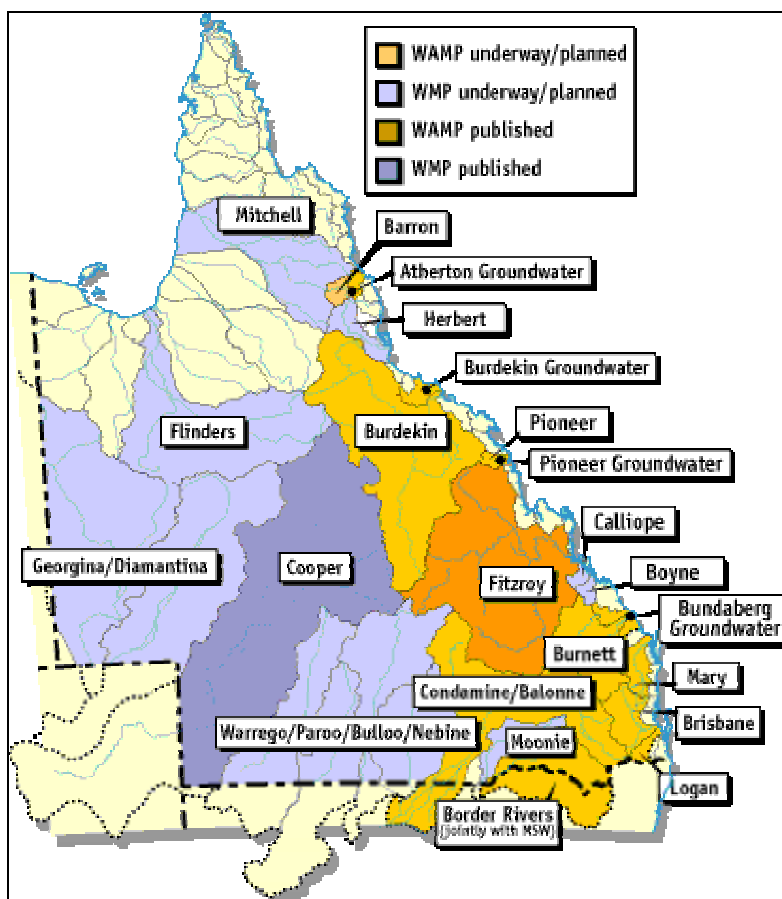


community reference panels. These plans will be used as part of the negotiation with the other States concerning how much water Queensland can divert under the Cap from the Basin. A text box outlines the planning process for the Moonie River Catchment and highlights some of the difficulties that Queensland faces in coming to terms with water reform and the Cap on diversions.

In Queensland, there are 27 local government areas (LGAs) in the Murray-Darling Catchment. The urban councils of Toowoomba, Roma, Dalby and Goondiwindi have the largest impact on the Basin through land management, water supply, waste management and sewage treatment. These governments coordinate their activities through the Local Government Association of Queensland.

Figure 6.5

Water Allocation Areas and Water Management Areas in Queensland



source:  
<http://www.dnr.qld.gov.au/resourcenet/water/wrp/index.html>

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An example from Queensland will help to illustrate how catchment boards have prepared their own plans which will feed into the water plan for the State of Queensland.

**Text Box 6.1**

**Preparing a Water Management Plan in the Moonie River Catchment, Queensland**

This example from Queensland represents one approach to catchment planning. In this catchment, members of a community reference panel, scientific and technical experts and government agencies worked together to develop the Water Management Plan. The Department of Natural Resources subsequently published a draft of the Plan.

The Moonie River Catchment can be seen in Figure 6.5 in the southeast portion of the map. It is flanked by the Condamine-Balonne Rivers Basin to the north and west and the Borders Rivers Basin to the east. Almost all of the Moonie catchment lies in Queensland and represents about 1% of the total catchment area of the Murray-Darling Basin.

The plan contains an assessment of the current situation in the catchment. There has been an increase in demand for water for large scale agricultural developments in the catchment. Beef cattle and sheep grazing are the most predominant forms of grazing and an increasing amount of area is being converted to improved pasture.

Water is being extracted for urban use, irrigation, rural domestic, stock watering and industrial purposes. Current levels of extraction, whether licensed or not, is about 76% of the natural mean annual flow. If all the works which are licensed are actually brought on line, the extraction level would be 74% of natural mean annual flow.

Following consultation with irrigators, interested parties in the community, indigenous peoples and scientific experts, the government has set a series of broad objective to:

- maintain the mean annual discharge of the Moonie River at the Queensland/New South Wales border at 70% of its natural mean annual discharge,
- maintain the natural flow variability, and to
- provide supply security for users.

The plan also considers groundwater supplies. A groundwater licence will be provided if the total rate of extraction from all bores within an aquifer was less than the recharge rate from all sources relating to that aquifer.

The plan indicates that there will be a re-evaluation of the plan and/or amendment of the plan if the total annual basin wide diversions are beyond the predicted range. This leaves the possibility of decreasing the amount of water that can be diverted by water users.

