

CHAPTER 11

Institutional Arrangements in the Murray-Darling River Basin

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Overview of the Basin

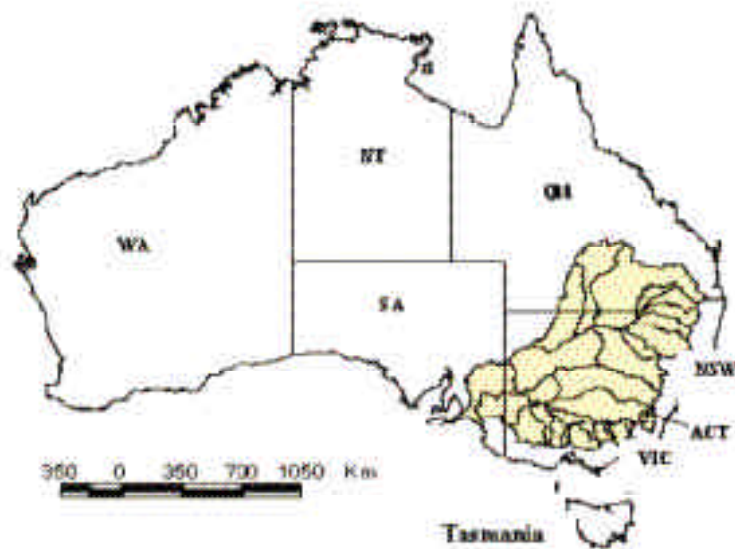
Managing water resources in the Murray-Darling basin is a lesson in resolving conflict across jurisdictional lines. Often, it is assumed that the water resources of the basin are managed by one body, which is not a full picture. Australia is a commonwealth of states and territories and works under a model of cooperative federalism. The Murray-Darling basin is managed in a framework that involves the commonwealth (or federal) government, four states and one territory. The framework involves layers of representative bodies that consist of a Ministerial Council, the Murray-Darling Basin Commission (MDBC), and series of high level groups interspersed with community representatives. These layers make up the fora where strategies and policies are set out for sharing the water and managing the serious problems of water quality in the basin. Water is fundamental to Australia's economy and a strong commitment to using water according to its highest and best use has emerged in Australia. As part of a National Competition Policy, Australia has embarked on major reforms, which include expanding water trading and moving to full cost pricing of the resource.

The two rivers, the Murray and the Darling, which give the basin its name, are hydrologically very different. The Murray river flows out of the mountains in southeast Australia and has a relatively reliable flow, whereas the Darling drains the northern half of the basin and displays the erratic flow patterns of a river in a semiarid area. The two rivers come together quite far downstream some 250 kilometers from the sea. The Murray-Darling river basin comprises a large geographical area, approximately one million square kilometers or approximately one-seventh of the landmass of Australia. With a total length of 3,780 kilometers, 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 basin can be seen in figure 1.

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

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Figure 1. Map of Australia with state lines and the outline of the Murray-Darling basin.



Notes

WA – Western Australia
NT – Northern Territory
Qld – Queensland
VIC – Victoria
NSW – New South Wales
SA – South Australia
ACT – Australian Capital Territory
Source: CSIRO

less than 200 meters above sea level. The basin covers 75 percent of the State of New South Wales, 56 percent of the State of Victoria, 15 percent of the State of Queensland, 8 percent of the State of South Australia and the entire Australian Capital Territory (MDMBC 1987). The Murray river system consists of the main course of the Murray river and all its branches, tributaries entering the Murray river upstream of Albury, as can be seen in figure 2.

Due to the relatively low rates of runoff in much of the basin, and the existence of a substantial amount of salt of geological origin present in the landscape, salinity is a significant issue in the basin.

