Stage 1:
Informing and engaging the community
The Living Murray
A discussion paper on restoring the health of the River Murray

Stage 1: Informing and engaging the community

July 2002

www.thelivingmurray.mdbc.gov.au
Community Engagement
Environmental Flows and Water Quality Objectives for the River Murray
Opportunities for community input

<table>
<thead>
<tr>
<th>STAGE</th>
<th>STEPS</th>
</tr>
</thead>
</table>
| Stage 1: Inform & Engage | - inform community of the work and knowledge that has led to the recognition of the need for the Australian community to consider what it wants for the future of the River Murray;  
- inform Murray-Darling Basin Commission of the community’s knowledge, values, aspirations, issues, information needs and concerns;  
- provide progress report on community engagement to Ministerial Council meeting in November 2002 and set a framework for further discussions and investigations. |
| Stage 2: Propose | Community and government agencies will work together to:  
- provide a comprehensive analysis for the provision of water to the River Murray using three reference points (350 GL, 750 GL and 1 500 GL a year);  
- evaluate the benefits and impacts of the three reference points;  
- seek views on a preferred way forward to address local and system-wide issues;  
- establish what’s needed to manage and keep track of the social, cultural, economic and environmental impacts of any decision;  
- inform the Ministerial Council meeting of October 2003. |
| Stage 3: Implement | - negotiate details of and timeframes for the implementation of Council decisions. |

2002
July  
August  
September  
October  
November  
December
January  
February  
March  

2003
April  
May  
June  
July  
August  
September

2003 October Ministerial Council Meeting  
- will consider the outcomes of the engagement process and the recommendations brought before it by the Murray-Darling Basin Commission.

November 2003–Onwards

Contacts
Website: www.thelivingmurray.mdbc.gov.au  
Email: icep@mdbc.gov.au  
Phone: 1800 687 044  
Facsimile: 02 6248 8053  
Mail Address: The Living Murray, GPO Box 409, Canberra ACT 2601
The health of the River Murray is vital to Australians for many reasons—our prosperity, our environment, our communities, and our future depend on it. Although much has been achieved for the River, and its environment, our scientific advice is now clear we have to do more to ensure a healthy River Murray in the long term. This is of particular importance to our valuable irrigation industries.

The Murray-Darling Basin Ministerial Council wishes the community to be fully engaged in an issue so significant to its values and future—one which warrants clear understanding, extensive discussion and debate, followed by sound decisions.

This paper provides an introduction to the issue of environmental flows in the River Murray. It explores the health of the River, and ways we might improve it. It identifies possible consequences, benefits and concerns and is intended to guide the discussion of relevant issues, including water trade and access rights to water.

The process for community engagement is outlined on the page opposite and in more detail throughout this document. It will be guided by principles about treating people and communities equitably and providing for diverse values and perspectives to be heard and considered. The Ministerial Council has established the Independent Community Engagement Panel (ICEP) to facilitate this process.

The document commences Stage 1 of a three stage process. Stage 1 is about informing and engaging the communities. We recognise this document will not meet the information needs of all sectors of the community and that further information will be necessary. Some of the more detailed information is available from www.thelivingmurray.mdbc.gov.au

Every person or group concerned about the health of the River Murray, its industries and communities is encouraged to contribute to this important debate.