Source: Draft Water Management Plan, Moonie River Catchment May 2000

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Another interesting model that emerged during this case study of the Basin is the Queensland Murray-Darling Basin Coordinating Committee. The Committee coordinates the activities of the four catchment boards, landcare groups, regional assessment panel, Darling Downs Local Government Association, relevant State government departments and Aboriginal groups.

### South Australia

In the case of South Australia, we will go into a bit more detail in order to outline how the decision making process works. It is a model of successful communication across levels of entities, which make and implement decisions.

In South Australia, Department of Environment and Heritage was responsible for water until very recently.

Several months ago, the South Australian government in response to increasing concerns about expected declines in water quality separated water management from other environmental issues and formed a new Department for Water Resources. The website is

<http://www.environment.sa.gov.au>

This trend goes against practice in other States which seeks to integrate all forms of land and water management within a single department. This reversal of policy is explained by Ministers as necessary to give a strong political focus to water management in a State which is facing a massive increase in salinity.

South Australian Water Corporation is a corporate entity that owns, manages and operates South Australia's water supply and wastewater treatment systems. The Department for Water Resources is responsible for water policy and strategic direction.

In South Australia, there is only one catchment management board in the Murray-Darling Basin and it is the River Murray Water Catchment see Figure 6.6.

Catchment management has been underway involving community input for many years in South Australia. The Water Resources Act 1997 formalised

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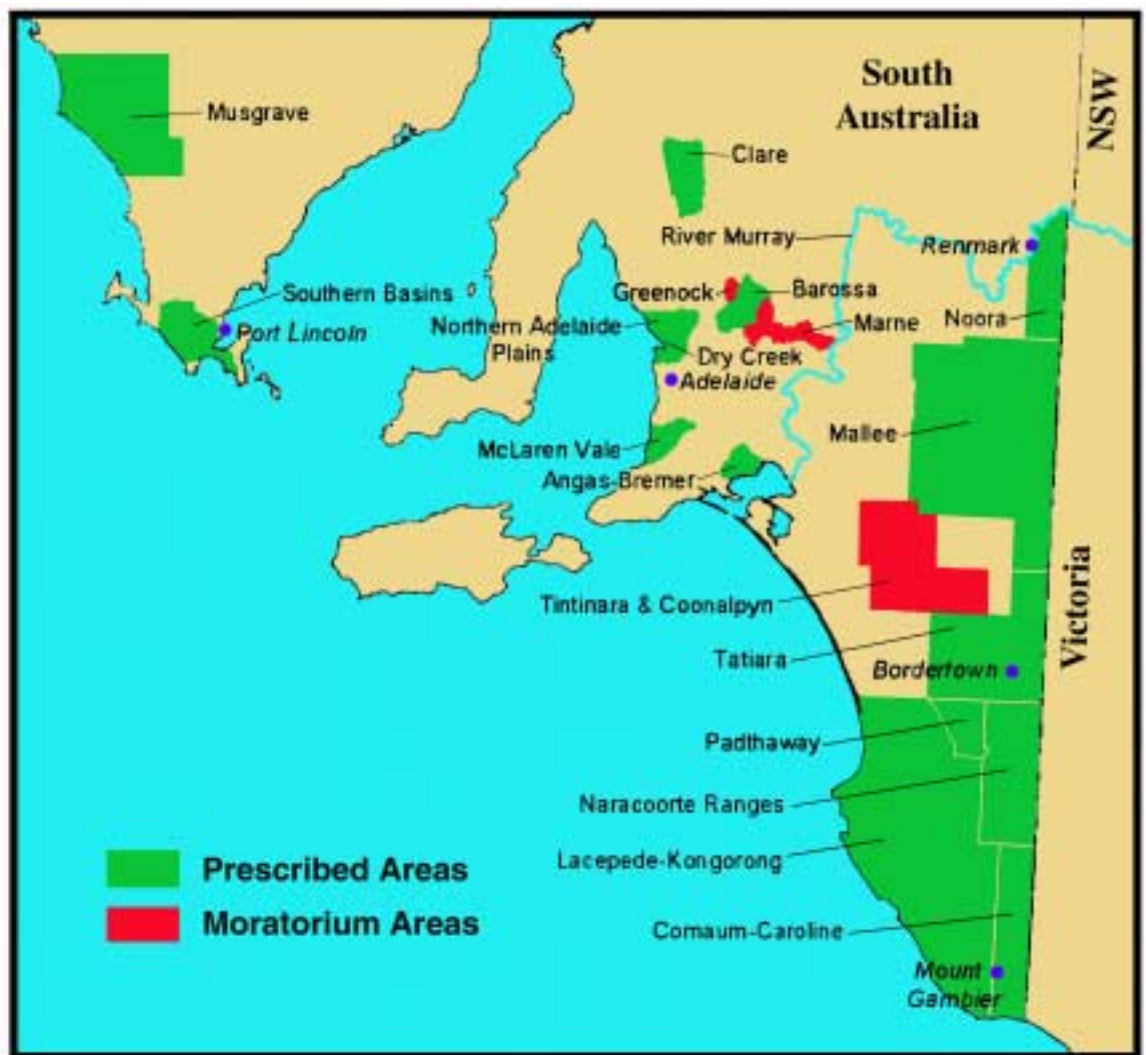
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the provisions for more community involvement in water resource management decisions. Catchment boards are designed under the Act to be skills based.

