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## **Managing river systems: the Murray-Darling Basin experience**

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### **Introduction**

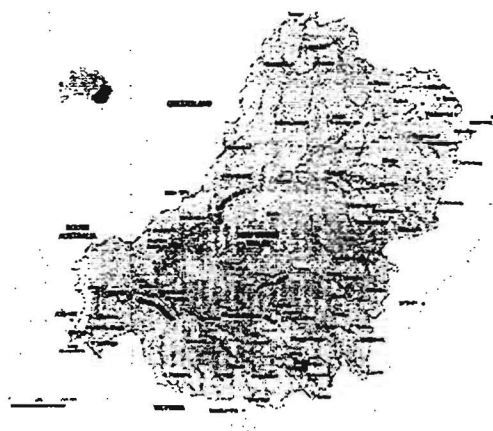
Most governments perceive water as a priceless public asset and believe they should control and manage water resources for the benefit of society as a whole and for future generations. Globally, 261 major trans-border rivers cover 45 per cent of the planet's land surface and carry 80 per cent of its fresh water.<sup>1</sup> In many regions, water is an increasingly scarce resource, and competition for it is causing serious tensions along and across many borders – for example between Turkey and downstream Syria and Iraq for water in the Euphrates and Tigris rivers, and between Egypt and upstream nations for the Nile's water. Water scarcity has also caused competition amongst states and user groups within nations, including in the Murray-Darling Basin in south-eastern Australia (see figure 1).

Both within and between nations, political and individual self-interest is usually paramount in water management. Governments grapple with the need to distribute equitably the wealth arising from water in an environment where scarcity is exacerbated by the vagaries of climate, especially drought. Engineering solutions such as building dams, while usually generating economic benefits, historically have also created social upheaval and almost always comes at the expense of both the biophysical and cultural environments.<sup>2</sup>

These and other forces have been at play in the Murray-Darling Basin (the Basin) over the last century or more. In this paper I examine the evolution of river management in the Basin since the early 1900s, the drivers for change and institutional responses to them. Drawing from this experience I will identify what I believe are essential criteria for robust management arrangements for any river, whether located in one or more countries. I will then assess current arrangements in the Basin against these criteria before outlining future challenges and how we are placed to tackle them.

### **The Basin at a glance**

*Figure 1 – Map of the Basin*



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The Murray-Darling catchment (watershed) covers 1.06 million square kilometres, or 14 per cent of Australia. Topographically the Basin is relatively flat with much of its area located in semi-arid regions, and it has a highly variable rainfall pattern. Its annual run-off is 24,300 GL, just 6 per cent of Australia's total run-off each year.

Average diversions from the river system total 11,431 GL annually in addition to the water supply for a million people in Adelaide, the capital of South Australia, plus some other towns in that State. As a result of diversions, median annual flow to the sea is only 27 per cent of natural, pre-development flow. With a population of 2 million in the Basin, economic output is \$23 billion per annum, of which agricultural output is \$10 billion a year. The Basin contains almost three-quarters of all irrigated land in Australia, and supports half the nation's crop land, half the sheep flock and a quarter of the cattle herd.

The Basin also contains significant wetlands, ten of which have been recognised internationally through Ramsar listing<sup>3</sup>, and many other areas of natural and cultural significance. It has been home to Aboriginal peoples for tens of thousands of years; its rivers have helped shape their beliefs and lives, and sacred and significant places in the Basin today need to be respected, protected and conserved. Over the last 200 years additional layers of cultural meaning have been forged with European settlement. Since Federation in 1901, the Basin has been the responsibility of the governments of the Commonwealth, Queensland, New South Wales, Victoria and South Australia. A sixth jurisdiction entered the picture in 1989 when the Australian Capital Territory was granted self-government.

### **Evolution of institutional arrangements in the Basin**

Attempts were made as early as 1863 to coordinate management of the River Murray, but foundered in the 'climate of parochialism and arrogance which prevailed in the Colonies at the time'.<sup>4</sup> The push to successfully develop formal institutional arrangements for water management dates from around 1900, with Federation of the colonies paving the way for the necessary cooperation. The evolution of these arrangements to the present can be described in terms of three main phases.

#### ***1. The pioneering phase (from around 1900 - 1920)***

The first phase is characterised by a government and community desire to use and exploit the water resources of the River Murray in ways largely unconstrained by detailed understanding of impacts. The political vision of the time was to increase wealth through development. The newly created federation of states locked in administrative boundaries that were not compatible with natural ones, and gave each State responsibility for managing the environmental resources within its boundary.