Dr Roy Green
President
Murray-Darling Basin Commission
<table>
<thead>
<tr>
<th>CHAPTER 8. OUR BALANCING ACT</th>
<th>33</th>
</tr>
</thead>
<tbody>
<tr>
<td>STRIKING THE RIGHT BALANCE</td>
<td>33</td>
</tr>
<tr>
<td>Irrigated agriculture</td>
<td>33</td>
</tr>
<tr>
<td>Drinking water</td>
<td>33</td>
</tr>
<tr>
<td>Manufacturing industry</td>
<td>34</td>
</tr>
<tr>
<td>Tourism and recreation</td>
<td>34</td>
</tr>
<tr>
<td>Different parts of the river</td>
<td>34</td>
</tr>
<tr>
<td>The river and its tributaries</td>
<td>35</td>
</tr>
<tr>
<td>Trade-off between states</td>
<td>35</td>
</tr>
<tr>
<td>Sovereignty of the states</td>
<td>35</td>
</tr>
<tr>
<td>HOW SHOULD WATER BE RECOVERED?</td>
<td>35</td>
</tr>
<tr>
<td>THE CAP, ACCESS RIGHTS TO WATER AND WATER TRADE</td>
<td>36</td>
</tr>
<tr>
<td>The Cap</td>
<td>36</td>
</tr>
<tr>
<td>Access rights and water trade</td>
<td>36</td>
</tr>
<tr>
<td>THE IMPACT OF WATER RECOVERY</td>
<td>37</td>
</tr>
<tr>
<td>The cost of doing nothing</td>
<td>37</td>
</tr>
<tr>
<td>Costs and benefits</td>
<td>37</td>
</tr>
<tr>
<td>Who will pay?</td>
<td>38</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHAPTER 9. MAKING IT WORK</th>
<th>39</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONE BASIN, ONE RIVER SYSTEM, ONE ENVIRONMENT</td>
<td>39</td>
</tr>
<tr>
<td>LIFTING OUR GAME</td>
<td>39</td>
</tr>
<tr>
<td>IDENTIFYING ENVIRONMENTAL WATER</td>
<td>39</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHAPTER 10. NEW HORIZONS AND OPPORTUNITIES</th>
<th>41</th>
</tr>
</thead>
<tbody>
<tr>
<td>KNOWLEDGE EXPORTS</td>
<td>41</td>
</tr>
<tr>
<td>NEW INDUSTRIES</td>
<td>41</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHAPTER 11. OVER TO YOU</th>
<th>43</th>
</tr>
</thead>
<tbody>
<tr>
<td>THE DECISIONS</td>
<td>43</td>
</tr>
<tr>
<td>How will a decision be made?</td>
<td>43</td>
</tr>
<tr>
<td>Stage 1: Inform and engage—July to December 2002</td>
<td>44</td>
</tr>
<tr>
<td>Stage 2: Propose—April to October 2003</td>
<td>44</td>
</tr>
<tr>
<td>Stage 3: Implement—after October 2003</td>
<td>44</td>
</tr>
<tr>
<td>WHO IS INVOLVED?</td>
<td>46</td>
</tr>
<tr>
<td>HOW CAN I BE INVOLVED?</td>
<td>46</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONTACTS</th>
<th>46</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLOSSARY</td>
<td>47</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>49</td>
</tr>
<tr>
<td>THE LIVING MURRAY FEEDBACK FORM</td>
<td>51</td>
</tr>
</tbody>
</table>
Chapter 1. The Living Murray

About your future

This is a discussion paper about environmental flows for the River Murray. It’s about protecting the things the River Murray means to Australians: prosperity, irrigation, industry and clean water, natural landscape, history, culture and tradition. The future of the River Murray has relevance to the whole Murray-Darling Basin. In addressing the environmental needs of the River Murray, the tributaries will have to play their part in providing adequate flows. This will involve the Murrumbidgee and Goulburn Rivers and, although the contribution to the River Murray is smaller, the Darling River above Menindee Lakes. There will be environmental benefits achieved for the tributaries as well as the River Murray through this process.

A river at risk

There is evidence the River Murray is in trouble. Poor water quality, loss of native plants, animals, fish, forests and wetlands, and an increase in pests such as carp, all point to a river and a landscape in decline. Scientific advice indicates that if we do nothing, the river’s health will inevitably get worse. This will affect our irrigation and other industries, our native plants and animals, and our communities.

One of the main causes of decline is the large amount of water we take from the rivers for irrigation and other uses. Governments and the Australian public have actively supported irrigation for over 100 years, and it has generated great prosperity for the nation and our communities. Tourism has prospered along the river, partly because of its controlled water supply and flow. Continued enjoyment of these benefits depends on maintaining the river’s health.

Despite signs the River Murray is in poor health, there are prospects for recovery. Compared with the state of many of the world’s great rivers, we still have the opportunity to restore its health and vitality. Environmental flows are one way we can do this.

An ‘environmental flow’ is any river flow pattern provided with the intention of maintaining or improving river health. Environmental flows include:

- making best use of water currently available to the environment;
- saving water lost in channels and other distribution systems and redirecting it to the environment; and
- reducing the amount of water removed from the river for human use.

Some major issues of river health—like salinity, turbidity and decline in native fish—are due to other factors besides altered flow patterns in the river. These issues will continue to be dealt with under the Ministerial Council’s Integrated Catchment Management Policy and other initiatives like the National Action Plan for Salinity and Water Quality (NAPSWQ).

The Murray-Darling Basin at a glance

- covers 1.06 million square kilometres (14% of Australia)
- annual run-off of 24 300 GL a year (which is 6% of total Australian run-off)
- average diversions: 11 431 GL plus water supply for Adelaide and some other South Australian towns
- median annual flow to sea: 27% of natural (pre-development) flow
- population: 2 million
- annual economic output: $23 billion a year
- agricultural output: $10 billion a year
A healthy working river

Our goal is to create a healthy working river—one that assures us of continued prosperity, clean water and a flourishing environment. However balancing the different and often conflicting social, economic and environmental values is difficult. There needs to be discussion about the best ways to use the river's waters and the balances that must be struck between different values.

Our understanding of how to achieve a healthy working river, both scientifically and socially, is still growing and needs more work. However we cannot afford to wait until the river declines to the point where recovery will be very difficult or even impossible. Corrective action can be taken now, with existing knowledge, and improved as we come up with better solutions.

One Basin, one river system, one environment

To achieve a healthy working river we need to recognise we are dealing with one Basin, one river system, one environment.