Within the River Murray Water Catchment, there is the River Murray Prescribed Water Course Areas and the Noora, Mallee and Angas-Bremer Prescribed Wells Area.

Figure 6.6

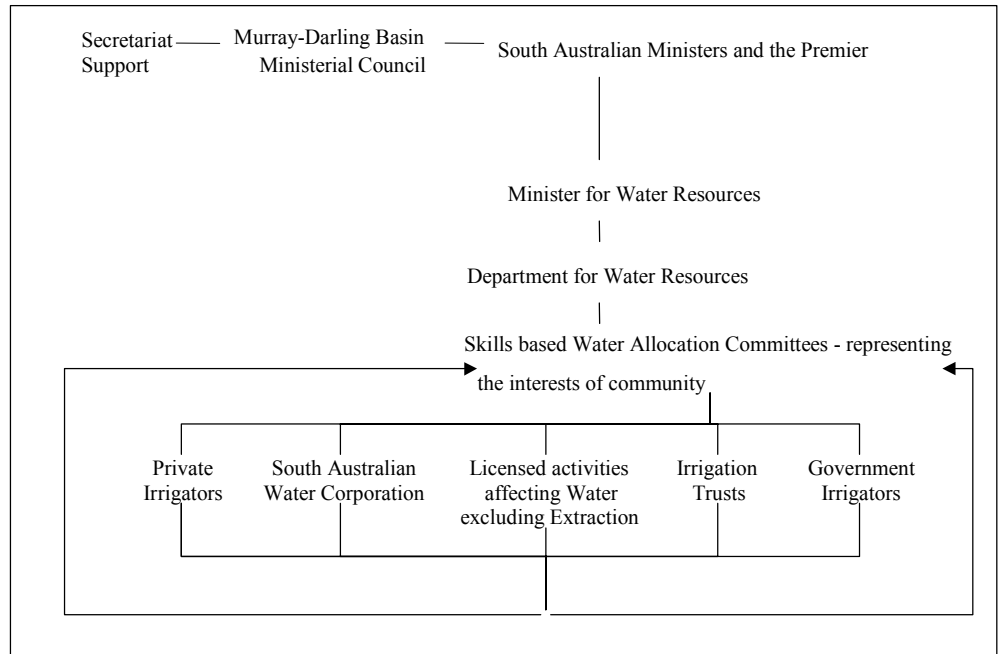
Map of Prescribed Water Areas, South Australia



source:[http://www.environment.sa.gov.au/water/pdfs/swp\\_volume2.pdf](http://www.environment.sa.gov.au/water/pdfs/swp_volume2.pdf)

The decision making process regarding water resources in South Australia is probably the most straight forward given the relatively few catchments and prescribed areas involved. Figure 6.7 outlines the decision making bodies involved in setting priorities and planning resource use.

Figure 6.7  
Decision Making Regarding Water in South Australia



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High level decisions, for instance regarding the Cap on water diversion from the Murray-Darling Basin, are made at the level of the Murray-Darling Ministerial Council. These decisions to which the State has agreed are then brought back to the South Australian Ministers and Premier and the Department for Water Resources to be implemented.

The Department has been in the process of taking the directions set out by the Ministerial Council, Council of Australian Governments, Agriculture and Resource Management Council of Australian and New Zealand (ARMCANZ) and Australian and New Zealand Environment and Conservation Council (ANZECC) and putting these policies into practice. The Department has been encouraging skills based boards to prepare catchment plan and water allocation plans which feed into and are consistent with the State Water Plan. Textbox 6.2 provides a description of the skills and experience of the board members.

**Text Box 6.2**

**River Murray Catchment Water Management Board**

The Board consists of:

**River Murray Catchment Water Management Board Members**

Jim McColl - SA agricultural and natural resources consultant and former Director-General of Agriculture (Chair);

Guy Boothby - Currency Creek flower farmer. Deputy Chair RAMSAR Consultative Committee for the Coorong and Lower Lakes and a member of Fleurieu Regional Development Board;

Ian Kroehn - Irrigator, Chairman of Waikerie Irrigation Trust, Director Central Irrigation Trust, member of Riverland West LAP;

Peter Norman - General Manager Country with SA Water and an experienced water resources manager;

Joanne Pfeiffer - dairy farmer from Long Flat in the Lower Murray, member National Murray-Darling Basin Community Advisory Committee;

Peter Arnold - a viticulturist from Barmera. Former Minister for Water Resources. Chair SA Dried Fruits Board and Director Wetlands Care Australia;

Ray MacDonald - from Angas Plains, a potato grower and past presiding member of The Angas Bremer Water Resources Committee;

Jeff Parish - Chief Executive of Central Irrigation Trust in Barmera and experienced in the operation of large scale irrigation districts; and

Bill Paterson - is CEO of the Coorong District Council, a Murray-Darling Association representative and a member of the Coorong District LAP Committee

The River Murray Catchment Management Board consists of an independent chair and members. Its offices are located at Berri on the Murray River and not in Adelaide - the capital city of the State.

