PRODUCTIVITY COMMISSION

Water Rights Arrangements in Australia and Overseas

Annex A

Murray-Darling Basin

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Contents

Abbreviations

ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agricultural and Resource Management Council of Australia and New Zealand
CAC	Community Advisory Committee
CoAG	Council of Australian Governments
CRP	Community Reference Panel
GL	Gigalitre
HDDORP	Hume and Dartmouth Dams Operations Review Reference Panel
IAG	Independent Audit Group
MDA	Murray Darling Association
MDBA 1992	Murray–Darling Basin Agreement 1992
MDBC	Murray–Darling Basin Commission
MDBMC	Murray–Darling Basin Ministerial Council
NAPSWQ	National Action Plan for Salinity and Water Quality
NRMMC	National Resource Management Ministerial Council
NWQMS	National Water Quality Management Strategy

Preface

Water Rights Arrangements in Australia and Overseas is a study that forms part of the Commission's program of benchmarking the performance of economic infrastructure industries. It continues previous work undertaken into the arrangements for setting drinking water quality standards. The study compares the legal, organisational and regulatory arrangements for managing water rights, against accepted best practice principles.

This annex is one of twelve case studies prepared to assist readers understand the complex legal, organisational and management arrangements of the jurisdictions studied. Case studies were prepared for the Murray–Darling Basin, NSW, Victoria, Queensland, South Australia, the ACT, the Colorado River Basin, California, Colorado, Chile, Mexico and South Africa. These case studies should be read in conjunction with the main report.

Research for the study and each of the annexes was undertaken by the Economic Infrastructure Branch, with Dr Neil Byron as mentoring Commissioner.

The Productivity Commission would like to thank the staff of the Murray–Darling Basin Commission for providing information on the activities of the organisation. Further feedback from readers would also be welcome.

1 The water sector

The Murray–Darling Basin is the largest surface water system in Australia. It straddles five Australian jurisdictions, and is the catchment for two of Australia's major rivers — the Darling River and the River Murray — and their many tributaries, including the Namoi, Murrumbidgee and Lachlan rivers in NSW and the Campaspe River in Victoria. The basin is managed under an agreement (the Murray–Daring Basin Agreement 1992) between the Commonwealth, NSW, Victoria, Queensland and South Australia.

The headwaters of both the River Murray and the Darling River are in the Great Dividing Range. The Snowy Mountain Scheme in the southern part of the range is the largest transmountain diversion scheme and redirects water away from the Snowy River into the Murrumbidgee and Murray Rivers (see box 1.1).

Box 1.1 **The Snowy Mountain Scheme**

The Snowy Mountain Scheme has 145 kilometres of interconnected tunnels and 80 kilometres of aqueducts, which collect and divert most of the inflows to the Snowy Mountains area. On average, the scheme diverts approximately 1100 GL of Snowy River water each year westward to the Murray and Murrumbidgee valleys.

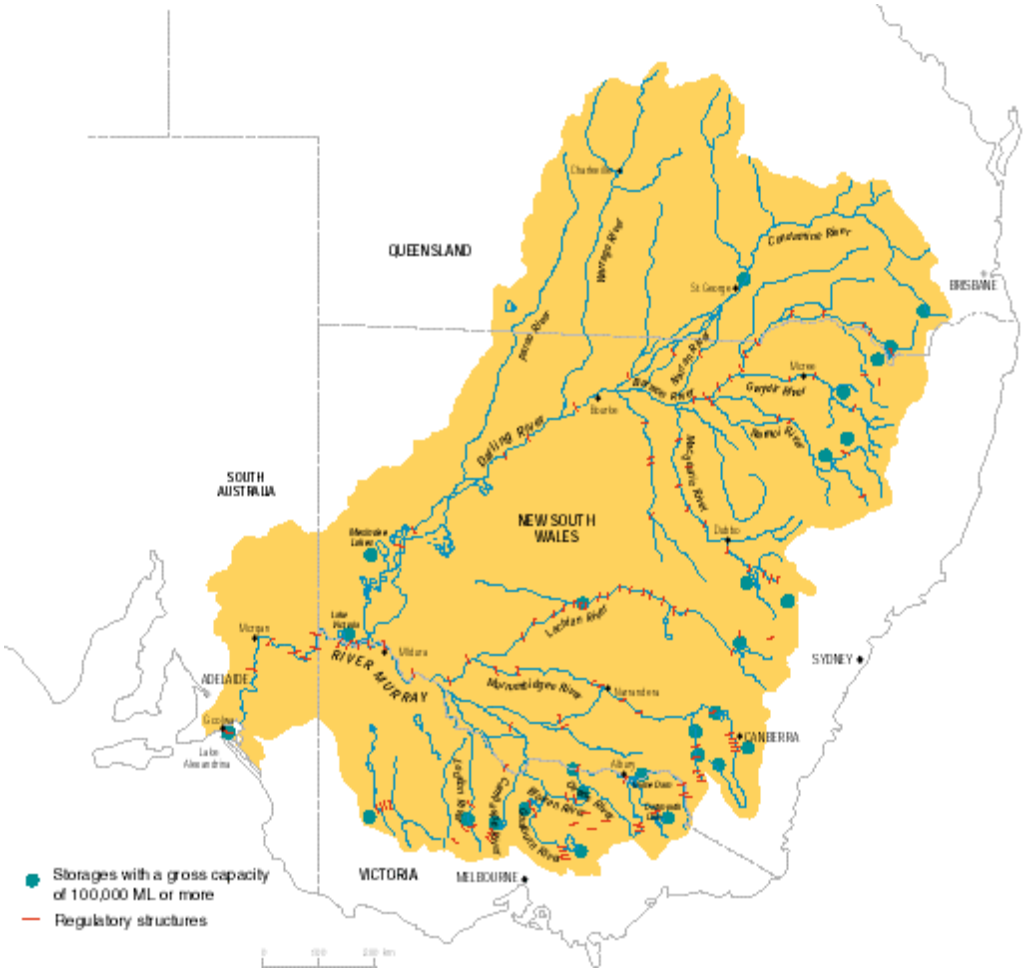
The Murray–Darling Basin Commission estimates that the Snowy Murray Diversion provides on average around 8 per cent of the flow to the Murray River. However, during dry periods, the contribution from the Snowy Mountains Scheme can amount to around 35 per cent of the total flow. Similarly, the Snowy Tumut Diversion contributes on average 25 per cent of the total flow to the Murrumbidgee River, which can increase to around 60 per cent during dry periods.

The Snowy Mountains Scheme has resulted in much of the water that would otherwise have flowed from the Snowy River to the ocean being redirected to the west of the Great Dividing Range. This has led to an increase in the inflow of water to the Murray–Darling Basin. The changes to environmental flows from the Snowy Mountains Scheme have brought about physical changes to some rivers in the Snowy Mountains region.

Source: SnowyHydro Limited (2002).

The River Murray and the Darling River join near Wentworth, on the NSW and Victorian border, where the River Murray then continues into South Australia until emptying into Lake Alexandrina and the Murray Mouth Barrages (see figure 1.1).

Figure 1.1 **The Murray–Darling Basin**



Source: MDBC (undated(c))

Annual mean runoff in the basin is estimated to be 24 300 GL. Annual mean outflow is estimated to be only 12 200 GL — implying fifty percent evaporation and seepage losses. The relatively high evaporation and seepage losses in the Murray–Darling Basin are in part due to the flat floodplains through which the rivers flow. The basin's mean annual runoff is estimated to be the lowest of the world's major river systems (Pigram 1986).

