Inquiry into future water supplies for Australia's rural industries and communities.
Submission by the Murray–Darling Basin Commission,
March 2003.

This submission relates to water issues in the Murray–Darling Basin in south-eastern Australia. The Basin covers 1.06 million square kilometres, or 14% of Australia. It has a population of 2 million, with another 1 million outside it in South Australia dependent on its water resources. The Basin's 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. It also contains significant wetlands, ten of which have been recognised internationally through Ramsar listing.

1. Basin institutional arrangements

The *Murray–Darling Basin Agreement* provides the inter-governmental framework for the governments of the Commonwealth, Queensland, New South Wales, the Australian Capital Territory, Victoria and South Australia to co-operatively develop and implement policies for the management of the Basin's water and other natural resources. The purpose of the Agreement is '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 Agreement is backed by a Murray–Darling Basin law in each jurisdiction.

The Agreement establishes a Ministerial Council, Commission and Community Advisory Committee as the political, bureaucratic and community 'arms' of the Basin's institutional arrangements. The various elements of this institutional package are called the Murray-Darling Basin Initiative. The roles and details of current membership of the Council, Commission and Community Advisory Committee are shown in the MDBC Annual Report 2001–2002 (see Attachment 1). The Agreement requires that all Council and Commission decisions are reached by consensus.

2. Basin water resources

Much of the Basin is located in semi-arid regions, and it has a highly variable rainfall pattern. River flow, as measured by the ratio of maximum to minimum annual flow, is also highly variable (15.5 for the Murray and 4,705 for the Darling). Annual run-off from the Basin is 24,300 gigalitres*, just 6% of Australia's total run-off each year. In its 'natural' state, about 50% of average total runoff would reach the sea through the Murray mouth.

The River Murray system is highly regulated through the presence of dams, locks and weirs whose construction spanned the period from 1919 to 1980. The four major storages (Hume and Dartmouth reservoirs, Lake Victoria and Menindee Lakes) have a total capacity of 9,910 gigalitres. River regulation facilitated agricultural development in the Basin by providing a more reliable source of water (see Attachment 2). In 1920 the level of diversion of water for consumptive use was about 1,200 gigalitres a year. Water extractions tripled in the 50 years to 1994, and average annual diversions now total 11,431 gigalitres, of which irrigation accounts for 96%. As a result of diversions, median annual flow to the sea is only 27% of natural, pre-development flow. Almost half of the Basin's surface water management areas have been developed beyond 100% (NLWRA 2002).

* A gigalitre equals 1000 megalitres or one billion litres.

River regulation and the high levels of water diversion for consumptive uses have had significant adverse impacts on the riverine ecosystems. Agricultural practices within the Basin and irrigation along the Murray have also created problems with water quality, particularly salinity. The Ministerial Council has responded to these natural resource management issues by adopting an overall integrated catchment management approach (see Attachment 3) and by developing and implementing initiatives aimed at reducing the effects and causes of the problems, and increasing the efficiency of water use. Key responses and current issues are outlined in section 3.

3. Managing water scarcity and balancing water use

3.1 The cap on water diversions

In 1993 the Ministerial Council directed the Commission to carry out an audit of water use in the Basin. The audit report (MDBMC 1995) indicated that 80% 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 diversions would increase by a further 14.5% if all existing water entitlements were fully developed. 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.

In response, in June 1995 the Council imposed an interim cap on diversions from the Basin's rivers to prevent any further increase in average diversions. 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, on average, under 1993/94 levels of development (see Attachment 4). 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. The cap was intended to help the establishment of management systems aimed to achieve healthy rivers and sustainable consumptive water use in the Basin. It also prevented further reduction of the reliability of water allocations within the three down-stream States (see also Attachment 2).

Implementation of the cap was reviewed after its first 5 years (see Attachment 5). The review found the cap 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. In August 2000 the Ministerial Council confirmed the cap would continue to operate and agreed to a range of measures to strengthen its implementation.

The main issue in implementing the cap is:

- the lack of certainty about whether the current cap represents a sustainable level of water diversions in the Basin. This is being addressed through the Living Murray initiative (see section 3.5).

3.2 Basin salinity management

Salinity problems in irrigation areas along the Murray River became increasingly evident in the 1960s and 1970s. Studies in the 1980s highlighted the need for a joint, Basin-wide

approach to manage the problem, and led to the adoption in 1989 of the *Salinity and Drainage Strategy* (MDBMC 1989). 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. The strategy included a measurable target for salinity reduction (80 EC[†] at Morgan, the benchmark location just upstream of Adelaide's water take-off), and specified the level of tradeable salt credits available to each State (15 EC) and cost-sharing arrangements. These rights and obligations and the rules for implementing the strategy were formalised in Schedule C to the *Murray-Darling Basin Agreement*.