A skills based board does not guarantee that conflicts will not arise. Instead the catchment becomes a forum for constructive discussion among the various interests in the catchment. The various players must negotiate through contentious issues before a water allocation plan can be adopted.

In South Australia, boards have the power to set and collect a levy to fund its activities and even have the

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power to ask the Minister to amend a local government plan for them.

### Responsibility Matrix

A responsibility matrix has been constructed for an area in South Australia. This example was chosen because the Angas-Bremar Prescribed Wells Area has a relatively straight forward process of administration. The area has a good relationship with the Department for Water Resources and the process of developing and implementing plans is well understood by the community. The responsible catchment board is the River Murray Catchment Water Management Board.

The matrix is constructed in terms of which agencies take a role in each specific task. The agency might have:

**Executive responsibility (E)** - ultimate responsibility for the task though parts of the task may be delegate

**Management responsibility (M)** - primary responsibility to manage

**Planning (P)** - involved in the planning process.

**Consulted (C)** - consulted about the task

**Regulatory Responsibility (R)** - responsible for the regulatory side

**Interested Party (IP)**

### South Australia - Angas-Bremer Prescribed Wells Area

Task	DWR	EPA	SAW*	LC	PWA	MDBC	RMCWMB
Governance	E						M
Water Allocation	E	IP			P	IP	M
Water Distribution			M		E M		P
Water Quality Protection	C IP	E R			C IP P		
Flood Protection					IP	IP	P
Wetland Protection	E M R				IP	IP	P
Maintenance of Infrastructure			M	M			C
State Water Plan	E	C	C	C P	C P	IP	C
Design and Construction of New Facilities	C	C	M P		M P		

**DWR** - Department for Water Resource

**RMCWMB** - River Murray Catchment Water Management Board



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**EPA** - Environmental Protection Agency

**SAW** - SA Water

**Langhorn Creek** - private consortium of irrigators

**PWA** - Prescribed Wells Area

**MDBC** - Murray-Darling Basin Commission

\* Note SA Water provides water to country towns and thus SA Water and the Prescribed Wells Area do not actually overlap in the management of resources.

The Angas-Bremer area described in Textbox 7.2 is an example of how farmers are able to organise and coordinate their efforts with the State government as well as local landcare groups to manage resources sustainably.

Not shown are the many other institutional arrangements that through their use of natural resource, (agriculture, urban development, etc) have a significant influence on the demand for water and water quality outcomes.

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## 7. WATER PRICING AND WATER DELIVERY

As introduced earlier in the report, the National Competition Policy, endorsed by the Council of Australian Governments (COAG) in 1995, provides the framework in Australia at the present time. This policy and the related reforms have shaped the process of water reform. Two important parts of the reform process include how to price the resource and how best to deliver it.

### Fee Collection

Fee collection is a fairly straight forward manner in the well developed commercial economy of Australia. Water users are billed for water by the corporate entity, trust or in some cases still, the government agency that provided the water.

### Water Pricing

In the 1990s, many of the States were reforming pricing of water for irrigation and water for household consumption (and stock watering in some cases). The pricing of what is considered “urban” water is relevant in the Murray-Darling Basin because the Australian Capital Territory contains Canberra (population 305 000). The City of Adelaide (population 1.1 million), outside the Basin, is a major downstream consumer of River Murray water, especially in drought years.

Basic principles of economics suggest that a resource will be used most efficiently where the competitive market would price the resource. This is usually taken to be the long run marginal cost (or the incremental cost per unit of water). Water and many other utilities have large fixed or “start-up” costs which leads to a decreasing cost industry where average and marginal costs decrease with the amount produced (at least over the relevant range). Thus, there is always a tendency for a few firms (often only one in a particular jurisdiction) to supply water.

Pricing at marginal cost in a decreasing cost industry means that average costs are not covered in the long run. In the long run, a competitive firm must cover its costs. Further, marginal cost pricing will not allow for covering the costs of future expansions as are sometimes required in water systems.

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These economic considerations are in part covered by the key elements of the water pricing policy of Council of Australian Governments (COAG). In the case of pricing, the COAG reforms codified many of the policies which had been floating at the time. The COAG pricing regime is to be based on:

- consumption based pricing and full cost recovery for urban water and rural water supplies;
- the elimination of cross subsidies as far as possible and their exposure where they exist;
- cost recovery that includes environmental costs (externalities) and the cost of asset consumption as well as taking the cost of capital into account;
- positive real rates of return on written-down replacement costs of assets;
- future investment in new schemes or extensions to existing schemes to be undertaken only after appraisal indicates it is economically viable and ecologically sustainable.