Australia, together with southern Africa, experiences higher runoff variability than any other continental area (MDBC undated(a)). Many of the rivers naturally dry to a series of pools during dry spells, and are prone to severe flooding because of their low banks and relatively small capacity. For example, before dams were constructed, the River Murray did not supply a reliable flow of water, and during droughts, it was reduced to a chain of saline ponds (MDA 2001).

A number of storage and diversionary projects have been constructed in the lower basin to regulate the flow of the river and to supply water users. The storage capacity in the basin is almost 35 000 GL. The storages of the River Murray are managed by River Murray Water, a government-owned trading enterprise of the Murray–Darling Basin Commission. These storages account for nearly one-third of the basin's storage capacity (MDBC undated(b)). The storage system is collectively referred to as the River Murray system and includes the Hume and Dartmouth dams, Menindee Lakes, Lake Victoria, and numerous locks and weirs along the River Murray.

The basin's rivers provide most of the water supplies used by the inland areas of NSW, Victoria, southern Queensland, South Australia and the ACT. Estimates suggest that the volume of water diverted from rivers is double the estimated mean annual flow of surface resources (NHT 2001). This is because water, once used for irrigation, is returned to surface water channels to be used again by downstream users.

2 Legal framework

Under Australia's federal system of government, the primary right to own or to control and use water is vested with the states and territories (Fisher 2000). The Commonwealth does not have any direct power over water but, under section 51 of the Commonwealth *Constitution*, it may legislate with respect to external affairs, trade and commerce, and trading corporations (Fisher 2000). The Commonwealth 'may also grant financial assistance to any state on such terms and conditions as the Parliament thinks fit' under section 96 (Fisher 2000, p. 37).

The main legislative and policy instruments providing Commonwealth financial assistance to the states include the:

- Council of Australian Governments' Water Reform Framework (and its subsequent incorporation as a related reform in the National Competition Policy in 1995);
- National Water Quality Management Strategy, which was included in the Council of Australian Governments (CoAG) Water Reform Framework in 1994; and
- National Action Plan for Salinity and Water Quality.

Under its external affairs powers, the Commonwealth is bound by a number of international conventions and treaties that include but are not limited to the Ramsar Convention on Wetlands of International Importance 1971, the United Nations Conference on Environment and Development 1992 and the United Nations Convention on Biological Diversity 1992.

The main inter-jurisdictional water sharing agreement is the Murray–Darling Basin Agreement 1992 (MDBA 1992). Other agreements not considered here include the NSW–Queensland Border Rivers Agreement 1946 and the Victoria–South Australia Border Groundwater Agreement 1985.

2.1 CoAG Water Reform Framework

In 1994, CoAG agreed that the state and territory governments would adopt a strategic framework for the reform of the water industry. The objective of the policy

was to improve the efficiency of the water industry and address the range of environmental problems associated with the use of water.

In April 1995, CoAG agreed to include the implementation of the Water Reform Framework under the umbrella of the National Competition Policy. On the basis of progress in implementing water reform, state and territory governments will be entitled to share in the competition transfer payments from the Commonwealth.

The CoAG Water Reform Framework comprises overarching guiding principles for each state and territory to adopt. The guidelines provided each state and territory with the flexibility to implement their own reforms (box 2.1).

To facilitate greater coordination and consistently of interpretation on the framework, a number of guidelines were released encompassing the:

- general principles (Working Group 1995);
- definition of water rights (ARMCANZ 1995);
- trading of water rights (NRMSC 2002);
- determination of environmental flows (ANZECC and ARMCANZ 1996);
- allocation of groundwater (ARMCANZ 1996);
- pricing and cost-recovery of water assets (ARMCANZ 1994; Expert Group 1995, ARMCANZ 1998).

National Water Quality Management Strategy

In 1995, CoAG also incorporated the National Water Quality Management Strategy (NWQMS) into the Water Reform Framework to improve water quality. The NWQMS is a joint initiative of the Commonwealth, state, and territory governments under the current auspices of the National Resource Management Ministerial Council (NRMMC).

The policy objective of the NWQMS is ‘to achieve sustainable use of the nation’s water resources by protecting and enhancing their quality while maintaining economic and social development’ (ANZECC and ARMCANZ 1994a).

Box 2.1 **Council of Australian Governments' Water Reform Framework guiding principles**

Proper pricing of water — Water is to be priced according to consumption-based pricing, full cost recovery (including a real rate of return earned by water suppliers), the removal of cross-subsidies or their transparency and the disclosure of community service (CSO) payments to suppliers.

Investment in rural water infrastructure — any future investment in irrigation infrastructure, or extensions to existing schemes, are to be undertaken only after appraisal indicates it is economically viable and ecologically sustainable.

Institutional role separation — the separation, as far as possible, of resource management and regulatory roles of government from water service provision.

Delivery of water services — the delivery of water services to be placed on a commercial basis, meeting international best practice, with comparison of inter-agency performance. Greater responsibility at the local level for the management of water resources.

Entitlements to water users — states and territory governments to implement comprehensive systems of water allocations or entitlements, which are to be backed by the separation of water property rights from land and include clear specification of entitlements in terms of ownership, volume, reliability, transferability and, if appropriate, quality.

Recognition of the environment as a legitimate user of water — the formal determination of water allocations or entitlements include allocations for the environment as a legitimate user of water.

Trading of entitlements — trading of water entitlements, including inter-state trading, is undertaken where it is socially, physically and ecologically sustainable.

Integrated resource management — integrated approaches to resource management to be adopted in recognition of the interdependencies of different natural resources, such as water.

Water quality — improved water quality to be achieved through the implementation of the National Water Quality Management Strategy.

Public consultation and education — greater public education about water use and consultation in the implementation of water reforms; and

Research and development — appropriate research into water use efficiency technologies and related areas.

Source: Shadwick (2000).

The strategy currently comprises a number of guidelines that provide the principles for managing key elements of the water cycle, including:

- national policies and principles, that form the basis of state and territory government water quality policies; and
- national guidelines for developing water quality standards or benchmarks, including drinking, irrigation and other uses, livestock and aquaculture, recreational uses and aesthetics, recreational water quality and aesthetics and protecting aquatic ecosystems; and
- national guidelines on the implementation, monitoring and ongoing management of water quality.

In 1994, as part of the Water Reform Framework, CoAG (Water Reform Framework 1994, clause 8(b)) agreed to:

> Support ANZECC and ARMCANZ in their development of the National Water Quality Management Strategy, through the adoption of a package of market based and regulatory measures, including the establishment of appropriate water quality monitoring and catchment management policies and community consultation and awareness.

Responsibility for implementing the strategy lies with the state and territory governments. The strategy represents a set of general guidelines (ANZECC 1998).

National Action Plan for Salinity and Water Quality

The National Action Plan for Salinity and Water Quality (NAPSWQ) is a national policy intended to address problems associated with salinity and water quality in priority regions in Australia. The policy seeks to address salinity and water quality problems that have significant economic, social and environmental consequences in 21 priority regions of Australia. The strategy seeks to integrate the activities of Commonwealth, state and territory, local governments, and of regional and local communities into a coherent framework.