Severe drought in the 1890s was a major driver for secure water supplies along the Murray, although there were tensions between states on its use. Downstream South Australia wanted water for river boat navigation, but had to compete for it with upstream Victoria and New South Wales whose primary water use was irrigation development.

Following a community initiated water sharing conference in 1902, a Royal Commission six months later, and years of subsequent negotiations, institutional arrangements for managing the river were agreed and formalised in the *River Murray Waters Agreement*. The agreement was signed in 1914 by the Commonwealth, New South Wales, Victoria and South Australia, and ratified by each government in 1915. It was essentially a 'treaty'

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supported by parallel legislation in each of the four governments. It established a river authority, the River Murray Commission, which enabled the governments to share some sovereignty under the new Federal system. The agreement organised interactions so that each government represented on the authority had voice and influence, but was protected from decisions that would threaten its own perceived fundamental interests. Each State was able to barter support with the Commonwealth, and thus promote its own priorities. This system of countervailing pressures was complemented by Commonwealth leadership and financial power.

Distribution of wealth was a key issue during the development of the 1915 Agreement, ie how the states would share secure water resources. The following water sharing principles were established in the agreement:

- New South Wales, Victoria and South Australia all have rights to the catchment of the River Murray upstream of Albury<sup>5</sup>;
- flow at Albury is shared equally between New South Wales and Victoria;
- New South Wales and Victoria have the right to utilise to the full any of their tributaries downstream of Albury; and
- South Australia is guaranteed a minimum quantity of water (called an entitlement)<sup>5,6</sup>

The 1915 Agreement with these fundamental principles embedded in it, and establishment under this 'treaty' of the River Murray Commission in 1917, paved the way for the second phase to commence.

## ***2. The delivery phase (1920 - 1967)***

The major drivers for much of the second phase were economic development and social stability. This phase – delivery – is characterised by the construction and management of dams, weirs and associated infrastructure along the River Murray to provide a secure water supply and so 'drought proof' agricultural development.

The 1915 Agreement provided for the construction of two major water storages as well as several dozen locks and weirs to make the Murray and its tributaries navigable and facilitate diversions for irrigation. Under the agreement construction costs were to be shared by the three State governments and the Commonwealth. With a severe decline in river boat trade during the 1920s and difficult economic conditions from the Great Depression in the early 1930s, the 1915 Agreement was twice amended to reduce the number of locks and weirs and focus on water for irrigation rather than navigation.<sup>7</sup>

Construction of Hume Reservoir, just upstream of Albury, commenced in 1919 and was completed in 1936. By 1940 fourteen locks and two weirs had also been completed as had barrages across the Murray mouth and a storage at Lake Victoria.<sup>8</sup> The enlargement of Hume in 1961 and completion of additional storages at Menindee Lakes (1968) and Dartmouth Reservoir (built in 1979 during the third phase) brought the total capacity of the four major storages to 9,910 GL.<sup>9</sup> These have remained the principal storages in the Basin operated under the 'treaty'. In addition to the storage and irrigation works a range of other works were built to protect environmental values. These included the construction of barrages to prevent sea water intrusion into the lower Murray and regulators in key areas to prevent unseasonal flooding and to maximise the efficiency of the River Channel as an irrigation water conveyer.

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<sup>5</sup> Albury is a key point on the Murray because the catchment above it, despite being only 1.5 per cent of the total Basin area, yields about 30 per cent of the Basin's total runoff.

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The principles established for water sharing in 1915 continued throughout the delivery phase (and stand to this day), although towards the end of the phase tensions remained around security of water supply under the accounting rules used at that time.

The water storages facilitated irrigation development along the floodplains of the Murray, especially from the 1940s onwards, and stimulated sharp increases in water diversions in the 1950s and 1960s. This development was accompanied by broadscale land clearing in upland areas of the Basin for dryland cropping and pastoral grazing. In response to popular demand for land, governments gave high priority to the soldier resettlement schemes in the Basin after both world wars and supported population expansion there for defence reasons.

The years 1967-68 brought another severe drought – the worst for just over two decades – and, with the greatly increased number of people and expanded industries dependent on the Murray, saw water scarcity emerge once more as a major issue. The drought also highlighted the emerging problems of salinity, both in the reduced quality of the water in the lower reaches of the Murray and in the rising water tables, water logging and salinisation in many irrigation areas. These concerns highlighted the need for a broader focus on natural resource management, rather than water quantity alone, and led to phase three.