On a State by State basis, full cost pricing is at various stages of implementation. Cost recovery pricing is not a straight forward process to implement. Some States and Territories are further along this process than others. According to the Progress Report to the Council of Australian Governments, water sold in urban areas is sold on a cost recovery basis though there is some question whether any account is being taken of the environmental externalities.

Guidelines for costing and charging for externalities are being considered by the High Level Steering Group on Water. Prior to reform, it was common in Australian cities for users to pay a flat fee based on property values for a generous base or free allowance of water. Consumers who exceeded the base allowance paid a volumetric charge.

### New South Wales

New South Wales established the Government Pricing Tribunal which evolved into the Independent Pricing and Regulatory Tribunal (IPART). Both entities predate the COAG reforms. Thus New South Wales has more experience upon which to draw than other States.

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It is important to note that IPART is an independent authority that is aware of the COAG guidelines but does not report directly to COAG or ARMCANZ. IPART makes price determinations which the New South Wales government generally adopts.

IPART reviews information on costs and revenues and makes a determination regarding bulk water prices. IPART considers for instance whether the department's costs represent an efficient level of service. Further, as Musgrave (1999) reports:

*The tribunal also faced a contentious task in assigning the costs of functions that delivered more than one service. It employed the basic principle that costs should be paid for by those who benefit from the service in proportion to the benefit received, with the government paying for the cost of public benefit.*  
p.307

IPART considered what the appropriate structure for bulk water prices should be in order to promote efficiency and ecologically sustainable development. The extractive users, particularly the irrigators, mounted opposition to the potential increases in price. However, the tribunal conducted its review in a very public forum and consulted with interested groups across society. In the end, IPART was able to develop a set of pricing rules that were accepted for adoption at the national level by the Standing Committee on Agriculture and Resource Management. The rules are currently being used to guide the process of price reform across jurisdictions.

The problem of how to determine what full cost recovery levels is complicated by the issue of how the cost of new capital or infrastructure might be handled. IPART for example has deemed that the opportunity cost of the existing infrastructure is zero and uses a forward looking annuity approach to calculate costs instead of a method of depreciation.

### Victoria

In Victoria, Treasury is directly responsible for setting prices for metropolitan areas including the bulk water supplied by Melbourne water to other retail water companies. The Minister of Agriculture and Resources is responsible for setting prices for non-residential use. Victoria has already implemented full cost pricing for rural areas due to major reforms,

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which occurred in the 1980's. No attempt has been made to extend this charging framework to include formal consideration of externalities. It is possible to argue, however, that these costs are already embodied in the many regulations and policies that influence water use.

### South Australia

In South Australia, a catchment water board is able to charge a levy based on requirements for future infrastructure and resource management. Most irrigation schemes charge fees based on operating costs of delivering the irrigation water.

Reticulated water is largely supplied by the SA Water. Water pricing is on the basis of customer classes at the present time. South Australia is presently in the process of reviewing its pricing policy. A public consultation paper was released in December 1999 and the discussion it generated is under review.

Water pricing within a customer class is consistent across the State in that a residential user pays the same amount regardless of where he/she lives in the State. Residential consumers pay \$123 access charge and pay 36 cents per litre for the first 125 KL of water a year and 92 cents thereafter. Country lands and industrial users pay an access charge of \$136 and 36 cents for the first 125 KL and 91 cents per KL thereafter. Commercial water pricing is based on a more complicated multi-tiered structure:

- annual access charge of \$136 plus \$2.13 per \$1 000 of improved property value over \$63 850 (which gives the commercial user a "free" allowance of water equal to the access charge divided by 91 cents per KL) and
- 91 cents per KL for water consumed in excess of the "free" allowance.

This structure can encourage households to conserve water but large industrial users will tend to be charged the highest price (per unit basis) in two tier pricing regimes. In a deregulated environment where barriers to entry are reduced, it may even be worthwhile for firms to enter to service the high-price customer as high volume water tends to have a low marginal cost.

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There are really no bulk water sales in South Australia. A few small cooperative trusts exist and sell water to their members. In the rural areas, irrigators must have a license in order to draw water from the Murray. New projects or infrastructure in the basin are on a full cost recovery basis. There are still some questions about cross subsidies.

As identified above, none of the States has incorporated the environmental costs into full cost recovery. As part of the National High Level Steering Group on Water, South Australia is leading a project on Identifying, Costing and Charging for Externalities generated by water use throughout the country.

### Queensland

Queensland is in the midst of a consultation process regarding water pricing.

#### **Water Allocation and Delivery**

As part of the water reform package, there was a push to separate policy and regulation from day to day operations. As a result, most States and the Australian Capital Territory have “corporatised” the operation of water delivery. An example is the South Australian Water, which is owned by the State. Another example is the River Murray, which is discussed in Text Box 7.1.