The Murray-Darling basin has been transformed by the construction of major water weirs, locks and storages on the rivers over the last 100 years. A number of works have been put in place: Dartmouth dam, Hume dam, Yarrowonga weir, Lake Victoria storage, the Menindee lakes storage, the weirs and locks along the Murray river and lower Murrumbidgee, as well as the barrages near the mouth of the Murray river. Further, a major hydroelectric power station, the Snowy river scheme, was constructed over a 25-year period beginning in 1949. The scheme diverts water from the Snowy and Eucumbene rivers and adds about 1,140 GL (giga-liters: million m³) of water to the Murray and Murrumbidgee valleys making more water

Figure 2. Branches and tributaries of the Murray-Darling basin.



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

available for irrigation. People living in the Snowy catchment are now arguing for some of this water to be returned to them.

The total volume of water-storage capacity in the basin is just less than 35,000 GL. 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.

The basin has been populated for an estimated 40,000 years and there are significant sites where cave paintings and artifacts of aboriginal culture have been found. The basin is also important as a place of recreation and tourism. The Adelaide city with a population of over 1 million people draws an average of 40 percent of its water needs from the Murray system. There are a large number of wetlands throughout the basin some which are considered to be of international significance and listed as Ramsar wetlands. The basin provides the breeding habitats for many species of water birds, fish, invertebrates and plants.

The importance of the basin to Australian agriculture is evident by the fact that 43 percent of the total number of farms in Australia are in the basin, representing 45 percent of the crop area. Within the agriculture sector, crops, pastures and grasses are the largest-value components of agricultural production in the basin, with a gross value of production of A\$7.9

billion (Australia Bureau of Statistics) (US\$1.00=A\$1.54). Irrigation dominates the landscape of the basin. Irrigated crops and pastures in the basin represent 72 percent of Australia's total area of irrigated land. Irrigation is essential for improved dairy, cotton, rice and horticulture, in particular viticulture.²

Water Resources in the Basin

One of the more remarkable features of the Murray-Darling basin is the climatic variability. Within the basin, rainfall varies from 1,400 mm/yr. in the highlands to 300 mm/yr. in the northwest (MDMBC 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 1,000:1 in Australia. Extremes of 10,000:1 have been reported for the Darling river. The northern "Darling" system is essentially a summer rainfall system, while the southern "Murray" system is essentially a winter rainfall system.

The Murray and Murrumbidgee rivers experience relatively more reliable precipitation and, as a result, streamflow 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.³ The Murray-Darling basin has a relatively low mean annual discharge in proportion to runoff and in comparison with the other river systems in the world.

Geopolitical Organization 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 at the basin level. Australia is a commonwealth of states and territories. Water resources are largely under the jurisdiction of the states and territory governments. Rather than amending the Constitution, a MDBC has been formed to manage interjurisdictional processes and conflicts in an organized manner.

The commonwealth (or federal) government does participate in water and water-resources management through other means such as legislative and executive capacity. In particular, the commonwealth government gives financial assistance to the states and territories under section 96 of the Commonwealth Constitution (Fisher 2000, 35). However, these 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

²See Crabb (1997) or <http://www.mdbc.gov.au/tour/irrigation.html>.

³Water flow becomes an issue later in the report when we discuss security of water allocations.

agreements 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 bodies that shape commonwealth, state and territorial government policy on water. The institutional arrangements in the basin are in a process of evolution as the states and territories move towards market-based systems of allocation of resources.

An overarching policy, which affects most sectors of the Australian economy, is the National Competition Policy. Under this 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 (Hilmer 1993).

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 in 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. Payments are not large enough to fully finance reform but have been sufficient to ensure that serious steps are taken to implement the required reforms.

Council of Australian Governments

The Council of Australian Governments (COAG) comprises heads of federal (Commonwealth of Australia) and state/territory governments plus a representative from each local government. Water is one of many sectors that come under the purview of the COAG.

The 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. Many of the states and territories had been moving in these directions prior to the COAG. In developing its framework, COAG adopted a position that required a consistent approach to water reform throughout Australia. The key elements of COAG's water reforms are the following:

- All water pricing is to be based on the principles of full cost-recovery and cross-subsidies must be made transparent.
- 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.
- States and territorial governments, through relevant agencies, are 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.