### **3. The management phase (1968-present)**

The third phase is characterised by managing for a broader set of objectives – water quality as well as secure supplies, and addressing threats to both from landscape processes. Early drivers for change included public opinion to halt degradation of the natural environment, increasing demand by the public to participate in government decision-making, and government concerns about sharing wealth in the context of increasing competition for water and the cost of addressing salinity to maintain water quality. The water reform agenda of the Council of Australian Governments (COAG) became an additional driver for change in the mid-1990s.<sup>10</sup>

The River Murray Commission, whose knowledge, expertise and culture had been built around five decades of planning, building and operating dams and other structures, reluctantly entered the third phase in the 1970s. However the need for greater cooperation to stem the threats to water quality resulted in the three southern states and the Commonwealth renegotiating the *River Murray Waters Agreement*. In 1985 they agreed to change from a river authority to a Basin authority under a new 'treaty' – the *Murray-Darling Basin Agreement* – with a charter 'to promote and coordinate 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 new agreement was ratified by the four governments in 1987 as an amendment to the *River Murray Waters Agreement* and in 1992 as an entirely new agreement which was given legal status the following year when the four governments each passed specific Murray-Darling Basin legislation. Queensland signed the agreement in 1996 and the Australian Capital Territory two years later. All six governments recognised that the reform of land management practices in the Basin would be a complex process requiring substantial political commitment from each jurisdiction. The new agreement provided the substance to achieve this.

The *Murray-Darling Basin Agreement* established new institutional arrangements. These included:

- the Murray-Darling Basin Ministerial Council, the highest-level decision-making body responsible for Basin policies;

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- the Murray-Darling Basin Commission, which replaced the River Murray Commission, comprised of senior public servants representing both economic productivity and environment/biodiversity interests and chaired by an independent President; it was responsible for managing the River Murray and implementing Council decisions concerning natural resource management in the Basin; and
- a Community Advisory Committee, appointed by the Ministerial Council to strengthen connections with Basin communities.

The various elements of this institutional package are called the Murray-Darling Basin Initiative.

Key issue-specific challenges to the Initiative in the early stages of phase three were resolving tensions in the water property rights of each State and crafting responses to rising salinity and increasing water use. General challenges included working out how to manage the Basin's natural resources in an integrated way for water quality and water quantity outcomes, and broader public education.

Satisfactory definition of water property rights between NSW, Victoria and South Australia was achieved in 1989, after 15 years of negotiations, when the Ministerial Council agreed to a revised method of water sharing based on a system of continuous water accounting. Storage volumes that must be reserved under certain conditions are specified, and water used by the states accounted for continuously. This method provides water security for individual states, by clearly defining their 'property right' to the shared water of the Murray in a way that takes account of existing storage infrastructure and the massive seasonal variability of stream flows in the Basin. It increases the states' flexibility to pursue resource allocation policies suited to their development needs and provides the opportunity for them to trade water if desired.

As a first step towards addressing the biophysical challenges, in 1985 the Ministerial Council initiated a series of studies to increase its knowledge about how the Basin worked and what changes were needed in order to develop sound policy. Separate inter-governmental groups developed options for on-farm water use efficiency<sup>11</sup>, irrigation infrastructure<sup>12</sup> and salinity reduction<sup>13</sup>. A fourth group focused on trying to integrate the findings of the three studies, to identify and assess commonalities and conflicts and develop a draft integrated action plan.<sup>14</sup> The Council also initiated a 'comprehensive benchmark environmental study' of the Basin to draw together existing information, identify gaps in knowledge and understanding and 'indicate what is required to protect and enhance significant environmental features in the Basin'.<sup>15</sup> These and other later studies lead to the development of Basin-wide policies to address the issues at hand, and established an emphasis on knowledge-based policy decisions that continues today. Over the last decade the Ministerial Council has spent approximately \$70 million on knowledge generation programs to support its decision-making.

The following three case studies will demonstrate this pattern of knowledge development, key drivers for change and the Council's policy responses to three major issues during the management phase.

***Case Study 1: reducing salinity.*** Salinity was the most pressing issue facing the Ministerial Council in 1985. The main drivers for change were rising water salinity in the lower Murray, the need for water of sufficient quality for consumption by downstream users, and the need to maintain irrigated agricultural industries along the river. Sharing wealth was a key issue: individual States realised that if they wished to share the benefits of improved