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**Text Box 7.1**

**River Murray Water**

River Murray Water has been established by the Murray-Darling Basin Ministerial Council as an internal business division of the Murray-Darling Basin Commission for the specific purpose of operating and managing aspects of the River Murray system. River Murray Water commenced operations in January 1998. Its establishment as an internal business unit provides a clear distinction between the service delivery functions of the Commission and its resource management and policy setting functions. The primary services provided by River Murray Water are:

- Water storage and delivery
- Salinity mitigation (operation of salinity mitigation schemes)
- Navigation
- Recreation and tourism
- Other, including hydro-power

The River Murray Water came about as a result of a number of factors that have been influencing Australian water authorities to create more business-like arrangements for delivery water services. The two most important factors are the objectives of the Council of Australian Governments (COAG) to:

- Separate service delivery from regulatory and resource management policy matters so as to achieve clear and effective outcomes; and
- price for cost recovery and remove cross-subsidies, promote efficiencies, and ensure sustainability of the assets of the business.

In response to these various drivers, the Ministerial Council decided that a 'water business' should be established with the mission:

*"In accordance with the Council of Australian Governments water resource policy and Murray-Darling Basin Commission policies, to contract with each owner of the water to provide a delivery service which generates adequate revenue to allow effective maintenance and long term replacement/creation of assets and the move towards a positive real rate of return in accordance with a timetable agreed with the owners of the business."*

Source: <http://www.mdbc.gov.au/>

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In this new environment of competitiveness, governments are no longer building irrigation schemes as they did earlier in the century. As a result, private irrigators have become directly involved in the provision of irrigation water in South Australia as can be seen in Text Box 7.2.

### Text Box 7.2

#### The Angas-Bremer Prescribed Wells Area

In the early 1990s, a consortium of private irrigators in South Australia, specifically Langhorn Creek in the Angas-Bremer prescribed wells area (see Figure 6.6), built their own pipeline from the River Murray. The area had been using groundwater prior to the construction of the pipeline. Concerns about the sustainability of the groundwater resources had led to innovative approaches to aquifer recharge through water banking.

The pipeline is the largest privately built pipeline in Australia with 35 km of pipe and some 48 outlets serving approximately 41 irrigators. The pipeline has a capacity of 400 000 gallons per hour.

Each irrigator in the consortium contributed to the initial cost of construction based on how much water per hour the irrigator needed and the location of the irrigator on the pipeline. Each irrigator pays a monthly maintenance fee and their share of the cost of electricity. Each irrigator holds a licence for the water that they are using.

Access to a secure source of water has allowed for a shift towards more profitable enterprises such as growing grapes, vegetables, and some lucerne.

Members of the consortium were also involved in the water management planning process for the area.

This is a unique example of how the private sector can become involved in the planning process as well as the delivery of water. There are a couple of key reasons why this consortium works. First, there is a commitment by the community to the long sustainability of their farming operations. This is reflected in the difficult choices and the financial commitment the community has made to dealing with groundwater and surface water issues.

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Second there is the issue of accountability. Each irrigator must prepare an annual report regarding the use of water over the year. Summary documents are prepared for annual general meetings, which show each irrigator where they stand relative to all the other consortium members (without being able to identify the other irrigators). This has proven to be sufficient to keep individual irrigators in line with community goals.

Based on personal communication with Bruce Allnut.

In New South Wales, the Murray Irrigation Limited is a private irrigation company formed in March 1995 when the New South Wales Government Murray Irrigation Area and Districts were privatised and ownership transferred to irrigators.

### Text Box 7.3

#### Murray Irrigation Limited

Murray Irrigation Limited provides irrigation and drainage services to 2400 farms owned by 1600 family farm businesses covering almost 800000 ha of farmland in the upper reaches of the River Murray System.

Murray Irrigation Limited holds the largest single private irrigation licence in the Murray-Darling Basin. Murray Irrigation Limited has an entitlements to 1450 GL which is 75% of New South Wales general security water entitlements.

Murray Irrigation Limited is regulated by the State government through the NSW Environment Protection Authority and Water Management Works Licence with the Department of Land and Water Conservation (DLWC). Compliance conditions require Murray Irrigation Limited to minimise any negative environmental impacts of their operations.

Murray Irrigation Limited is also the implementation authority for the Murray Land and Water Management Plans (LWMPs). The Murray LWMPs are a major integrated natural resource strategy developed by the Murray community, in partnership with government between 1991 and 1995. The Murray Plans aim to protect the environmental, social and economic values of the region. They are a leading example of how a genuine partnership between the community and government can address complex environmental issues on a regional scale. The Murray LWMPs involve a total investment of \$498 M over 30 years shared between the regional community (\$382 M) and government (\$116 M).

Source: <http://www.murrayirrigation.com.au>

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**KEY HIGHLIGHT**

The idea of pricing at close to long run marginal costs has certain advantages in terms of economic efficiency.