- The formal determination of water allocation entitlements, including allocations for the environment as a legitimate user of water, is to be undertaken.
- Trading, including cross-border sales of water allocations and entitlements, is to be allowed within the social or physical and ecological constraints of catchments.
- An integrated catchment management approach to water resources management is to be adopted.
- Resources management and regulatory roles of governments are to be separated as far as possible from water-service provisions.
- Greater responsibility is to be given to local areas for the management of water resources.
- Greater public education about water use and consultation in the implementation of water reforms and appropriate research into technologies of water-use efficiency and related areas should occur.⁴

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 key feature of the COAG framework was the state and territory agreement to a tranche payment system, where access to very large payments was conditional upon delivery of reform milestones. The tranche payment system was instrumental in achieving the degree of economic reforms that has occurred across the states.

The reform process has not led to universal or even uniform changes in policies and practices across the states and territories. Governments have tended to tackle the reforms that are most easily achieved. In some ways, South Australia was furthest along the track, as the state had already introduced many of the reforms in a single piece of legislation, the *Water Resources Act 1997*. South Australia has the most comprehensive planning process where catchment boards undertake community consultation as part of the water management plans and this process is made consistent with a State Water Plan. However, South Australia has made only partial progress towards full cost pricing of water because of the state-level commitment to one price for reticulated water throughout the state. Arguably, New South Wales has made the greater strides towards full cost pricing because the state already had a process in place through the Independent Pricing and Regulatory Tribunal (IPART). Musgrave (2000) reports on the transparent public process that IPART uses to navigate through the conflicting interests.⁵ Many of these more successful aspects of water reform do not appear to be transferred easily even to other states, as the process of reform is constricted by

⁴Source: <http://www.affa.gov.au/water-reform/facts2.html>.

⁵Pricing issues will be described in more detail in the water pricing section.

institutional settings already in place. Generally, in the area of water reform, Queensland has the “longest way to go,” which has required the state to undertake an extensive consultation process on water pricing, water trading and the system of water allocation. A new insight beginning to emerge is that states that are slower to implement reforms can learn from others. Those states that were last to implement reforms are now beginning to pass those who were the first movers in the reform process.

The COAG Water Reform process has been further developed by the High Level Steering Group on Water. This group consisted of the chief executive of each state and territorial and commonwealth department directly responsible for water. The head of the Murray-Darling Basin Ministerial Council (MDBMC) is not represented on the High Level Steering Group **on Water but its members with a few exceptions, are members of the commission.**

MDBMC

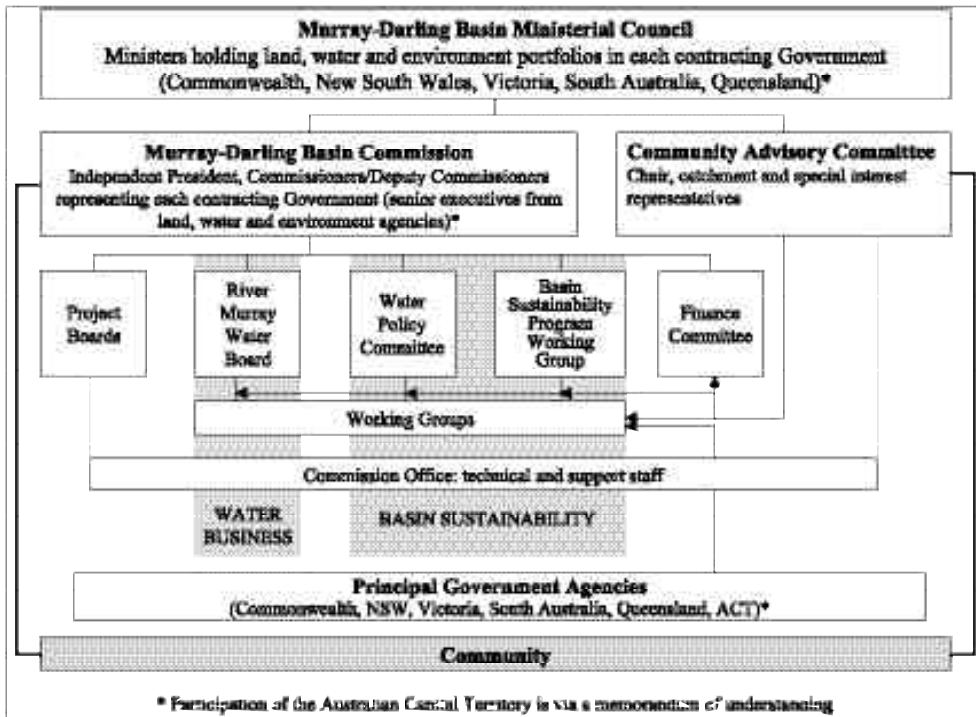
The MDBMC was established in 1985 with amendments to the Murray-Darling Basin Agreement. The MDBMC advises the council of Australian Governments as appropriate on matters relating to the implementation of the framework for water reform. The MDBMC consists of the ministers responsible for land, water 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. Its prime functions are:

- a. 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.
- b. To develop, consider and, where appropriate, authorize 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 MDBMC has the power to make decisions for the basin as a whole because of the presence of ministers representing each state and territory. Resolutions of the council are arrived at through consensus. This means that decisions taken by the council represent, in theory, a consensus of governmental opinion and policy across the basin at a point in time. However, the MDBMC relies on the states to implement any decisions taken. An overview of the high-level organization of the Murray-Darling basin can be seen in figure 3 and details concerning the MDBC are discussed below.

⁶A decision to rationalize the number of high level institutional arrangements in Australia has resulted in the recent transfer of the functions of this group to a new Natural Resources Management Council and its subsidiaries. At the time of writing, it is still too soon to see if this group will conclude that all water and natural resources management issues can be managed under a single structure or if there is an ongoing need for separate water-focused meetings. In most states, the CEOs responsible for water policy are the same people responsible for natural resources management.

Figure 3. Organization of the MDBC.



This organization chart highlights how the state and commonwealth governments coordinate their efforts to provide a high-level structure that is responsible for the basin. It is interesting to note that within this high-level structure, a place has been made for a community advisory committee, which reports to the MDBMC. The committee serves as a two-way communication channel between the MDBMC and the communities living in the basin. In the last few years, the community advisory committee has considered a number of controversial topics, such as dryland salinity, implementation and monitoring of the cap on water diversions, and floodplain management. The committee was able to communicate the issues to the community and provide a “reality-check” concerning the human dimensions of problems. The committee has also been considering issues relating to aboriginal involvement in natural resources management and recognition of cultural heritage in the basin (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.

MDBC

The MDBC is the executive arm of the MDBMC. It also works cooperatively with the states. The MDBC is responsible for managing the Murray river and the Menindee lakes system of the lower Darling river, and advising the MDBMC on matters related to the use of the water, land and other environmental resources of the Murray-Darling basin.

The MDBC comprises an independent president, two commissioners from each contracting government (i.e., the Commonwealth, New South Wales, Victoria, South Australia and Queensland) and a representative of the Australian Capital Territory Government. Each contracting government also has two deputy commissioners. The Australian Capital Territory has one deputy representative. Apart from the president, commissioners are normally chiefs and senior executives of the agencies responsible for management of land, water and environmental resources.

The MDBC is an autonomous organization equally responsible to the governments represented on the MDBMC 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.

The MDBC has a couple of key functions that include:

- advising the MDBMC 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 those measures, or where so directed by the council directly implementing measures; and
- giving effect to any policy or decision of the MDBMC.

The MDBC must balance equity considerations as well as manage and distribute the water resources of the Murray river in accordance with the Murray-Darling Basin Agreement. The MDBC began with a mandate to manage the water quantity that has gradually extended to include water quality issues and, to a limited extent, related issues on land-resources management. In the late 1980s, it was given a mandate to initiate, support and evaluate integrated natural resources management across the Murray-Darling basin.