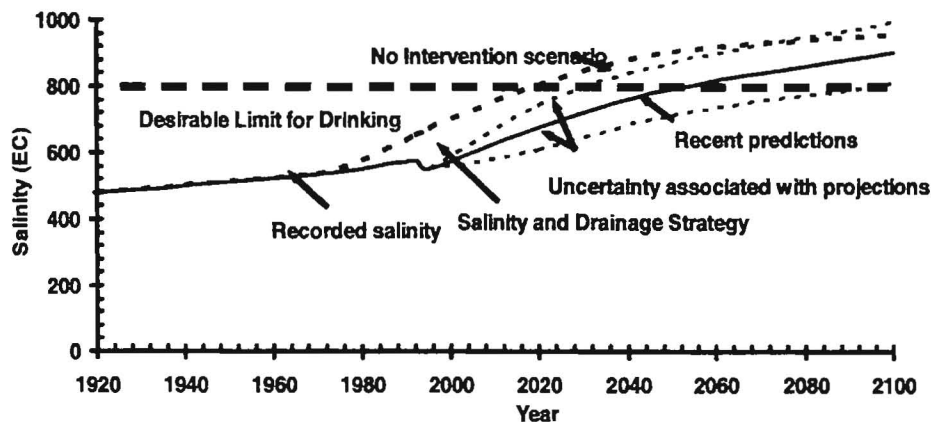
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water quality they would also need to share the cost of works to achieve it.

Improved knowledge from reports in 1986<sup>16</sup> and 1987<sup>17</sup> about the causes of rising salinity and its effects and extent along the Murray highlighted the need for a joint, Basin-wide approach to manage the problem. It led to the adoption in 1989 of the *Salinity and Drainage Strategy*<sup>18</sup> after an economic evaluation of a range of feasible river protection and land management schemes and their environmental effects. The strategy effectively put in place a system of tradeable pollution credits that allowed New South Wales and Victoria to invest in groundwater interception schemes along the middle and lower Murray to compensate for upstream drainage activities installed to protect irrigation developments there. The strategy focussed on a combination of engineering works (salt interception schemes) jointly funded by the Commonwealth and three southern states, and the development of Land and Water Management Plans. This combination of activities was designed to provide an equitable balance between the competing needs to address river salinity and land salinisation.

Since implementation of the strategy commenced in 1990, it has resulted in a net reduction in river salinity at Morgan, the benchmark location just upstream of Adelaide's water take-off, of 57.3 EC (see figure 2). Average salinity in the post-strategy period has been 152 EC lower than before the strategy was put in place and 14 EC lower than the benchmark conditions despite flows being 14 per cent lower<sup>19</sup>. The main factor critical to this successful outcome was the clear guidance provided in the strategy on the obligations and rights of governments. They included specifying a measurable target for salinity reduction (80 EC at Morgan), the level of tradeable salt credits available to each State (15 EC)<sup>20</sup> and cost-sharing arrangements. Also critical to success were formalising these rights and obligations and the rules for implementing the strategy in a schedule to the *Murray-Darling Basin Agreement*.<sup>21</sup>

### Forecast of Salinity at Morgan, October 1999



Implementation of the *Salinity and Drainage Strategy* 'bought' the Ministerial Council an estimated 30 years of time to tackle the insidious threat of dryland salinity arising from broadscale land clearing and inappropriate land use practices. These had been promoted and supported by governments during the decades of agricultural development in phase 2 and

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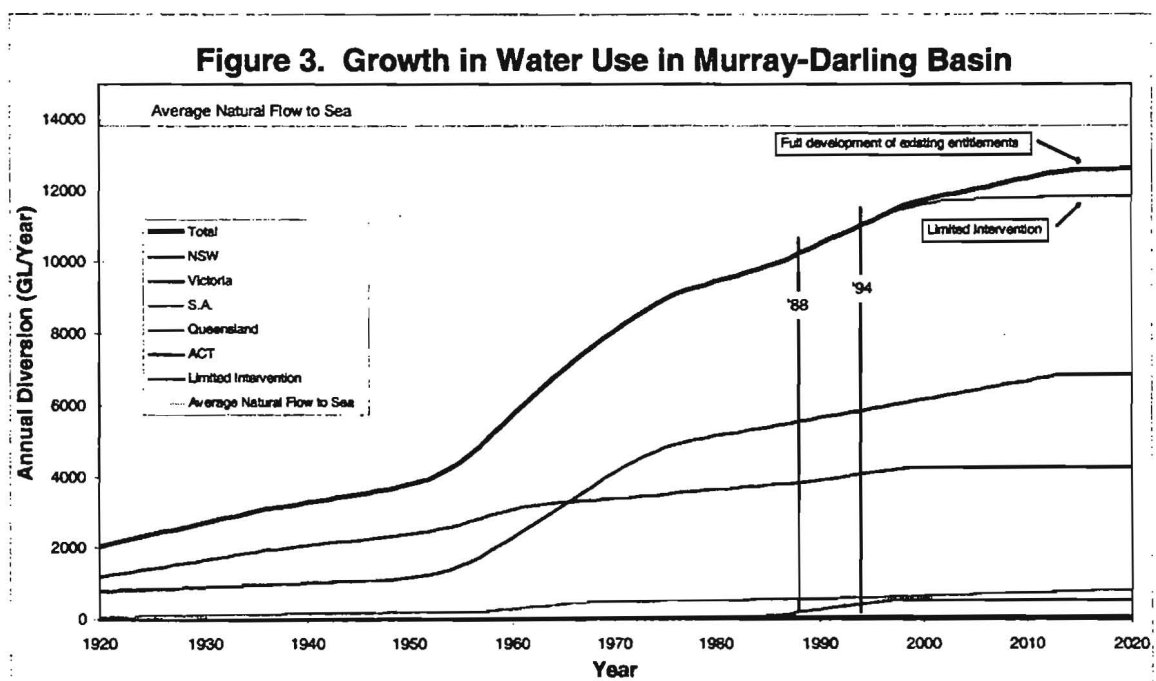
have continued in phase 3. Consistent with the knowledge-based approach to policy development, in 1999 the Murray-Darling Basin Commission carried out a new audit of salinity across the Basin<sup>22</sup> simultaneously with a review of the effectiveness of the strategy<sup>23</sup>.