Full cost pricing is not a straight forward process. No consensus has emerged across the States concerning what should be included in “the full cost”. There is a lack of agreement on even how existing infrastructure should be treated, let alone environmental costs. This indicates that significant work remains to be done.

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## 8. CONFLICT RESOLUTION

One of the key lessons of the Murray-Darling Basin is that institutions can serve as mechanisms to resolve conflict. When institutions fail to resolve conflicts they must evolve or be disbanded. As transaction costs amongst increase, in this case operating in the Basin, there is an incentive to create institutions to internalise these costs.

### **Murray-Darling Basin Commission**

There are numerous examples in the Murray-Darling Basin beginning with the Murray-Darling Agreement. Early conflicts arose between users of the River Murray for irrigation and navigation. However, an agreement between the States of New South Wales, Victoria and South Australia was not reached until after a series of severe droughts raised the cost of non-cooperation past the threshold for the three States (see Appendix I for a history of the Basin).

The existence of the River Murray Commission from 1917 to 1985 speaks of the Commission's ability to work cooperatively with the States and to coordinate the construction and operation of some of the works on the River. Regulating the flows of the River clearly served the interest of the States (eg expansion of agriculture in the Basin).

The Commission expanded its role over time but was not able to evolve into an institution capable of dealing with Basin wide problems such as salinity and the declining health of the riverine environment. As States realised they could not resolve these issues within their own jurisdictions and costs would continue to escalate with inaction, there was again the incentive to develop a new institution - the Murray-Darling Basin Commission.

### **Murray-Darling Basin Community Advisory Committee**

Over the last decade or so, the Murray-Darling Basin Commission has become increasingly aware of the need for the benefits of community consultation. To this end, in 1986 it established a community advisory committee that reports directly to the Murray-Darling Basin Ministerial Council. The committee consists of:

- an independent chair;

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- 21 catchment/regional representatives (New South Wales 7, Victoria 5, South Australia 4, Queensland 4, Australian Capital Territory 1);
- 5 specialist peak organisation representatives (Agriculture, Conservation, Local Government, Landcare and Indigenous people).

Today, virtually all Commission programs involve a large degree of consultation. Most policy reforms are, at least, discussed with the Council and explored through transparent media and meeting-based processes. Draft policies and/or strategies are then released and finalised after a period of time.

### Irrigation Schemes

Within the Basin, most of the large irrigation schemes were created to deliver water and encourage the expansion of agriculture. The water reform process and the Cap on diversions has changed the operating environment of these entities such as Goulburn-Murray Water in Victoria and Murray Irrigation Limited (discussed in Textbox 7.3) in New South Wales.

These institutions have evolved over time from a means to put irrigation infrastructure in place to institutions which manage water from planning through operation stages. Water trading would appear to represent a potential threat to the continued viability of these institutions. For instance, Murray Irrigation Limited does not permit permanent water trades outside its boundaries once the bulk entitlement falls below a certain level (MJA 2000).

Murray Irrigation recently recommended to the Murray-Darling Basin Ministerial Council that a process be put in place to provide a forum for resolving intra-valley conflicts that would

- provide the parties with an opportunity to influence resolution of the conflict,
- include an independent mediator and
- require provision of robust information to the parties involved.

This points to unresolved issues and there is no immediate evidence that provisions will be made to set up new mechanisms. Murray Irrigation Limited has issued position papers that suggest that there is a

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lack of confidence in compliance with the Cap and the Audit process.

(<http://www.murrayirrigation.com.au/watsapp/mdbccap.html>)

Another example of conflict resolution comes through unexpected mechanisms. Colleambly Irrigation is a privately owned irrigation corporation that has traditionally delivered irrigation water but over time has been evolving into a natural resource manager. Colleambly recently obtained ISO 9002 and 14001 accreditation.<sup>9</sup> Applying for this accreditation provided a means of conflict resolution between Colleambly, non-governmental organisations and the media about the health of the river environment.

There was a crisis in confidence about the land and water management planning process and the impact that irrigation in New South Wales was having on the environment. The New South Wales government was moving to impose costly monitoring and reporting requirements. Colleambly perceived that it did not have time to wait for natural resource outcomes to demonstrate that it was a responsible resource manager. The accreditation process proved successful in demonstrating commitment to the environment and a means of differentiating itself in a competitive environment.

### Catchment Boards

At the catchment level, people are most closely associated with environment and the water resources. Throughout the Basin, there are catchment boards with differing levels of experience, expertise and power. Most boards engage in public consultation and have varying degrees of community involvement. This is a means of engaging people in the issues and it is also a process in education for most of the interested parties. Through consultation, boards as well as the public learn about the State of the catchment and the positions of the various parties with respect to what should be done. South Australia is currently the only state which gives boards the power to raise levies.

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<sup>9</sup> ISO 9002 is accreditation systems where a set of procedures to ensure a certain level of quality are in place. ISO 14001 is an environmental management system based on the same accreditation process.