The MDBC must work in cooperation with the contracting governments, committees, and community groups to develop and implement policies and programs. As a result, it tends to work on a consensus basis. This cooperative approach reflects the constitutional reality and the importance placed on government-community partnerships, brings to participants and end users the benefit of shared concerns and expertise, jointly developed and integrated solutions and avoids duplication of effort.⁷

Other Committees Involved in Water Reforms

There are a couple of key ministerial committees⁸ that have been charged with putting the policy framework in place in each state and territory in line with COAG reforms. Two groups,

⁷www.mdbc.gov.au/about/about_mdbc/the_commission.html.

⁸Under 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 the cabinet. Departments are constrained and guided by legislation and are subject to the direction and control of a minister.

the Agriculture and Resource Management Council of Australian and New Zealand (ARMCANZ) and the 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.

In recent years, ARMCANZ and ANZECC have been fora for government ministers to coordinate efforts. The High Level Steering Group on Water, which consists of departmental heads, provided the ties between government agencies and the policy setting committees such as ARMCANZ and ANZECC. There are a number of other committees that 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. Recently, ARMCANZ, ANZECC, and a number of other committees have been restructured to separate pure agricultural issues from integrated natural resources management issues and environmental issues.

Coordination of Various Agencies

Coordination is achieved via a constellation of councils and bodies that often involve the same people. Agreements entered into by the states will necessarily reflect approval by the ministers who sit in the various government cabinets.

The MDBC is also an important point of coordination. Each year, each state develops a 3-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 3-year rolling investment plan, based on state plans, then provides a summary of the investments being made across the basin. This allows for some evaluation of progress towards sustainability goals.

In Australia, it is recognized that states must work together on resources management issues. The process works because of the processes embodied within institutions to resolve issues. The constellation of myriad committees and groups of officials works reasonably well despite the complexity of the arrangements. The key is the continuities created by ministers and their deputies by sitting on various committees. Mutual trust and a culture of cooperation among individual administrators have grown up over the years. Further, in these settings, moral suasion is used as a mechanism to encourage states to act in a manner consistent with the common good.

Characteristically, new agenda issues are approached by setting a vision and then negotiating the detail once a consensus concerning a vision is achieved. A second feature is the complex web of people involved. It is common for many of the commissioners to chair subcommittees, sit on the High Level Steering Groups and be the head of a natural resources management department. These same people also interact through committee processes that involve ministers.

How to Share the Water

In the Murray-Darling river basin of Australia, water is used for passive, environmental and consumptive purposes. Historically, access to the Murray-Darling basin began with a framework that enabled virtually whoever 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 subsidized prices.

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

Priorities amongst Users

In general, across states, the consumption of water by people and animals takes top priority followed by agriculture. Most water licenses and legislation indicate that water needed for domestic purposes and livestock production is a prior right. That is, people may not interfere with the rights of others to consume water for stock or domestic purposes.

The importance of the environment has been underlined through a number of policy statements that have been issued. However, where in the list of priorities the environment is actually placed is not always well defined in practice. An example is the *Corporatization of the Snowy Mountains Hydroelectric Authority, Draft Environmental Impact Statement (EIS)* released by the Commonwealth (Department of Industry, Science, and Resources 2000). 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 (Department of Industry, Science and Resources 2000, 2).

This reluctance indicates the difficulties that governments, communities and businesses face in placing the environment in a list of priorities. However, positive steps have been taken as 100 GL have been set aside for the Barwah-Millewa forest. The Barwah section of the forest is a Ramsar wetland indicating that this is a site of international importance (MDBC 1999).