A review in 1999 of the first decade of implementing the strategy (see Attachment 6) showed it had resulted in a net reduction in river salinity at Morgan of 57.3 EC. 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% lower. Implementation of the strategy 'bought' the Ministerial Council an estimated 30 years of time to tackle the insidious threat of dryland salinity.

In 1999 the Commission also carried out a new audit of salinity across the Basin (see Attachment 7). The findings included projected increases in land salinisation during the next century from 0.5 million to 3–5 million hectares and a 50% 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 (see Attachment 8). 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 have also been formalised in the *Murray-Darling Basin Agreement* Schedule C and costs of implementing the Strategy again 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.

Key issues in salinity management include:

- the long time frame (decades) for measures such as re-vegetation and new farming systems to start reversing the causes of dryland salinity
- the need for stable funding to support expensive engineering works (e.g. for salt interception) necessary to mitigate the effects of salinity and protect agricultural,

[†] EC (electrical conductivity) units provide a commonly used, approximate indication of the concentration of dissolved salt in water. The World Health Organization states that concentrations below 800 EC are desirable for drinking water. Seawater is in the range 40–50 000 EC.

environmental and social assets
- the need for a stable long-term policy and institutional environment to strategically implement and monitor the effectiveness of engineering and non-engineering works
- managing the short-term effects of broad-scale re-vegetation on water quantity.

3.3 Water trading

Water trade is a key mechanism to help ensure that water is used more efficiently, especially for irrigation. Water markets allow the irrigation industry to make better and more flexible use of limited water resources and provide the opportunity for new investment in high value-added agriculture. Trade helps individual irrigators to adjust to changing circumstances and to manage risk. With a well-developed market framework, trade will stimulate movement of water to higher value, more sustainable use. In addition, trade can provide opportunity for movement of water to enhance consumptive and environmental uses under conditions of very high seasonal and inter-annual variability, as are common in the Basin. For all these reasons, water trade was a key element of the COAG water reforms announced in 1994.

Three pre-conditions essential for water trading—allocation systems where water entitlements are clearly specified; an administrative system that can advise on physical aspects of water transfer; and arrangements to monitor the environmental effects of water trade—all exist in the Murray–Darling Basin (see Attachment 9). Although temporary water trade within States has occurred in the Basin since the mid 1980s, it increased dramatically around 1994/95 (see figure 3 in Attachment 9). Permanent intra-state trade increased only moderately over the same period.

In 1998 the Ministerial Council commenced a pilot project to introduce permanent inter-state trade for high security entitlement water from the River Murray between irrigators in southern New South Wales, north-western Victoria and South Australia. Key provisions for the inter-state trade were formalised in Schedule E of the *Murray–Darling Basin Agreement*, and the Commission has been responsible for recording all water exchanges under the pilot.

The pilot was reviewed after two years of operation (Young *et al.* 2000). The review showed that 9.5 gigalitres of water collectively worth $9.9 million had been moved across borders, with most water moving downstream to South Australia. This represented a relatively small proportion of all water traded during the period. The reviewers concluded that inter-state water trading had increased the value and economic efficiency of water use in the Basin without causing any measurable adverse social effects in the districts that had sold water inter-state, and also had significant positive social implications for the districts that acquired the water. The environmental effects of the inter-state water trade could not be assessed because of the small water volumes involved, but were thought to have been positive. The review included recommendations about how to improve the effectiveness of inter-state water trade, including the establishment of a system to define long-term obligations to the environment, improving enforcement mechanisms, and streamlining and harmonising the three jurisdictions' administrative systems in the long-term.

Key issues for expanding water trade across the Basin, which the Commission is currently addressing, include:
- putting in place effective, comparable salinity controls
- working to overcome bans by irrigator co-operatives on water being traded out of their region
- working to harmonise water access rights across the water trading zone

- establishing exchange rates to enable water of different reliabilities to be traded

3.4 On-farm water use

Given the cap on diversions and the high level of water use by irrigators in the Basin, there is a priority need for irrigators to use their water as efficiently as possible. To help facilitate this, the Commission has invested considerable funds to understand the current variability in water use efficiency in various irrigation sectors, identify target areas for improvement, and establish and promote best management practices. An outline of current projects is provided in Attachment 10.