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The consultation process with the community is often cited by catchment managers as a useful process for uniting divergent interests. The chairs of catchment boards which are unable to navigate through the conflict come under pressure to resign or not seek a renewal of their position. The process usually restarts with the appointment of a new chair.

### **The Courts**

Ultimately the court system in Australia serves as a place where remedies for conflict can be sought. Generally this is an expensive process for water users, States or Territories to engage in. These costs often serve as a means of motivating the different entities to work to solutions through other means.

### **KEY HIGHLIGHT**

Institutions within the Basin serve as a means of internalising transactions costs and/or mechanisms for conflict resolution.

The cost of engaging in court battles often serves as a means of getting parties back to the table.

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## APPENDIX I

### **A Brief History of the Murray-Darling Basin Agreement**

According to Crabb (1997), managing the River Murray has always been difficult and complicated because the boundary between New South Wales and Victoria was – and still is – the top of the bank on the Victorian side of the Murray.

Initially, the Murray was of immense economic importance as a means of transportation. This in part explains the number of clauses in the Australian Constitution that came into operation with the Federation of Australia in 1901 (Wright 1978). With the first diversions of water from the Murray for irrigation in the 1880s, conflict developed with those concerned with the use of the river for navigation.

One of the first discussions on managing the Basin took place in 1863 at a conference held in Melbourne between New South Wales, Victoria and South Australia to consider putting locks on the rivers to improve the navigability of the river. At this conference it was concluded that expanding commerce, population, and wealth of Australia could be accomplished by making the Murray, Edward, Murrumbidgee and Darling navigable.

Although nothing concrete resulted from this conference, at least all of the participants were in agreement (Eastburn 1990). Many other conferences were held over the following 40 years, but little progress was made, largely due to the prevailing parochialism of the three colonies (Crabb 1997).

#### **The River Murray Waters Agreement**

Severe droughts that extended through 1895 to 1902 forced the colonies/States to work together and finally come to an agreement in 1915. The governments of Australia, New South Wales, Victoria, and South Australia signed the River Murray Waters Agreement. It took a further two years to establish the River Murray Commission, which had the task of putting the River Murray Waters Agreement into effect.

The River Murray Waters Agreement was a pioneering document in its time and the same can be said of the River Murray Commission. Its prime task

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was the regulation of the main stream of the Murray to ensure that each of the three States received their agreed shares of the Murray's water.

The main provisions in the first Agreement allowed for:

- the construction of a storage on the upper Murray;
- the construction of a storage at Lake Victoria;
- the construction of 26 weirs and locks on the Murray between Blanchetown in South Australia and Echuca in Victoria; and
- the construction of nine weirs and locks on the lower part of either the Darling or Murrumbidgee Rivers (the Murrumbidgee was selected).

Over the 70 years it was in operation, numerous amendments were made to the River Murray Waters Agreement. This did not prevent conflict and controversy. For example, some actions of the Commission, in particular the abandonment of the Chowilla Dam proposal and the construction of Dartmouth Dam (Wright 1974) were very controversial decisions.

The powers of the River Murray Commission were gradually extended, both by amendment and informal practice, but its prime concern remained with water quantity.

Major dams such as the Hume and Dartmouth Dams were built, as well as 13 locks and weirs between Blanchetown and Torrumbarry, the Lake Victoria storage, the Maude and Redbank Weirs on the Murrumbidgee, and the Barrages at the Murray Mouth.

In the late 1960s, the River Murray Commission conducted studies in the salinity levels in the Murray Valley. This initiative ultimately led to the further amendment of the River Murray Waters Agreement in 1982. The Commission's role was broadened to take account of water quality issues. It was becoming clear that successful management of the Basin's river systems was directly related to land use throughout the catchment, further amendments to the Agreement in 1984 enhanced the Commission's environmental responsibilities in a limited way.

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By the early 1980s, it was clear that the River Murray Waters Agreement and the River Murray Commission were unsuitable for the management of the Basin's growing resource and environmental problems. Concurrently, individual agencies within the separate States were finding they were unable to tackle the rising water salinity and irrigation-induced land salinisation. It was gradually realised that critical issues were no longer confined within distinct jurisdictions, but extended across State boundaries.

In October 1985, a meeting was held in Adelaide of ministers responsible for land, water and other environmental resources from the governments of New South Wales, Victoria, South Australia and the Commonwealth. The meeting was called to discuss the resource and environmental problems of the Murray-Darling Basin and in particular salinity and land degradation. Two years of intensive meetings and negotiations by politicians and bureaucrats from the four governments culminated in the Murray-Darling Basin Agreement.

The Agreement provided the foundation for the Murray-Darling Basin Initiative by putting in place a process for the effective management of the water, land and other environmental resources on a Basin-wide basis. In 1988, the Murray-Darling Basin Commission was put in place as part of the new Act and Agreement.

Source: <http://www.mdbc.gov.au>

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