The findings of the salinity audit included projected increases in land salinisation during the next century from 0.5 million to 3-5 million hectares and a 50 per cent increase in salinity in the lower Murray in the next 50 years that would greatly exceed the gains of the *Salinity and Drainage Strategy*. Salt loads were projected to double in a number of catchments in the Basin over the next half-century, jeopardising water quality for agriculture and human consumption. The economic cost to agricultural productivity and Basin infrastructure was estimated to increase to \$1 billion per annum during the coming 100 years. The audit also predicted significant effects on the Basin's wetlands and biodiversity.

In response, the Ministerial Council signed a *Basin Salinity Management Strategy* in August 2001. Like the 1989 strategy that it replaced, the new strategy includes a target for salinity reduction at Morgan but at an improved level, and in addition, specifies targets for the end of valleys within catchments for each State. Rights and obligations under the new strategy will also be formalised in the *Murray-Darling Basin Agreement* and costs of implementing the strategy shared by the Commonwealth and state governments. The 2001 strategy combines engineering works (such as groundwater interception schemes) for short-term gains with non-engineering actions (eg large-scale revegetation and the introduction of new farming systems) to achieve longer-term outcomes.

***Case Study 2: balancing water use for consumptive vs environmental purposes.*** By the early 1990s members of the Initiative and many in the general community were aware that the level of water diversions from the Basin's rivers for consumptive use was placing increasing stress on the river systems. In 1993, in response to drivers such as the need to halt river degradation and ensure secure water supply for entitlement holders, the Ministerial Council directed the Commission to carry out an audit of water use in the Basin to gain a longer-term perspective of the likely situation.

The 1995 audit report<sup>24</sup> indicated that 80 per cent of the available flow in the Basin's rivers was being diverted for off-stream use, and that if the existing management regime was maintained, average diversion would increase by a further 14.5 per cent if all existing water entitlements were fully developed (see figure 3). The audit also indicated that the current diversion levels were already adversely affecting the health of the river systems, and that projected future diversions would make the management of algal blooms and water salinity more difficult.



With this knowledge, in June 1995 the Ministerial Council imposed an interim cap on diversions from the Basin's rivers to prevent any increase beyond that from the levels of diversion infrastructure at that time. Two years later it put in place a permanent cap (despite considerable public pressure to abolish it), defining the cap as the volume of water that would have been diverted under 1993/94 levels of development. The Ministerial Council was firm in seeing the cap as a necessary move towards establishing management systems aimed to achieve healthy rivers and sustainable consumptive water use in the Basin. The cap did not attempt to reduce diversions from the rivers, only prevent them from increasing. New agricultural developments could occur provided the water for them was obtained through purchase from existing entitlements or by improving water use efficiency.

A review of the cap after its first 5 years of implementation<sup>25</sup> found it had been an essential first step towards achieving a sustainable Basin ecosystem and had significantly reduced the risk of worsening environmental degradation. Economic and social benefits had accrued from ensuring security of water supply within valleys and providing an environment for water trading. The cap had also provided more certainty for long-term investment and development. With the knowledge of these and other benefits, in August 2000 the Ministerial Council confirmed the cap would continue to operate (although it noted there was no certainty that it represented a sustainable level of diversions) and agreed to a range of measures to strengthen its implementation.