Under the plan, Commonwealth, state and territory governments finance natural resource management policies and activities that have been accredited to Commonwealth, state and territory standards (CoA 1999).

Under the NAPSWQ:

- the Commonwealth would provide a national framework for natural resource use and management, and funding of national interest;

- state and territory governments would provide policy and regulatory frameworks for natural resource management;
- local governments, through their ownership of land, control of land-use planning, development approvals, rates and local service delivery, would assist in the implementation of regional strategies; and
- regional organisations, potentially comprising of local governments, catchment groups and community organisations, would be responsible for project implementation (CoA 1999).

Agreements between the Commonwealth and the state and territory governments, and between governments and regional organisations, would form an important component of the natural resource management framework. As at 1 July 2002, five states and territory governments have signed bilateral agreements with the Commonwealth. The agreements would state the expectations and mutual obligations of all parties including for financial contributions, and in meeting milestones and targets.

In addition to the block funding arrangements, it is anticipated that regional strategies would involve a mix of policy instruments that may include regulation, duty of care (on private and leased land), economic incentives (such as tradeable permits and grants), zoning for land use, management agreements, and environmental management and production accreditation.

2.2 Murray–Darling Basin Agreement

The MDBA 1992 between the Commonwealth, New South Wales, Victoria and South Australia sets out the objectives, functions and composition of the new institutions and the procedures to be followed for natural resource management, water distribution, asset management and financial disbursements. The MDBA 1992 replaced the 1915 and 1987 River Murray Waters agreements.

The objective of the MDBA 1992 (c. 1) is:

> to promote and co-ordinate effective planning and management for the equitable efficient and sustainable use of the water, land and other environmental resources of the Murray–Darling Basin.

The MDBA 1992 is ratified by the parliament of each signatory government. Queensland became a signatory in 1996 and the ACT signed a Memorandum of Understanding in 1998.

The MDBA 1992 describes the composition, functions, powers and responsibilities of the Murray–Darling Basin Ministerial Council (MDBMC), its committees and the Murray–Darling Basin Commission (MDBC). It also describes:

- the implementation of the Cap (Schedule F);
- the water sharing arrangements between the contracting governments for the River Murray system (Part X);
- the administration of the inter-state water trading pilot project (Schedule E);
- the role of the MDBC in natural resource management (Part V) and the administering the Salinity and Drainage Strategy (Schedule C); and
- the role of the MDBC in operating nominated dams, weirs, locks, barrages, and the water accounting and dam management practices in the River Murray system (Part X).

In addition, the MDBA 1992:

- authorises the construction, operation and maintenance of water works and the operational responsibilities of the MDBC and contracting governments (part VI);
- provides rules for apportioning the MDBC's costs between the contracting governments, as well as budgeting, payment and auditing requirements (part VII);
- requires annual reporting (part VIII); and
- provides a dispute resolution mechanism (part XIII).

2.3 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* provides a legislative base for environment protection and biodiversity conservation. This Act provides, among other things, that any action that may have a significant impact on a matter of national environmental significance must have Commonwealth approval. These matters include nationally listed threatened species (flora and fauna), listed migratory species and Ramsar wetlands, so they affect water resource management.

3 Organisations

The MDBMC, the MDBC and River Murray Water, under the umbrella of the Murray–Darling Basin Initiative, are the main agencies responsible for managing the flow and allocation of surface water in the Murray–Darling Basin.

The Natural Resource Management Ministerial Council is responsible for promulgating national policies for the management of water quality and salinity management.

3.1 Murray–Darling Basin Initiative

The Murray–Darling Basin Initiative is a national policy governing water management in the Murray–Darling Basin. In addition to the MDMBC and the MDBC, other organisations participating in the Initiative include:

- the Community Advisory Committee (CAC);
- the natural resource management and environment protection agencies from each of the signatory governments and
- a number of technical and advisory committees.

Murray–Darling Basin Ministerial Council

The MDBMC is the principal decision making body of the Murray–Darling Basin Initiative. It comprises the Ministers responsible for land, water and environmental resources from New South Wales, Victoria, Queensland, South Australia and the Commonwealth. The Australian Capital Territory is also represented on the council as a non-voting member. Up to three Ministers from each government may sit on the MDBMC. The chair of the Community Advisory Committee also attends all MDBMC meetings.

The MDBMC has the authority to make policy decisions for the basin as a whole. The MDBMC's main functions are specified in the MDBA 1992, and include:

- considering and determining policies for the planning and management for the equitable, efficient and sustainable use of the water, land and other environmental resources of the Murray–Darling Basin; and

- developing, considering and authorising measures for the equitable, efficient and sustainable use of such water, land and other environmental resources.

Resolutions of the MDBMC require a unanimous vote, which represents a consensus of governmental opinion and policy across the basin. The MDBMC meets at least once per year.

Murray–Darling Basin Commission

The MDBC is the executive arm of the MDBMC. It is constituted under the MDBA 1992 and comprises:

- an independent President (appointed by unanimous vote of the MDBMC);
- two voting commissioners from each of the Commonwealth, NSW, Victoria, South Australia and Queensland governments and a non-voting commissioner from the ACT government. Apart from the President, commissioners are normally chief or senior executives of the agencies responsible for management of land, water and environmental resources; and
- the chairperson of the Community Advisory Committee in an observing role.

The main responsibility of the MDBC is to develop, support and evaluate natural resource management policies for the Murray–Darling Basin. Its functions are specifically to:

- advise the MDBMC in relation to the planning, development and management of the basin's natural resources;
- assist the MDBMC in developing measures for the equitable, efficient and sustainable use of the basin's natural resources;
- implement measures or coordinate the implementation of measures, where directed by the MDBMC;
- give effect to any policy or decision of the MDBMC; and
- manage water sourced from the Hume and Dartmouth Reservoirs, Lake Victoria and Menindee Lakes to ensure that South Australia receives its water entitlement, in accordance with the MDBA 1992.

The MDBC normally meets at least four times a year, with these meetings held predominantly in regional centres within the Murray–Darling Basin or in the capital cities of the partner governments.

Community Advisory Committee

The MDBMC is required to establish a CAC, whose role is to provide an avenue of public consultation between the MDBMC and the community (MDBA 1992)

The terms of reference of the CAC are to advise the MDBMC and MDBC on:

- natural resource management issues referred to the committee by the MDBMC or MDBC; and
- the views of the basin's communities on matters identified by the Committee as being of concern (MDBC undated(d)).

The CAC reports directly to the MDBMC. Currently, it comprises an independent Chairman and 28 members:

- Twenty three state representatives are chosen on a catchment or regional basis. Nine of which are from NSW, five from Victoria, four from South Australia, four from Queensland, and one from the Australian Capital Territory.
- A representative is nominated by each of five special-interest organisations — the National Farmers' Federation, the Australian Conservation Foundation, the Australian Local Government Organisation, the Australian Landcare Council, and the Indigenous Land Corporation (MDBC undated(d)).

The states and the ACT are responsible for nominating representatives to the committee, using guidelines established by the MDBMC. These include membership of catchment management organisations, a mix of backgrounds and skills, and the maintenance of gender balance on the committee.

River Murray Water

River Murray Water is a government-owned trading enterprise responsible for the operation of the major storages along the River Murray system. The storages are owned and operated on a daily basis by the signatory jurisdictions, but the chief operational decisions are undertaken by River Murray Water. The roles and authorities of River Murray Water are contained in the MDBA 1992.