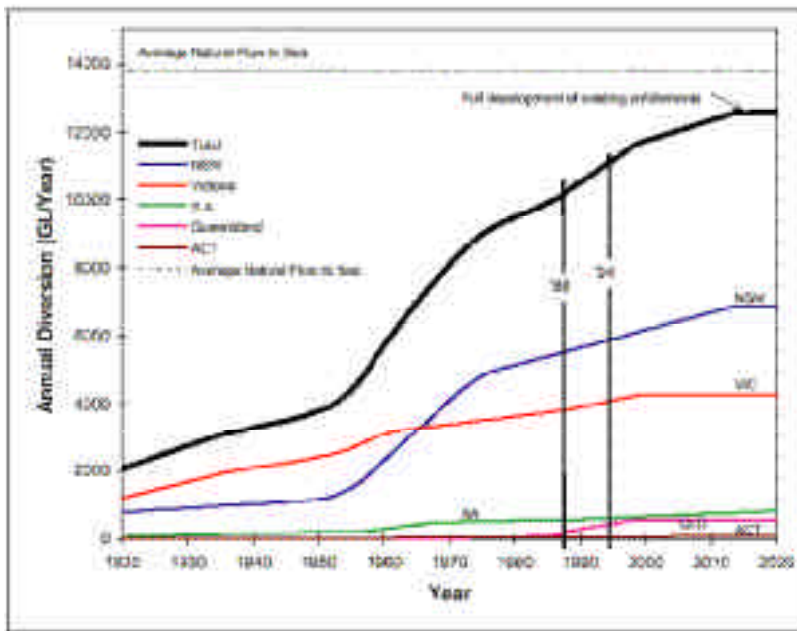
All levels of government have committed themselves to an Inter-Governmental Agreement on the Environment. This agreement commits them to a set of principles designed to ensure that all resources use and development in Australia are ecologically sustainable. Indicative of this change in emphasis, the New South Wales government recently reduced most irrigation allocations by 10 percent in the basin so that “allocations” to the environment could be increased. At this stage, however, no formal quantity of water has been allocated to the environment. Some irrigators, however, are of the view that this should occur and that any increase in allocations to the environment should be made only through processes that involve voluntary purchase of environmental flows at full market price.

Allocating Water among States

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 increasing use can be seen in figure 4. Through the 1980s, the amount of water being used for consumptive purposes began to increase significantly. In 1993, a decision was made by the MDBMC to prepare a water audit that would:

- establish water use in the basin;
- describe current level of development;
- document recent trends; and
- assess the implications of those trends.

Figure 4. Historical use of the Murray-Darling basin by the states and projections as of 1995 without a cap.



Source: MDBMC 2000.

The MDBMC was concerned about the health of the basin. Salinity of water 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 quite serious.

It was acknowledged by the MDBMC that water usage could not continue to increase within the 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 the 1993–94 levels of

development. The cap is variable depending on climatic conditions; in dry years, less water is diverted based on the water that would have been available given the existing infrastructure.

Perhaps, the most dramatic impact of the cap has been an increase in water trading. The ability to move water to its highest and best use has resulted in significant increases in the price of water. 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. The property right reforms that are underway in the states and territory will further facilitate trade.

Most of the states are putting in place legislation that separates title to land and water and allows licenses to be traded either permanently or temporarily.⁹ For example, in South Australia, 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. A system of well-defined property rights is not a requirement for water trading though it certainly facilitates more efficient trade.

Water Trading within and among States

The development of markets for water is well established in some states such as New South Wales and Victoria. In New South Wales, water trading was active and total sales amounted to 11 percent of total entitlements to consumptive users in 1997–98. Much of the trade involves temporary transfers of water. Until the new legislation is passed, land and water licenses are not separate. Permanent transfers would require cancellation of the license of the transferor and the issuing of a new license to the transferee. Temporary trades are essentially “leases” of a license. Moreover, the crops grown in New South Wales do not necessarily require high security water rights. In South Australia, the situation is considerably different, since the irrigation of grapes requires a very secure source of water. Most trades in South Australia are permanent.

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.

The next step in the water reform agenda is an interstate water trading pilot project. Under a pilot project, trade in water is permitted 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 licenses from the Darling river, which are supplied from Lock 10, near the junction of the Murray and Darling rivers. The Mallee region was selected for two reasons. First, the same type of agricultural activity, such as irrigated production of fruits, vegetables and grapes for wine, is prevalent in the region. Second, the price per megaliter (ML) of water is relatively uniform throughout the region.

⁹At the time of writing, New South Wales had a new water bill ready that was soon expected to be enacted.