Factors that have been critical to the successful implementation of the cap include putting in place an integrated reporting framework for its operation and establishing an Independent Audit Group that reports annually to the Ministerial Council. Formalising the conditions of cap operation and the responsibilities of each State government in a schedule to the *Murray-Darling Basin Agreement*,<sup>26</sup> and Council's concurrent facilitation of interstate water trading arrangements have also been essential.



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**Case Study 3: integrated catchment management.** While moving in 1985 to address immediate priority single issues such as salinity, the Ministerial Council also 'appreciated that the issues transcended the separate...responsibilities of their governments and therefore needed to be approached in an integrated manner'.<sup>27</sup> The Council's ensuing environmental resources study and other reports paved the way for the development of its 1990 *Natural Resources Management Strategy*.<sup>28</sup> This strategy focused on the biophysical resources of the Basin and those actions needed to prevent them degrading further, to restore those already degraded, and to promote sustainable user practices. The strategy was build around the concept of integrated catchment management, which remains at the core of the Initiative today. Other key elements included the notion of managing the Basin as a government-community partnership (given the high level of privately owned land and the mutual obligation to manage the shared resources) and the use of community supported action plans to guide on-ground works designed to tackle local natural resource management issues.

The *Natural Resources Management Strategy* facilitated a decade of planned local and regional activity in the Basin to address resource degradation. Strong community support and participation together with substantial government funding for planning and on-ground works were essential to the achievements. However, towards the end of the decade, limitations to the strategy became increasingly evident. These included its aspirational nature, its reliance on voluntary community efforts, and the use of local action plans not or poorly taking account of Basin priorities and upstream/downstream effects beyond the local area. This led in June 2001 to Council adopting a revised approach in an Integrated Catchment Management (ICM) Policy Statement<sup>29</sup> that builds on the strengths of the 1990 strategy.

The new ICM Policy Statement was signed jointly by members of the Ministerial Council and, for the first time in the Initiative's history, by the chair of Council's Community Advisory Committee. It focuses attention on the human aspects of natural resource management, defining ICM as 'a process through which people can develop a vision, agree on shared values and behaviours, make informed decisions and act together to manage the natural resources of their catchment'. The policy provides the basis for processes to deliver catchment and Basin outcomes in an integrated way. Its key elements include:

- values and principles for all partners (government and non-government) to work together, developed jointly by the Commission and the Community Advisory Committee;
- commitment to develop biophysical targets for the Basin and its component catchments to help protect environmental, social and economic assets to be prioritised jointly by governments and communities;
- increased responsibility at the regional/catchment level for planning and implementing on-ground actions needed to achieve Basin targets;
- greater accountability of government and other natural resource management bodies;
- and
- clear roles and responsibilities for all the Basin's natural resource management partners and commitment to build their capacity to fulfil their roles.

The policy statement has received wide stakeholder support and strongly helped to shape the Commonwealth government's National Action Plan for Salinity and Water Quality announced in late 2000.

The ICM Policy Statement for the Basin is in the early days of its 10-year implementation timetable. To date, Basin targets have been agreed for salinity (in the *Basin Salinity Management Strategy* outlined in case study 1 above), and work is under way to develop targets for water sharing (that will supersede the current cap on diversions), river ecosystem health and terrestrial biodiversity.

For the ICM policy to be implemented successfully, stable institutional structures will need to be maintained at Basin and catchment scales, and regional/catchment management bodies provided with the legal, institutional, planning, management, financial, technical and information skills and capacities they need to operate effectively. Natural resource management planning must be linked with regional planning, and the development of local targets linked with Basin targets. Across the Basin and outside it, communities must be engaged in a way that allows them to be meaningfully involved in decision-making.

### Lessons from the Basin experience

The last century of experience in the Murray-Darling Basin suggests there are five factors critical for achieving sustainable river management. They are:

1. Stable institutional organisation, supported by agreement/treaty;
2. Technical secretariat to support the agreement and stable funding;
3. Decisions based on sound and shared knowledge;
4. Awareness of, and processes to enable, integration across natural resource management issues; and
5. Transparent governance arrangements, including strong community participation.

I believe these factors can be used as criteria for assessing the robustness of river management arrangements for river systems located within a nation or shared between nations. How do current arrangements in the Murray-Darling Basin measure up to these criteria? A summary of current and previous arrangements is shown in table 1.