The River Murray Water Advisory Board provides advice to the MDBC on the operation of River Murray Water. This arrangement effectively 'ring-fences' the MDBC from River Murray Water, while still permitting the MDBC to be involved in the continued operation of the basin's storages.

The board comprises:

- The President of the MDBC;
- a nominee from each of the signatory jurisdictions;
- an external specialist appointed by the MDBC;
- the chief executive of the MDBC; and
- the general manager of River Murray Water (MDBC undated(e)).

The primary services provided by River Murray Water are to:

- operate water storage facilities;
- operate salinity mitigation schemes;
- deliver water to consumptive users; and
- deliver water for non-consumptive uses such as navigation, recreation, tourism, and hydro-power (MDBC undated(f)).

The board reports directly to the MDBC.

3.2 Natural Resource Management Ministerial Council

The NRMMC is the national council of Commonwealth, state and territory ministers from primary industry, natural resources, environment and water portfolios. The NRMMC is a policy-level decision making forum and has jurisdiction over issues affecting the sustainability of Australia's land and water resources. Its policy decisions apply to all jurisdictions in Australia. The scope of its decisions is limited to developing national natural resource management frameworks for:

- standard (including best practice management standard) and target setting;
- accreditation, and
- implementation;
- monitoring and evaluation.

In the case of water, the NRMMC is the lead body responsible for coordinating the implementation of the NWQMS and the NAPSWQ. The NRMMC also reports to CoAG on progress in implementing the Water Reform Framework.

4 Definition of water rights

As noted, the states and territories are vested with the right to the control, use and flow of water. Where water crosses jurisdictional boundaries, the diversion of water is managed by inter-jurisdictional agreements. The MDBA 1992 covers the sharing of the waters of the River Murray and lower Darling River and their tributaries.

4.1 Murray–Darling Basin Agreement

Each state's allocation of the River Murray system's waters is defined under the MDBA 1992. Under Part X of the MDBA 1992:

- South Australia is to receive 1154 GL per year plus an additional 696 GL of flows to improve water quality and account for transmission losses, plus any surplus flows as the MDBC sees appropriate.
- NSW and Victoria are each entitled to use half the water of the River Murray downstream of Doctors Point. NSW and Victoria are each entitled to use all waters in their jurisdiction before they reach the River Murray at Doctors Point.
- NSW is also entitled to use half the water in the Darling River entering the Menindee Lakes Storage system. It has priority to the water entering the Menindee Lakes Storage when lake levels are low, but must release water to South Australia when water levels exceed 1680 GL.
- NSW and Victoria must provide, in equal proportions, South Australia's entitlements. Transmission losses in fulfilling South Australia's entitlement are assumed to have occurred in NSW and Victoria respectively (MDBA 1992, Part X).

5 Government involvement in water allocation

The MDBMC is the natural resource manager of water along the River Murray and the lower Darling River. As such it has the authority to determine the total volume of water available for allocation between consumptive uses and the environment. The principal instruments for allocating water include:

- The Cap — the MDBMC agreed in 1995 to limit diversions from the rivers in the basin as a temporary measure to ensure that water was allocated for environmental uses. The Cap is described in schedule F of the MDBA 1992 and was reviewed in August 2000 (MDBC 2000).
- The Living Murray Initiative — the MDBMC agreed in march 2001 to a vision of a '…healthy River Murray system, sustaining communities and preserving unique values' (MDBC 2002a, p. 5). This objective laid the basis for increasing environmental flows. The MDBMC is expected to finalise its decision on environmental flows at its meeting in October 2003.

5.1 The Cap

In response to declining river health and with the incremental decline of security to existing water rights, the MDBMC at its June 1995 meeting decided to introduce a Cap on the diversions from the basin's rivers (MDBC 2000).

The diversion limits imposed by the Cap are determined in reference to the following factors existing at 30 June 1994:

- the infrastructure supplying the water; and
- the rules for allocating water and for operating water management systems applying; and
- the operating efficiency of water management systems; and
- existing entitlements to take and use water and the extent to which those entitlements were used; and

- the trend in the level of demand for water within and from the Murray–Darling Basin (MDBA 1992, Schedule F, c. 2).

In December 1996, the MDBMC ratified its decision to permanently cap diversions effective from 1 July 1997, by agreeing to Schedule F of the MDBA 1992.

Caps were negotiated for each river valley and state, and for the basin as a whole.[1] Each jurisdiction agreed to ensure that diversions within each designated river valley, upper and lower reaches of the River Murray, met their respective state caps.

The MDBMC expected that river valley and state-based caps would adjust over time to reflect trading of water rights within or between the states. While introduction of a Cap was seen as an essential first step in achieving the sustainable management of the basin's rivers (MDBC 2000), the MDBMC recognised that the Cap was an interim measure to protect the sustainability of the basin's rivers.

Each jurisdiction is responsible for monitoring their diversion from the rivers in the basin and report to the MDBC, and the MDBC must produce an annual audit report of diversions, for each designated valley and for each state and territory. Where the Cap has been exceeded, the matter would be referred to the MDBMC.

5.2 The Living Murray Initiative

Following the MDBMC's Corowa Communique in March 2001, the MDBC identified the key broad objectives to be:

- river health (such as protect and restore key habitat features in the river, riparian zone, floodplain and estuary);
- environmental flow objectives (such as restoring ecologically significant elements of the natural flow regime);
- water quality objectives (such as improving water quality with respect to salinity, blue-green algae and pesticides); and
- human dimension objectives (such as recognising the cultural values of the river) (MDBC 2002b).

The adoption of these objectives represented the culmination of ongoing research and policy development by the MDBC that included but were not limited to the:

- review and operation of the Cap;

[1] The ACT, as at 19 July 2002, did not have a diversion limit but its current water use was within any expected agreed cap.

- management of flood plains, including the River Murray between the Hume dam and the Yarrawonga waterway;
- recovery and conservation of fish species along the River Murray, such as through the draft Native Fish Strategy; and
- provision of environmental flows, for ecological and water quality purposes (MDBC undated(g)).

Each signatory jurisdiction is responsible for planning for the allocation of water in its catchments. No jurisdiction or body is currently examining the basin-wide implications of environmental flows for the River Murray (MDBC 2002b).

5.3 Allocation mechanism

Central to any adaptive management framework is one or more mechanisms to re-allocate water between consumptive and environmental uses. Under the Living Murray Initiative, the MDBC canvassed a number of methods to be undertaken by signatory jurisdictions to re-allocate water, including:

- re-allocating without compensation or assistance — reducing the volumetric entitlements or reliability of supply of water rights without compensation, or not renewing short-term water rights when they were due for renewal;
- re-allocating with compensation or assistance — such as compulsory acquisition of access rights and the provision of structural assistance to irrigators following the closure of uneconomic irrigation areas; and
- market-based mechanisms — such as voluntary acquisition of water rights through water markets, purchases of water through investments in water savings, incentives to reduce water use (MDBC 2002b).

Any re-allocation of water to environmental uses will depend in part on how the proposed environmental flows will be implemented. It is not clear whether such flows under the proposed Living Murray Initiative will be implemented. Options include: separate transferable environmental water rights; a reduction of the Cap; the use of rules governing the operation of storages; and/or the specification of limits on river flows. In addition, it is not clear who will be responsible for managing such flows.