Only high-security entitlement¹⁰ holders engaging in the permanent transfer of water were allowed to participate in trading. In New South Wales, holders of private high-security licenses, in South Australia holders of water licenses granted under the Water Resources Act of 1997 and in Victoria holders of private diversion licenses are allowed to participate in trading. 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 the 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 has been developed.

Temporary trading between states, outside the interstate pilot project, was put on hold by the Minister for Natural Resource in Victoria. The difficulty appears to be in the way each state accounts for water use. New South Wales has a system of continuous accounting and Victoria has a “use it or lose it” system. Under this suite of arrangements, a Victorian water user could transfer water to New South Wales, carry it forward to the next season and bring it back without “losing” it. Victoria was worried about this because its allocations are based on the assumption that every year a proportion of the water would be lost. If this feature is abandoned, then all existing allocations may need to be reduced. Temporary interstate trades will not be allowed after February until the next irrigation season.

The pilot project was allowed to operate for 2 years and then the program was independently reviewed by Young et al. (2000). Under the pilot, 9.8 GL of water were traded at a price of approximately A\$1,000 per ML though there was considerable variability in the price over the time frame. The evaluation of the pilot project revealed that the ability to trade interstate tended to lead to “unused” water¹¹ being moved out of New South Wales and Victoria to South Australia to be used for horticulture and viticulture. The ability to trade water has highlighted the need to simplify and streamline the administrative checks and balances, and the need to put in place a system of binding salinity mitigation obligations.

Issues of Water Quality

One of the major failures of the institutional arrangements is in the area of water quality. With multiple jurisdictions and conflicting interest of resources users, it has been difficult to get jurisdictions to agree that there is a significant problem, let alone agree on solutions. The MDBC was formed initially to deal with the issues of water quality relating to algal blooms, waterlogging salinization, etc. 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 Murray-Darling Salinity Strategy are:

¹⁰A high-security entitlement is a license for which the water will be provided except in severe drought conditions. A low- or general-security entitlement is a license for available water, which can vary from year to year.

¹¹Unused in the sense that it was not used by people who held allocations from where it was transferred. In practice, however, it needs to be recognized that before these transfers occurred the water was left in dams and then allocated to others.

- salt-interception schemes;
- changed operating rules for several lakes with a view to reducing evaporation and, hence, salt concentration; and
- 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 agreement between the Victorian and New South Wales governments to manage water resources within agreed limits. These states cannot construct or approve any proposal that would increase salinity by 0.1 EC¹² or more in the Murray river 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 MDBC maintains a register of works undertaken and the salinity credit and debit impacts. The salinity impact of any proposed irrigation scheme must be offset by acquiring credits in the register. South Australia requires that interstate water be subject to a Zero Impact Assessment. However, the difficulty with all these processes is the difficulty of making the agreements with irrigators binding, especially if the water can be traded again.

Despite the progress that has been made, some analysts such as Quiggin (2001) suggest that the present policies are still unsustainable. Even with the cap on diversions, if all entitlements existing in 1995 were fully developed by 2020, more than 90 percent of the average natural flow to the sea would be diverted. This pattern is unsustainable for the water-dependent ecosystems. This suggests that further steps must be taken to reduce the amount of water being diverted, if important ecological resources are to be preserved and the costs associated with salinity damage to downstream users in Adelaide are to be averted.

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). 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. Moreover, pricing at marginal cost in a decreasing cost industry means that average costs are not covered in the long run. In the long run, firms must cover their costs. Further, marginal cost pricing will not allow for covering the costs of future expansion as is sometimes required in water systems.

¹²EC is a measure of electrical conductivity. 1 EC=1 micro-Siemen per centimeter measured at 25 °C.

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 that had been floating in policy circles at the time. The COAG pricing regime is to be based on the following:

- 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, and
- 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 straightforward process to implement. Some states and territories are further along this process than others. According to the Progress Report to the COAG, water sold in urban areas is sold on a cost-recovery basis though there is some question whether proper account is being taken of the environmental externalities.