**Table 1. Assessment of Murray-Darling Basin (MDB) management arrangements**

Criterion for robust river management	MDB Phase 1 (1900-1920)	MDB Phase 2 (1921-1967)	MDB Phase 3 (1968-present)
1. Stable institutional organisation supported by agreement/treaty.	Only towards the end when River Murray Commission established through 1915 <i>River Murray Waters Agreement</i> .	Yes, through 1915 <i>River Murray Waters Agreement</i> and its River Murray Commission.	Yes, through 1915 <i>River Murray Waters Agreement</i> and its River Murray Commission, and their transition to the 1985 <i>Murray-Darling Basin Agreement</i> and the Murray-Darling Basin Initiative
2. Technical secretariat and stable funding	No.	In part, with most of the technical support provided by governments. Funding generally stable.	Yes, with a technical secretariat with adequate skill to meet the primary responsibilities of the

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			Agreement. Funding reasonably stable.
3. Sound knowledge base.	No.	Sound engineering & economic knowledge; poor environmental or social knowledge.	Good engineering, irrigation technology & economic knowledge; greatly improved environmental knowledge but still significant gaps; social knowledge still poor.
4. Integration across natural resource management issues (awareness and processes to enable).	No.	Processes partly available but no awareness of the need.	Strong awareness of the need; processes still in their infancy.
5. Transparent governance arrangements, including strong community participation.	No.	Government processes relatively transparent but no community participation.	Government processes relatively transparent; strong community involvement through Community Advisory Committee; broader stakeholder understanding often poor & effective engagement of them in its infancy.

The table suggests that arrangements in the current management phase are significantly more robust than in earlier phases. However, the significant knowledge gaps and immaturity of many processes leave no grounds for complacency.

The ability to resolve wealth-sharing issues, which go to the heart of self-interest, has been fundamental to achievements in the Basin. The 'tool' for this has been the Murray-Darling Basin Ministerial Council, and before it the River Murray Commission, essentially acting as a 'natural resource banker'. The 'banker' has identified each State's property right to the shared natural resources – water and salinity – and encapsulated these rights in a formal 'treaty' (schedules to the current *Murray-Darling Basin Agreement*). The states have certainty about their rights to access these resources, freedom to determine how to manage their rights, and certainty about the conditions under which they can exercise them. The 'banker' has put in place audit arrangements – continuous accounting for water sharing; the Independent Audit Group for the cap on diversions – to protect the states' interests and that allow each State to measure what resources it and the other governments have taken.

This 'natural resource banking business' has been essential for ensuring the trust and integrity of processes between each of the participating governments that are pre-requisites for cooperative action.

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## **Future challenges in the Murray-Darling Basin**

The current centenary of water management in the Basin has provided the impetus to re-examine current and future challenges and think very critically about the type of Basin we want future generations to inherit. Many of these challenges will be articulated in a centenary book *Unchartered Waters*<sup>30</sup> being prepared for the Commission. Challenges that I see as critical, and some of which I know are not ours alone, are summarised below.

We must continue to improve our knowledge base and how that knowledge is managed and communicated to the wide range of natural resource managers across the Basin and others with a stake in the Basin's resources. Priority topics include:

- establishing realistic targets for catchment health (salinity, biodiversity etc) that will guide community effort and investment;
- the development of farming systems that mimic natural systems in the Basin, to help slow the rise of saline ground water;
- research at catchment and regional scales that integrate environmental, social and economic matters, to provide more confidence that the solutions that are proposed will be effective at their necessary scale of implementation; and
- social research to better understand community needs, fears, aspirations and capacity, to facilitate the structural adjustment needed to bring in new forms of land management and ensure individuals are supported appropriately through this change.

We must also develop better ways to provide communities with the knowledge they need to manage their natural resources profitably in ways that help achieve Basin outcomes, understanding the risks to their enterprises if Basin outcomes are ignored.

Tackling salinity, improving the balance between water for consumptive use and environmental purposes, and setting targets for riverine ecosystem health and terrestrial biodiversity will involve tradeoffs within and between valleys as well as between states. We will need to take account of the social and cultural concerns and aspirations of stakeholders as well as environmental and economic matters. We will need to define property rights for things like groundwater, biodiversity and native vegetation, both for states and individuals as they relate to the broader Australian community and future generations. The Community Advisory Committee already takes an active part in the Ministerial Council's agenda. However it is essential that we better engage the broader communities living in the Basin and/or reliant on its resources, help them understand options and likely outcomes, and allow them to help shape as well as implement solutions. Giving the community this role, let alone putting in place the processes to achieve it, will be a major task as it is contrary to most government methods of operation and challenges existing authorities and relationships.