5.4 Resource planning

The MDBMC requested the MDBC to investigate options for the provision of increased environmental flows in the River Murray system. The MDBC's Project Board on Environmental Flows and Water Quality Objectives is currently developing a environmental flow management plan that includes:

- a review of options for achieving environmental flows;
- an analysis of the trade-offs that might be considered through the adoption of new river operation procedure;
- the participation of community, industry and jurisdictions in developing the flow management plan;
- a framework for adaptive management; and
- establishing research and investigation to improve knowledge of the river system and its response to environmental flow provisions (MDBC undated(h)).

Any decision to implement environmental flows requires the agreement of NSW and Victoria to implement any proposed changes in environmental flows and changes in existing water rights (MDBC 2002b).

Resource assessment

The MDBC has undertaken research into the available water resources and environmental requirements of the basin. As part of this assessment, hydrological modelling of the availability of water resources was undertaken — similar to the modelling undertaken during the review of the operation of the Cap (MDBC 2000).

The MDBC's Sustainable River Audit will review and monitor river health and ecological condition for each major river valley, and will include indicators (such as hydrology, water quality, species and habitat) (MDBC 2002b).

Specification of desired objectives

The broad objectives to the Living Murray Initiative were identified in the Corowa Communique of the MDBMC in 2002. The MDBMC also agreed to the development of a Sustainable Rivers Audit. The audit represents the next step of identifying the necessary and detailed environmental outcomes on which future environmental flow allocations will be based.

The audit will be used to inform decision makers on progress into improving river health management and will form part of the adaptive management approach of the Living Murray Initiative (MDBC undated(i)). The Sustainable Rivers Audit is scheduled to be piloted in 2003 (Whittington et al. 2001).

Impact assessment

The MDBC has broad powers to initiate studies and investigations into:

(a) the conservation and regulation of river water;

(b) the protection and improvement of the quality of river water;

(c) the conservation, protection and management of aquatic and riverine environments;

(d) the control and management of groundwater which may affect the quality or volume of river water (MDBA 1992, c. 39)

In addition, the MDBA 1992 requires the MDBC to 'promote the effective planning and management for the equitable, efficient and sustainable use of the water, land and other environmental resources of the Murray–Darling Basin' (MDBA 1992, c. 1). Finally, the MDBC is required to undertake environmental impact assessments of its activities and policies.

> The Commission must, in exercising its powers or functions, or in implementing works or measures under this Agreement, examine and take into account any possible effects which the exercise of those powers or functions or those works or measures may have on water, land and other environmental resources within the Murray–Darling Basin (MDBA 1992, c. 47).

The MDBC has undertaken a number of assessments in the lead up to and as part of the Living Murray Initiative. For example, in the initial recommendation to adopt the Living Murray Initiative, it undertook a preliminary assessment of the potential benefits and costs associated with increasing environmental flows (MDBC 2002a). The study was principally concerned with estimating the environmental consequences of various flow scenarios and some future implementation issues.

A number of studies have been undertaken to further develop options to be put to the MDBMC for its October 2003 meeting. Studies included a:

- Detailed assessment of the environmental impacts of different flow scenarios. These included assessment measures of the impacts of the existing regulation of flow patterns (Gippel and Blackham 2002) and estimates of the benefits of different flow scenarios (Jones et al. 2002).

- Preliminary assessment of the economic, social and environmental costs and benefits for various environmental flow scenarios (Young et al. 2002). The study also explored further issues that required additional assessment.

Other studies are being prepared to assist in the final determination of flow scenarios, final assessment of costs and benefits and the implementations options to be put to the MDBMC at its October 2003 meeting.

Transparency

The MDBA 1992 does not require the MDBMC or the MDBC to make transparent their studies or decisions. Nonetheless, there has tended to be a high level of transparency. For example, the Living Murray Initiative planning process allows stakeholders to access relevant documents, such as objectives and studies, to assist them to evaluate whether the planning process has been rigorous. However, as the final decision for the Living Murray Initiative has yet to be made, information is not publicly available.

Consultation

The MDBMC authorised consultation with the community about the development of the Living Murray Initiative under the Community Engagement Strategy (MDBC 2002a).

Consultation involved publishing an information paper, a call for submissions (MDBC 2002b) and undertaking meetings with local communities.

In addition to the CAC, which has a standing responsibility to provide the MDBMC and the MDBC feedback on community views, a number of specific groups were appointed to assist the community consultation process. These include a:

- three person Independent Community Engagement Panel, appointed by the MDBMC to monitor progress of the community engagement process; and
- twenty-four person Community Reference Panel (CRP), appointed by the project board responsible for the Living Murray Initiative.

The CRP is chaired by the chair of the CAC. The CRP was appointed on a skills and interest basis and on geographic representation.

The CRP is responsible for:

- providing community input into the development of environmental flows proposed under the Living Murray Initiative; and
- recommending how community engagement ought to be undertaken.

Other groups have also been appointed by the project board to provide consultation. These include the Independent Social and Economic Reference Panel and the Independent Advisory Group. In addition, each Commonwealth, state and territory government provides feedback (MDBC 2002b).

A progress report on community consultations to the draft proposal is to be put to the MDBMC in November 2002. The MDBMC meeting in October 2003 will consider outcomes of the engagement process.

Review

The Living Murray Initiative is a seven year program. A feature of the program is that it will adopt the principles of 'adaptive management'. The adaptive management program will be based around regular annual and more detailed reviews of the river health. The Sustainable Rivers Audit will be the regular assessment of river health and ecological condition for each valley. The audit is an attempt to provide detailed and consistent data previously unavailable. The audit also includes the development of performance indicators for:

- macroinvertebrates;
- fishes;
- water quality;
- hydrology; and
- physical habitat.

Each index is developed from a number of sub-indices. For example, the hydrology index comprises sub-indices covering mean annual flow, flow duration curve difference, seasonal amplitude, and seasonal period. An Independent Sustainable Rivers Audit Group has been appointed to assist with the design of the future Audit function. The group comprises four eminent ecologists with extensive expertise in river ecology and river health monitoring (MDBC undated(i)).

6 Administering water rights

The administration of water rights in the basin remains the responsibility of NSW, Victoria, Queensland, South Australia and the ACT. However, the MDBC does have a role in administering the Pilot Inter-state Water Trading Project (see box 6.1).

Box 6.1 **The Pilot Inter-state Water Trading Project**

The Pilot Inter-state Water Trading Project is described under Schedule E of the Murray–Darling Basin Agreement 1992. The Murray–Darling Basin Commission (MDBC) is undertaking a pilot inter-state water trading project, whose objective is to:

- improve the efficiency of consumptive water use, especially in irrigation;
- contribute to economic sustainability by encouraging water to move to its highest value use; and
- contribute to resource and environmental sustainability.

The pilot is located in the Mallee Region of South Australia, Victoria and New South Wales. It covers the River Murray between Nyah and the Barrages at the mouth of the Murray. Also included are River Murray licences on the Darling River, which are supplied from the weir pool at Lock 10 (just downstream of the junction of the Murray and Darling rivers).

The pilot project is limited to the permanent transfer of high security water entitlements held by private diverters (individual irrigators who pump water directly from the river), which are defined to include:

- New South Wales — private high security access licences;
- South Australia — water licences granted under the Water Resources Act 1997; and
- Victoria — private water rights and take and use licences.