New South Wales established the Government Pricing Tribunal, which evolved into the Independent Pricing and Regulatory Tribunal (IPART). Both entities predate the COAG reforms. IPART reviews information on costs and revenues and determines bulk water prices. IPART considers, for instance, whether the department's costs represent an efficient level of service. Revising the price strategy of a resource is unlikely to be a painless process. The extractive users in New South Wales, particularly the irrigators, mounted a noisy 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 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.

Conflict Resolution

One of the key lessons of the Murray-Darling basin is that institutions can serve as mechanisms to resolve conflicts. When institutions fail to resolve conflicts they must either evolve or be abandoned. As transaction costs among economic agents increase, in this case the various entities operating in the basin, there is an incentive to create institutions to internalize these costs. Challen (2000) points out that the voluntary agreements that the state and commonwealth governments have entered into allow for sharing and accounting for the resources. This results in mechanisms for managing the resources that avoid a situation of open access. As yet, however, the framework does not provide sufficient incentives for states to control resources use so that the activities of users in any particular state are viewed in

terms of the impact across the entire basin. When issues become serious, however, the framework does appear to enable governments to negotiate a solution. Illustrative examples of this include the commitment to cap water allocations and, more recently, to try and set valley-by-valley salinity targets.

MDBC

The Murray-Darling Agreement is a prime example of institutional rules designed to manage conflicts. Early conflicts arose between users of the Murray river 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 noncooperation past the threshold for the three states.

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 (e.g., 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 realized 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 MDBC that, as discussed earlier, has a broad mandate to bring about basin-wide solutions.

Over the last decade or so, the MDBC 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 MDBMC. 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 finalized 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, the expansion of water trading, and the cap on diversions have changed the operating environment of these entities. These entities have evolved over time from a means to put irrigation infrastructure in place to become major water managers. One irrigation scheme, Colleambly Irrigation, has been evolving into a natural resources manager at a time when 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 resources outcomes to demonstrate that it was a responsible resources manager. Colleambly chose instead to apply for ISO 9002 and 14001 accreditation.¹³ The accreditation process provided a means of resolving conflict between Colleambly, NGOs and the media about the health of the river environment. 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 the 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 of 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 that boards the power to raise levies.¹⁴

The planning process of water allocation and the consultation process with the community are 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 conflicts 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.

Conclusions

The Murray-Darling river basin by its physical and geopolitical nature is difficult to manage and is likely always to be a source of conflict due to its economic significance. The lessons from the basin can be summarized largely in terms of how conflicts are managed. The sustainable management of resources has required innovative mechanisms to be put in place that will encourage reform in an environment of cooperative federalism. The system of tranche payments has proven to be a means of encouraging states to move in a consistent manner through water reforms.

¹³ISO 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.

¹⁴Until recently Victoria's boards also raised levies but a recent change in government resulted in the withdrawal of this power.

In Australia, there is an unspoken philosophy concerning how much room there is concerning adherence to rules. There is generally some tolerance about minor deviations from rules but there is a point of no return where payments are frozen, governments go to the courts seeking remedies and voters lose confidence in their elected officials.

The constellation of myriad committees and groups of officials works reasonably well despite the complexity of the arrangements. The key is the continuities created by ministers and their deputies sitting on various committees. Trust between individuals has grown up over the years. Moreover, in these settings, moral suasion works as a mechanism to encourage states to act in a manner consistent with the common good.

Institutions such as the MDBC and IPART in New South Wales have tended to use open transparent processes. The commission operates to create consensus concerning a common vision or broad principles and negotiates the details later. The commission will use a combination of moral suasion and public shaming to force states to honor commitments to the cap on diversions and salinity targets within the basin. IPART has used the open public setting to prevent interest groups from hijacking the agenda from the goal of full cost pricing.

Australia has done a number of things well in the basin. Capping water usage and establishing a salinity credit system represent major accomplishments. Adherence to these systems, where not all states bear the burden of salinity or benefit from enhanced environmental flows, is going to be the major challenge in the short term. Moving to full cost pricing and expanding water trading have proven to be sources of conflict that are gradually being resolved through the institutions, which appear robust enough to survive the demands of water users in the basin.

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