A partnership of the National Farmers Federation and the Australian Conservation Foundation, both national lobby groups, recently estimated the cost of degradation in Australia's rural landscapes as at least \$2 billion annually.<sup>31</sup> They put a case for capital investment of \$60 billion per annum for a decade to repair this damage plus \$0.5 billion annually for maintenance. Around the same time, the Commonwealth committed \$700 million over seven years from 2001 to address salinity and water quality problems in priority catchments across the nation.<sup>32</sup> While this investment has the potential to make a big difference, sustained progress will not be likely until integrated catchment management becomes a mainstream activity. Despite the commitment of the Initiative's six governments to ICM in the Basin, culturally, most Australians do not think of ICM in the same way as roads, health, education, welfare, defence or even sport, and neither expect nor demand

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similar funding arrangements. We must continue work to achieve the cultural shift required for us to move beyond reliance on grants and voluntary labour, and further evolve institutional arrangements to manage change for long-term outcomes.

In the short- and long-term, perhaps the most critical need and challenge is to maintain the political commitment of the partner governments. We are now moving beyond win-win outcomes for all the states to a situation where achieving Basin outcomes must take precedence over more narrowly focussed State or regional outcomes. This requires political commitment beyond self-interest, whether that interest is defined in political boundaries or election timeframes, and requires ongoing, strong bipartisan support and leadership.

### **Conclusion**

The management issues described in this paper are not unique to the Murray-Darling Basin – they are shared with many other watersheds, governments and communities across the world. While the context for river management varies from continent to continent and from nation to nation, in human and environmental terms nations cannot afford to manage their river basins unsustainably.

The five factors I identified from the Murray-Darling experience as essential for achieving sustainable river management provide robust criteria for assessing any river basin authority. These criteria can be used to help determine how management authorities 'are travelling' and what is needed to improve their arrangements.

Institutional arrangements for the Murray-Darling Basin have changed significantly over the last century, from a river authority to a Basin authority. The main drivers for this change have included biophysical factors such as drought and environmental degradation, cultural factors such as the need for economic development and social stability, public opinion and community desire to help shape policy, and political factors such as the need to share wealth and government reform programs. Some of these drivers are universal and provide windows of opportunity for change.

An assessment of current arrangements in the Basin against the five criteria for sustainable river management suggests that institutional arrangements in the Basin are robust, although improvements are still needed especially in our knowledge and many processes. Integrated catchment management and community involvement are critical elements of the current arrangements, as is the stability between the partner governments built around sharing sovereignty and wealth. The trust maintained since 1915 through the operation of the 'natural resource banking business' gives me confidence that we will continue to maintain this stability, thus enabling governments to continue to address the issues cooperatively and with vision and leadership.

End Notes<sup>b</sup>

- <sup>1</sup> World Commission on Dams 2000, *Dams and development: a new framework for decision-making*, The report of the World Commission on Dams, p. 15.
- <sup>2</sup> World Commission on Dams 2000, *Dams and development: a new framework for decision-making*, The report of the World Commission on Dams, p. 16.
- <sup>3</sup> Crabb P 1997, *Murray-Darling Basin Resources*, Murray-Darling Basin Commission, Canberra.
- <sup>4</sup> MDBC 1993, *Managing Australia's Heartland*, Murray-Darling Basin Commission, Canberra
- <sup>5</sup> Close AF 1995, 'Water sharing within the Murray-Darling Basin', in *Proceedings of the Third Princess Chulabhorn Science Congress - Water and development: water is life*, Dec. 11-15, 1995, Bangkok, Thailand.
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<sup>b</sup> MDBC = Murray-Darling Basin Commission; MDBMC = Murray-Darling Basin Ministerial Council

**D J BLACKMORE**

**Chief Executive  
Murray-Darling Basin Commission**

**Don Blackmore has been Chief Executive of the Murray-Darling Basin Commission since 1990. Prior to that he was Deputy Chief Executive for six years and worked for 15 years as a Civil Engineer with the Rural Water Commission in Victoria.**

**He was also Deputy Chair of the Land and Water Resources Research and Development Corporation – a position that he held from 1990 to June 1999.**

**He has been a Commissioner on the World Commission on Dams who had a mandate to review the development effectiveness of large dams and criteria for the future investment in dams.**

**He became a Fellow of the Institute of Engineers Australia in 1995 and a Fellow of the Academy of Engineering and Technological Sciences in November 1998.**

**In May 2000 he was awarded the degree of Doctor of Science (honoris causa) by La Trobe University.**

**He has recently been appointed Deputy Chair of the CRC for Plant Based Solutions to Dryland Salinity and Chairman of their Research Committee.**

**August 2001**

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