The pilot project has the potential to influence the allocation of water, as permanent water entitlements are traded across state borders.

Source: MDBC undated(j).

The administration of inter-state trades involves:

- Both buyers and sellers lodging applications to transfer water (and any applicable fees) with the licensing authority in the state of destination. Copies of the applications are forwarded to the MDBC and the state of destination.
- Licensing authorities in the states of destination and origin assess the applications in reference to the transfer requirements of the state, environmental clearances and development standards, and the MDBC's policies on Salinity and Drainage Strategy and environmental flow management.
- The MDBC assesses the application and then informs each state of its ability to deliver the water to the buyer, a determination of the exchange rates to be applied to the transfer and any consequent adjustment to the transferred water entitlement.
- On the basis of the states' findings and the MDBC's advice, the application is either approved or rejected. The state of destination will determine what conditions, if any, will apply to the transfer in order to satisfy state and MDBC requirements (MDBC undated(j)).

Environmental requirements

A condition of the Pilot Inter-state Water Trading Project is that inter-state transfers of water rights do not increase levels of in-stream salinity, reduce environmental flows or degrade the natural riverine environment. Further, no transfer should result in an acceleration of environmental degradation resulting from the use or management of the transferred water (MDBC undated(j)).

The MDBC has three policies protecting the environment from the potentially adverse effects of trade:

- Each state requires new and expanded irrigation developments to be subject to an environmental approval that addresses the concerns of salinity, soil conservation, native vegetation clearance, protecting endangered species of plants, animals and wetlands (MDBC undated(j)).
- States must comply with the MDBC's Salinity and Drainage Strategy 1988, which establishes the protocol by which salinity credits and debits can be earned by states that result from the transfer of water rights and the development of new irrigation districts.
- Trades from NSW and Victoria downstream of the Barmah Choke to NSW and Victoria are prohibited, as the congestion arising may result in unseasonal flooding and therefore harm the adjacent Barmah–Millewa forest.

Approved plans attract salinity credits from the state government if they reduce their discharge of saline water. Developers of approved projects are expected to pay at least some of the costs of obtaining the credits, such as the operational and maintenance component of the salt interception scheme. They may own credits if they also contributed towards the capital cost component (MDBC 1999a). The precise funding formula depends on the cost-sharing arrangement of the state government.

Details of inter-state transfers of entitlements are recorded by the MDBC and the appropriate salinity credit and debit adjustments made to the salinity register.

7 Distribution management

Distribution management involves determining how much water is available and who is to receive it (water accounting), and coordinating the collection, storage and transportation of water to its various uses and users (water distribution).

7.1 Water accounting

Water accounting is the management of registries of water rights and accounts of water use to ensure that that there is an accurate record of the water rights issued to water users, and that the volume of water assigned and distributed to water right-holders accurately reflects both those rights and the hydrological characteristics of the resource.

Registries of water rights are maintained by each of the state and territory governments. The MDBC is responsible for maintaining and auditing accounts of the water assigned to the signatory governments in the River Murray system.

Each year, the MDBC publishes an annual water report that summarises:

- water resources available for that year;
- volume of environmental flows, water right trades;
- water use (diversions) by each jurisdiction, for each of the catchments and valleys;
- comparison with actual and natural flows during the year;
- storage and major irrigation system losses; and
- carry-overs and over-draws (forward-draws) for that and the previous year (MDBC 2002c).

This annual report is an important component in the MDBC's compliance strategy,

Determining water availability and assigning water

The Water Liaison Committee of the MDBC is responsible for determining and assigning bulk water to the signatory jurisdictions in accordance with the terms of

the MDBA 1992. The Water Liaison Committee is chaired by MDBC and comprises offices from NSW, Victoria and South Australia.

Additional meetings of the committee may be convened if significant inflows occur to the storages between August and November. Each signatory government is then responsible for determining the volume of water available to water users in its jurisdiction (DLWC undated).

River Murray Water, when determining and assigning water to signatory jurisdictions, must take into account the:

- level of inflows for a period;
- volume of water diverted (supplied) to states;
- losses incurred during the distribution of water to South Australia, and in storage;
- accounting for dilution flows to South Australia; and
- spillages (MDBA 1992, c. 114).

The MDBC is required to maintain a minimum reserve of up to 835 GL to be held until the following May, of which the first 250 GL is to be stored in Lake Victoria (MDBA 1992, c. 100).

Managing water accounts

The major storages are operated on a continual basis (MDBA 1992, c. 110). In any major storage, water allocated either to New South Wales or Victoria must be re-allocated to the other state to prevent the volume of water allocated to either state in the storage exceeding half the lesser of:

- the target capacity of the storage; or
- the volume of water stored when releases are being made for flood mitigation (MDBA 1992, c. 115).

Any water lost by evaporation or other means from the upper catchment of the River Murray is deemed to have been used by NSW and Victoria. For example, in the case of evaporation from a major storage, it is in proportion to the volumes of water allocated to the states in that storage (MDBA 1992, c. 108).

NSW and Victoria own equal capacity shares of the Hume Dam, the major collection storage facility of the River Murray system. Victoria's more conservative

water storing program has meant that on occasion when the Victorian capacity share reached its full capacity, water spilled into the NSW capacity share.

Accounting for water right transfers

As mentioned earlier, the MDBC is responsible for ensuring that each state complies with the Cap on water extractions. Consequently it must ensure that inter-state water transfers are reflected in the states' accounts.

As part of its objective in meeting its objectives of maintaining and improving water quality and reliability, the MDBC has introduced a number of 'exchange rates' on the inter-state transfers of water rights.

The security (or supply reliability) exchange rate is employed to address the change in the level of security of supply, both for the buyer of the water right and for other water users. This is because the water may have to come from a different source, such as a different reservoir or river. Water traded upstream becomes less secure than water traded downstream because there are fewer storage options and rivers, thereby increasing the variability in any given year.

The Cap exchange rate is employed to adjust each state's Cap following inter-state transfers of water rights — although it does not apply to each user's water right. The destination jurisdiction only receives 90 per cent of the transferred water right, since 'on principle, on average, high security allocation irrigators use only 90 per cent of their annual allocations' (MDBC undated(i)). The Cap exchange rate is applied after the security exchange rate (MDBC undated(j)).

A third exchange rate is applied on all inter-state movement of water. Inter-state deliveries of water experience conveyancy (evaporation and seepage) losses. The management of these losses and the use of conveyancy exchange rates is governed by the MDBA 1992.

South Australia receives a specified allocation to address conveyancy losses (and dilution flows) (MDBA 1992, c. 86). No specific allocation is made for losses for either NSW or Victoria, and such losses are calculated on a pro-rata basis in accordance with each jurisdiction's allocation.

In the case of water right trades to South Australia, an exchange rate is normally applied to adjust for the changed volumetric entitlement of the water right. However, no adjustment is made to the water right since South Australia's allocation for conveyancy losses and dilution flows is pooled, and individual transfers do not make an appreciable impact on the overall losses (DNRE 2001).

Arrangements for water shortages

The MDBC is required to declare a period of special accounting unless the volume of water in reserve for NSW or Victoria exceeds 1250 GL. Special accounting periods do not necessarily apply to water shortages. Special accounting may be declared at any time between the end of July in any given year and before May of the following year. Special accounting requries declaring a period of restriction under the terms of the Snowy Mountain Agreement if both NSW and Victoria are subject to periods of special accounting.