The dairy industry in the Basin, like many other irrigation industries, is one in which there is considerable variation in water use efficiency. For example in northern Victoria and southern New South Wales, the top 10% of dairy farms produce almost three times as much as the lowest 10%. Many farms have the potential to substantially improve their water use efficiency to the level of the top 10%. (See Attachment 11)

The Watermark project (see Attachment 12) aims to develop an integrated package of measures to provide catchment managers with reliable information and decision support tools to establish irrigation water priorities, targets and response plans. It will also develop policy options to underpin improvements to land use planning, groundwater management, water use efficiency and biodiversity. While work is still in progress, a draft framework for an integrated management information and reporting system for irrigation in the Basin has been prepared (see Attachment 13), and a range of technical possibilities and supporting policies for improving water use efficiency identified (see Attachment 14 and Attachment 15).

The Commission considers that benchmarking of irrigation practices, such as has been carried out by the Australian National Committee on Irrigation and Drainage (ANCID) (see example at Attachment 16) is also an important mechanism for promoting change from within the industry itself.

Key issues for improving on-farm water use efficiency include:

- the need for an integrated package of policies, decision support tools and other measures, that are developed in consultation with irrigation stakeholders, which link on-farm practices with regional/catchment plans and priorities
- promotion of technological improvements in irrigation infrastructure on and off farm
- the need for information systems that support a structured, consistent approach to collecting data about the irrigation industry across the Basin that allows measurable benchmarks to be set, characteristics of and trends in the industry to be monitored, and progress in implementing management plans to be assessed.

3.5 Environmental flows

A recent 'snapshot' of the condition of rivers in the Basin provided 'a clear, unequivocal indication that the current general state of the ecological health of rivers … is less than what is required for ecological sustainability' (see Attachment 17). The need to improve environmental flows in the Basin's rivers is acknowledged by a wide range of stakeholders, although there is pessimism about whether governments have the political will to resolve the issues (see Nancarrow & Syme 2001).

In April 2001 the Ministerial Council committed $150 million over seven years for structural and operational measures to improve floodplain health, fish management and management of

the Coorong, Murray Mouth and Lower Lakes (see Fact Sheet FSLM005.101 in Attachment 18). The following year the Council launched its Living Murray initiative (see Attachment 18) which aims to improve environmental flows in the River Murray and achieve a better balance in water uses. Activities include major studies on the environmental, social and economic impacts of various environmental flow scenarios for the River Murray, development of policy options for recovery of water for the environment and an extensive public education and consultation exercise. Possible mechanisms for water recovery range from redevelopment of water supply systems or on-farm irrigation infrastructure to market-based water recovery to compulsory acquisition.

A discussion document was released in July 2002 to make the Basin community and other stakeholders aware of the issues (included in Attachment 18). It included three 'reference points' to help highlight the costs and benefits of transferring various amounts of water from current uses to the river environment. The Council is set to decide in October this year how much water should be retained in the river for environmental purposes and how to achieve the agreed levels.

Key issues for restoring environmental flows to the River Murray include:

- determining and gaining acceptance for the best option/s for recovering water to enhance environmental flows
- clarifying water access rights in the Basin and developing a water rights access system that provides certainty about the nature of the rights and provisions for adjustment if the rights are changed
- understanding the possible long-term effects of climate change and revegetation initiatives on environmental flows.

4. Conclusion

The Murray–Darling Basin Initiative has been successful in putting in place policies and strategies that have had demonstrable benefits in improving water security, slowing down environmental degradation, mitigating the adverse impacts of salinity and improving water use efficiency. The most critical challenge now is to improve environmental management of the Basin's rivers, in order to prevent further degradation and hopefully to improve the health of the river system on which Basin agricultural sectors and communities within and outside the Basin are dependent. A healthier river system and continued agricultural growth can only be achieved by substantially improving the efficiency of water use. While water trading is possibly the most powerful single tool to promote water use efficiency, other gains can be made through policy, planning, technological and information improvements within the irrigation industry. Significant impediments to progress currently include uncertainty about water access rights. Key areas of research needed include the management of water infrastructure, environmental water management, the environmental, social and economic costs and benefits of options to restore environmental flows, and the effects of climate variability (including climate change) on the Basin's water resources.

5. References

MDBMC (1989). *Salinity and Drainage Strategy*, Murray-Darling Basin Commission, Canberra.

MDBMC (1995). *An audit of water use in the Murray-Darling Basin*, Murray-Darling Basin Commission, Canberra.

Nancarrow, B. & Syme, G. (2001). *River Murray environment flows and water quality project, stakeholder profiling study*. Australian Research Centre for Water in Society & CSIRO Land and Water, Canberra.