In a period of special accounting, South Australia is entitled to receive the lesser of:

- the sum of monthly volumes totalling 1154 GL per year plus an additional 696 GL of flows to improve water quality and account for transmission losses; and
- one third of water available for South Australia in storage, adjusted for any imbalance in use (MDBA 1992, c. 126).

There are no special provisions in the MDBA 1992 governing the requirements for transparency and consultation in the determination of special accounting provisions.

7.2 Water distribution

Water distribution is the management of the network of natural and artificial channels to ensure that water is delivered to meet the needs of water users. For example, releases of water to South Australia must meet the needs of minimum flow requirements, dilution of salinity, maximum rates of change of water level, and capacity of the river channels (MDBC undated(l)).

The infrastructure assets in the River Murray system are owned by each of the signatory jurisdictions. River Murray Water is responsible for coordinating the distribution of that water. As mentioned, River Murray Water operates Dartmouth Dam, Hume Dam, Menindee Lakes and Lake Victoria, as well as sixteen weirs, five barrages and numerous other smaller structures on a daily basis (MDBC undated(k) and (l)).

The MDBC recently commissioned an independent review of the operational procedures of its Hume and Dartmouth dams (HDDORP 1998 and 1999). The studies recommended changes to the existing operational practices that would lead to a greater efficiency of distribution — balancing the storage's functions of:

- storing and supplying water to consumptive users;

- supplying water for environmental purposes;
- supplying water for other non-consumptive purposes (including such as hydroelectricity and tourism); and
- flood control (HDDORP 1998 and 1999).

The review made recommendations on how the river is to be managed. Not all recommendations of the independent review were adopted immediately, pending the Living Murray Initiative. Under the Living Murray Initiative, the flow management of the River Murray would be reviewed for its environmental and non-environmental effects (MDBC 1999b). The following discussion is based on recommendations of the independent review and issues raised in the development of the Living Murray Initiative.

Managing environmental flows

The management of environmental flows is governed by a number of existing requirements. These include:

- state environmental flow provisions contained in NSW water management plans, Victorian bulk entitlement orders and South Australian water allocation plans;
- water quality targets, such as those set by the Salinity and Drainage Strategy 1988; and
- provisions under the MDBA 1992 to provide dilution flows to South Australia.

Three broad methods of providing for environmental flows were observed to be used by the signatory jurisdictions in the Murray–Darling Basin, including the:

- Provision of non-transferable allocations of water for specific and exclusive use of the environment.
- Provision of transferable allocations for the environment for periodic and specific environmental purposes, such as the flooding of wetlands.
- Use of rules, conditions and obligations on storage operators on the collection and release of water. This can include providing a minimum passing flow or the specification of minimum and maximum flow targets along a river.

The MDBC has canvassed whether changes to rules, conditions and obligations of storage operators could lead to a more effectively coordinated environmental flow management. Options considered included:

- Modifying flow patterns — such as those from the Dartmouth Dam, to achieve environmental benefits for the Mitta Mitta river and controlling flows to imitate natural flows through the Menindee Lakes in the Lower Darling (MDBC 2002b).
- Providing water for joint use by the environment and water users. This would reduce the cost of retrieving water, particularly if the water is unlikely to perform any real environment function further down the river (MDBC 2002b).

The MDBC is seeking to consolidate each of these approaches into a single flow management plan. This is to be developed as part of the environmental flow requirements of the River Murray (MDBC 2002b).

Managing distributions to consumptive uses

Water trading has the potential to move water along rivers, and place pressure on the distribution network, including river channels, irrigation canals and pipelines.

The most significant river channel constraint on the River Murray is the Barmah Choke (downstream of Tocumwal in the Barmah–Millewa Forest), and the section between Hume Dam and Yarrawonga Weir. These and other constraints limit the volume of water that can be provided to NSW and Victorian irrigators during the peak irrigation period.

The location of irrigation districts places demand on river flows at certain points in the river system. Congestion may result when irrigators, in the same area watering the same crop, simultaneously order their water. As a result, it may not always be possible to supply the additional demand without affecting supplies to existing water users and meet minimum river flow requirements.

As mentioned, the MDBC in its approval processes determines whether the proposed transfer can be satisfied subject to the capacity constraints of the reticulation system. If the proposed water transfers are manageable in terms of river operations, they will be endorsed by the MDBC.

The MDBC, however, is only responsible for endorsing the transfer in terms of the one river channel — the River Murray. Other congestion points, such as those within irrigation districts, are the responsibility of the districts and state governments respectively.

Managing distributions to consumptive and non-consumptive uses

A third source of coordination is between non-consumptive uses (such as hydro-electric power generators) and consumptive users. The independent review of the release strategies of River Murray Water undertook detailed assessments of possible flow regimes for non-consumptive and other uses. These assessments weighed up the costs and benefits of different release strategies for consumptive, non-consumptive, environmental uses and for flood control.

For example, it was found that more effective management of users' flows could be achieved by:

- Modifying the timing of flow releases to coordinate between consumptive and non-consumptive users — such as the management of floods and hydroelectric power schemes (MDBC 1999b).
- The management of flooding along private land can be accommodated through the purchase of easements which would have the effect of increasing channel capacity (MDBC 1999b). The net effect would be more cost-effective than the current regular flooding of productive land.

There is some scope for individual non-consumptive and consumptive users to negotiate mutually beneficial flow arrangements, through the leasing or sales of water rights — which are under the authority of the signatory jurisdictions.

8 Pricing

River Murray Water provides water delivery services and environmental management services to NSW, Victoria and South Australia. The Commonwealth Government and each signatory government contribute to the cost-recovery of these services. The terms of cost-sharing for River Murray Water and other MDBC services are provided in part VII of the MDBA 1992.

This cost-sharing arrangement was recently subject to an independent review (Langford and Scriven 2002). The independent review considered:

- current and capital costs of managing and administering water, including rates of return and expenditure on asset replacement and refurbishment;
- current costs of operating and maintaining delivery services, including rates of return on assets and expenditure on asset replacement/refurbishment;
- payment of taxation equivalents and competitive neutrality requirements;
- pricing structure of the services; and
- costing of environmental third-party effects.

The independent review reported that River Murray Water operated a cash-based accounting and classified its costs as:

- current expenditure, comprising operations and maintenance expenditure; and
- capital expenditure, comprising investigation and construction expenditure (Langford and Scriven 2002).

The independent review also reported that these cost types were then allocated to each of the four major expenditure programs:

- water storage and supply — access;
- water storage and supply — consumption;
- salinity mitigation; and
- specific beneficiaries.

These costs were passed onto each of the signatory governments and not the individual water users or beneficiaries themselves. The cost-sharing formula for attributing costs between the jurisdictions is required under the MDBA 1992. Each

jurisdiction's government then determined how those costs were passed onto individual water right-holders.

8.1 Pricing infrastructure services

Price regulation

River Murray Water is not subject to independent pricing regulation of its water delivery services. The provisions of the MDBA 1992 currently do not permit the full separation of River Murray Water from the MDBC. Currently the entity is ring-fenced within the MDBC.

Langford and Scriven (2002) recommended that an independent pricing review be undertaken periodically, with the findings reported to the MDBMC.

Recovering current and capital costs

Management and administration costs are fully allocated to each of the four program areas on the basis of management and administration time spent on those programs.

Under the cash-based accounting approach, River Murray Water's capital expenditure is fully expensed in the year in which it was incurred. Dividends are not paid on the opportunity cost and consumption of the capital.

The independent review recommended that River Murray Water adopt a renewals based accounting to account for future capital needs (Langford and Scriven 2002). Under this approach, a renewals annuity is levied to recover the expected costs of asset replacement and refurbishment.

Langford and Scriven (2002) said that a major benefit in moving to a renewals annuity was that it provided greater management discipline on capital expenditure. However, the MDBC does not have the authority under the existing provisions of the MDBA 1992 to levy a renewals annuity.

Pricing structure

The independent review reported that the recovery of River Murray Water's current costs were agreed by the MDBMC to the following formula:

- 40 per cent NSW;
- 36 per cent Victoria; and
- 24 per cent South Australia (Langford and Scriven 2002).

Under the cash-based accounting approach, the Commonwealth, NSW, Victorian and South Australian governments each bear 25 per cent of the annual capital expenditure costs.

This funding formula was agreed on the basis of the perceived benefits to jurisdictions. The independent review recommended that the structure of future charges be based on consumption or usage, such as for each megalitre of water delivered to each state. In addition, separate charges or subsidies could be made to reflect the other benefits or community service obligations received from or provided by River Murray Water (Langford and Scriven 2002).

Competitive neutrality

The independent review also reported that River Murray Water was subject to the National Tax Equivalent Regime, endorsed by the MDBMC in March 2001, and adopted by the MDBC in July 2002. However, the MDBC's assets, such as Hume and Dartmouth dams, are jointly owned by more than one government. Consequently, tax equivalence has currently not been implemented by River Murray Water.

8.2 Pricing water rights management

The MDBC and River Murray Water undertake several activities in relation to water rights including approving inter-state transfers, and monitoring and enforcing compliance with the Cap. The majority of water resource management costs associated with water rights are incurred by the signatory governments.

Water resource management costs are not separately identified by the MDBC and River Murray Water. They are grouped with other management and administration costs, such as those associated with water delivery and addressing environmental third-party effects (such as salinity mitigation).

8.3 Pricing environmental third-party effects

One of the major program areas for River Murray Water is salinity mitigation. River Murray Water (including the MDBC) also provides a range of other environmental services that includes:

- multi-level off-take towers — releases from low-level outlets for irrigation and domestic purposes have cold-water impacts on the downstream environment;
- preventing stream bank erosion — rapid rises and falls in river height caused by releases from storages for irrigation and domestic water supplies have resulted in significant stream bank erosion in some rivers; and
- fish ladders — fish passage has been interrupted by structures used to harvest and regulate water flows (Langford and Scriven 2002).

Apart from salinity mitigation, the MDBC does separately identify the costs associated with environmental management. Moreover, the MDBC did not link such costs to the level of water supplied to or environmental damage caused by each of the jurisdictions.

The independent review also recommended that any future costs in acquiring water for environmental purposes be financed through an annuity charge to finance any new works, investments to improve water use efficiency, and purchases of permanent or leases of temporary water (Langford and Scriven 2002).

9 Monitoring and enforcement

The MDBC is required to monitor the state of natural resources in the basin, such as water volume, quality, extent, diversity and representativeness of water, land and other environmental resources of the basin. This includes the aquatic and riverine environments, and the effect of groundwater on water, and other environmental resources (MDBA 1992, c. 40).

The MDBC is responsible for monitoring

- continuously the flow of the River Murray and its tributaries;
- the volume of water stored;
- all diversions, whether natural or artificial from the River Murray and its tributaries; and
- the quality of River Murray, tributary and stored water (MDBA 1992, c. 41).

Apart from monitoring for environmental outcomes, the MDBC is chiefly concerned with monitoring compliance of the signatory governments to the Cap. Each signatory government is responsible for monitoring activities in their jurisdiction.

9.1 Compliance strategies

Compliance strategies set out the monitoring and enforcement strategies necessary for the protection of water sharing arrangements. The framework for a compliance strategy is outlined in the MDBA 1992 (schedule F). Though there is no publicly available statement of the MDBC's compliance strategy, its strategy is evident from the provisions in the MDBA 1992.

9.2 Monitoring procedures

The MDBC is responsible for monitoring the volume of water in storage, assigned and distributed to each signatory government. Each jurisdiction must report

annually to the MDBC on its compliance with the Cap (MDBA 1992, c. 43).[2] State government monitoring and the compliance reports are independently audited by the Independent Audit Group (IAG) appointed by the MDBC (MDBC 2002c). The IAG reports on state assignments, environmental flows and diversions at individual valley (catchment) levels to ensure compliance in implementing the Cap (see box 9.1).

Box 9.1 **Monitoring and enforcing the Cap on diversions under the Murray-Darling Basin Agreement**

Each state jurisdiction must for each water use year and in relation to each designated river valley within its territory, monitor and report to the Murray–Darling Basin Commission (MDBC) on:

- diversions made within and to the territory of that state in that water year;
- water entitlements, announced allocations of water and declarations which permit the use of unregulated flows of water within the territory of that state in that water year;
- trading of water entitlements within, to and from the territory of that state in that water year (MDBA 1992, Schedule F, c. 11).

The MDBC must produce a water audit report which includes information about each state's compliance with the annual diversion target calculated for each designated river valley in the territory of that state and for the whole of the state in that water use year. The MDBC may publish any such report, or a summary thereof, in such a manner as it may determine.

The Independent Audit Group (IAG) is required by the MDBC to conduct an annual audit on each state's compliance with the Cap and report annually to the MDBC. This report is publicly available. The IAG may also be required to conduct a special audit of a designated river valley to determine if the Cap diversion in that valley has been exceeded.

Source: Schedule F-Cap on Diversions MDBC August 2000

The MDBC, with the cooperation of state-based agencies, monitors the volume of water released from storage. It also monitors the total flows along a river and any diversions permitted under the Cap. However, environmental flows along a river are not monitored directly and are generally imputed from what was known to be released from storage and diverted by users.

In the case of specific releases of water for environmental purposes, such as the NSW and Victorian bulk entitlements for the Barmah–Millewa forest, the MDBC

[2] In 2000–01, a Cap on diversions had not been established for the ACT and Queensland. The Cap on diversions does not cover all water resources of each state.

reports on whether water has been released from storage to meet the needs of the Barmah-Millewa forest (MDBC 2002c). The MDBC has recently prepared a strategy for monitoring whether such environmental flows reached their intended target and achieved their intended environmental outcomes (BMF 2000). Prior to October 2001, there had been no monitoring of whether those deliveries were actually received by the forest (BMF 2002).

9.3 Enforcement procedures

If the results of monitoring reveal that state diversions exceed the Cap, the MDBC must declare any state that has exceeded its Cap and report the matter to the next meeting of the MDBMC. The offending state must report to the MDBMC on the action taken, or proposed to be taken by it to ensure that cumulative diversions recorded by the MDBC are brought back into balance with the Cap.[3]

The MDBC has limited power to take enforcement action against the offending state(s). The MDBC, as an advisory body, has no power to withhold water to the offending state(s). The power to take action rests with the respective states.

3 In 2000–01, actual diversions in NSW exceeded the long term diversion Cap.

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