NLWRA (2002). *Australian catchment, river and estuary assessment 2002*. National Land and Water Resources Audit, Canberra, vol. 2, pp. 224–33.

Young, M., McDonald, D.H., Stringer, R. & Bjornlund, H. (2000). *Inter-state water trading: a two year review*. CSIRO Land and Water, Canberra. <http://www.mdbc.gov.au/naturalresources/policies_strategies/projectscreens/ pdf/watertrade_2yr.pdf>.

6. List of Attachments

1. MDBC Annual Report 2000–2001.
2. River Murray Irrigators: what affects the reliability of your water allocations? Murray–Darling Basin Commission brochure, 1999.
3. Integrated catchment management in the Murray–Darling Basin 2001–2010, delivering a sustainable future. Murray–Darling Basin Ministerial Council, June 2001.
4. The Cap. Murray–Darling Basin Commission brochure, 1998.
5. Review of the operation of the cap: overview report of the Murray–Darling Basin Commission, including the four companion papers. Murray–Darling Basin Ministerial Council, August 2000.
6. Salinity and Drainage Strategy Ten years on, 1999. Murray–Darling Basin Commission, 1999.
7. The Salinity Audit of the Murray–Darling Basin, a 100-year perspective, 1999. Murray–Darling Basin Ministerial Council, 1999.
8. Basin Salinity Management Strategy 2001–2015. Murray–Darling Basin Ministerial Council, August 2001.
9. Water trading in the Murray–Darling Basin, a critical tool for sustainable water use. Unpublished paper by D. Blackmore, Murray–Darling Basin Commission, 2003.
10. MDBC Irrigation Forum 2002 (a summary of 21 projects).
11. A survey of water-use efficiency on irrigated dairy farms in northern Victoria and southern new South Wales, by D.Armstrong, J.Knee, P.Doyle, K.Pritchard and O.Gyles, October 1998.
12. WaterMARK: irrigation within integrated catchment management, Murray–Darling Basin Commission, 2002. (Folder of fact sheets)
13. The development of a management information and reporting system for irrigation in the Murray–Darling Basin – Stage One final report. Draft framework for an IMIRS, volume 1. Murray–Darling Basin Commission, National land and Water Resources Audit and Sinclair Knight Mertz, 2002.
14. The potential for improving water use efficiency: a scoping study of opportunities for change and possible policy approaches for the Murray–Darling Basin, by N.Beynon, O.Kingma and D.White, CapitalAg and Murray–Darling Basin Commission, September 2002.
15. Policy frameworks for water use efficiency in the Murray–Darling Basin: principles,

concepts, approaches and tools for the development of a preliminary policy framework, by O.Kingma and N.Benyon, CapitalAg, Canberra, February 2003.

16. 1998/99 Australian irrigation water provider benchmarking report, by ANCID, February 2000.
17. Snapshot of the Murray–Darling Basin river condition. Report to the Murray–Darling Basin Commission, September 2001.
18. The Living Murray: a discussion paper on restoring the health of the River Murray, July 2002, Murray–Darling Basin Commission, see also Living Murray Fact Sheets (FSLM001.101 – FSLM013.101), Murray–Darling Basin Commission, 2003, available from the Commission's web site www.mdbc.gov.au

ADDITIONAL INFORMATION HELD BY THE SECRETARIAT

Attachments to Submission No. 144 - Murray-Darling Basin Commission

1. MDBC Annual Report 2000–2001.
2. River Murray Irrigators: what affects the reliability of your water allocations? Murray–Darling Basin Commission brochure, 1999.
3. Integrated catchment management in the Murray–Darling Basin 2001–2010, delivering a sustainable future. Murray–Darling Basin Ministerial Council, June 2001.
4. The Cap. Murray–Darling Basin Commission brochure, 1998.
5. Review of the operation of the cap: overview report of the Murray–Darling Basin Commission, including the four companion papers. Murray–Darling Basin Ministerial Council, August 2000.
6. Salinity and Drainage Strategy Ten years on, 1999. Murray–Darling Basin Commission, 1999.
7. The Salinity Audit of the Murray–Darling Basin, a 100-year perspective, 1999. Murray–Darling Basin Ministerial Council, 1999.
8. Basin Salinity Management Strategy 2001–2015. Murray–Darling Basin Ministerial Council, August 2001.
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18. The Living Murray: a discussion paper on restoring the health of the River Murray, July 2002, Murray–Darling Basin Commission, see also Living Murray Fact Sheets (FSLM001.101 – FSLM013.101), Murray–Darling Basin Commission, 2003, available from the Commission's web site www.mdbc.gov.au