The health of the River Murray relies in part on having healthy tributaries. Individual states and regions are making good progress in protecting their rivers and catchments. However there is now scientific evidence that work for individual tributaries will not be sufficient to protect the River Murray, its water quality or native plants and animals.

Discussing our future

The Murray-Darling Basin Ministerial Council (the Ministerial Council) consists of the Ministers responsible for land, water and environmental resources in each of the Commonwealth, New South Wales, South Australian, Victorian, Queensland and ACT Governments. The Ministerial Council has the power to make decisions for the Basin as a whole.

In March 2001, the Ministerial Council agreed to a vision and set of objectives for the River Murray. The vision is:... a healthy River Murray System, sustaining communities and preserving unique values.

The Ministerial Council is now asking the community to discuss the best ways to achieve this vision. In April 2002 it:

• agreed to hold a community-wide consultation process about environmental flows, beginning in July 2002;
• directed that a comprehensive study be done on the costs and benefits to the environment and the community of returning water to the environment;
• recognised a need to spend $150 million on modifying dams, weirs and locks and other measures, to make best use of all the water currently available to the environment; and
• recognised the importance of establishing water trading arrangements for the efficient allocation of the scarce water resources of the Basin and that the effectiveness of these arrangements will depend on clear definition of access rights to water.

The Ministerial Council recognises both the complexity of the environmental flows issue and the need for certainty in the communities relying on irrigated agriculture. Its strong desire is to manage the resources of the River Murray and its tributaries to improve its environment, while enhancing the social and economic benefits obtained from water use.

How much water?

To aid the discussion on how much water should be recovered, the Ministerial Council has picked three reference points. These are not actual options but are intended to give all sectors of the community an idea of the costs and benefits involved in transferring various annual volumes of water from current uses (such as irrigation or water...
losses) to the environment of the River Murray. No decision has yet been made on whether water will be recovered nor how much.

The reference points are:

- 350 GL a year (or 350 000 ML a year);
- 750 GL a year; and
- 1 500 GL a year.

Volumes of water

- a ‘GL’ or ‘gigalitre’ is a measure of volume; one gigalitre is shorthand for one billion litres.
- a ‘ML’ or ‘megalitre’ is one million litres or about the amount of water in one Olympic-sized swimming pool.
- the middle reference point of 750 GL is about one quarter of the capacity of the Hume Dam, or one-and-a-half Sydney Harbours.

More work is being done to define the costs and benefits associated with the return of each of these volumes of water to the River Murray. A second document will be published in 2003, which will clearly set out these costs and benefits so that the balances can be more easily weighed up.

There are those who believe it is essential to return water now, even though our knowledge is imperfect, before it is too late. At the same time we must recognise that irrigators and regional communities’ current and future livelihoods will be directly affected by reduced water availability. The people who live in and farm in the Basin have huge financial and social investments in existing arrangements.

Any changes to existing arrangements need to be considered as part of an open, transparent, accountable and fair decision-making process.

There will be opportunities for all stakeholders, including irrigators, townspeople, governments and scientists, to be involved in the debate.

In October 2003, the Ministerial Council will consider the outcomes of this process.

Vital issues

For many, the question of recovery of water for environmental flows centres on the security of access to water and the availability of compensation.

Each state and territory of the Murray-Darling Basin has laws providing access rights to water, and allowing access rights to be altered.

The laws in each state differ from one another, and some laws provide for compensation to be paid under certain circumstances where access rights might be altered.

This discussion touches on other difficult and sensitive questions:

- What might be the impact on current uses such as irrigation, of recovering water for the environment?
- What does the health of the River Murray really mean for our industries, our drinking water, our environment and us?
- How should environmental water be managed to achieve the optimal environmental, social and economic outcomes?
- How much water needs to be saved? Where would it come from? How should it be used? What would it cost? Who should pay for it?
- How do we minimise the chance that any region or group—such as broadacre irrigation—might be disadvantaged or dealt with unfairly?
- How could we share the benefits and costs, which are likely to be high, fairly among all Australians?
- Should water given up for the environment be kept for the environment until it reaches the Murray Mouth, or should irrigators be able to use it after it has performed an environmental function?

These issues raise further questions:

- Should water for the environment be just taken back or acquired through compensation?
- Should water for the environment be acquired compulsorily or voluntarily?
- What are people’s access rights to water? How secure are they? How will they be affected?

We are dealing with one Basin, one river system, one environment.
The community’s advice and views are being sought.

- How can water trading help? How could we run a more efficient water market?
- Should the water be purchased by government on an open market?
- How do we achieve more efficient irrigation practices and how do we share the water savings?
- How effective will environmental flows be in restoring the health of specific environments along the River Murray?

How you can take part

The Ministerial Council is asking for the advice of the community about how governments should respond to the issue of environmental flows. It wants to give everybody in the Basin, and beyond, a chance to put forward their views, concerns and ideas. This intensive community engagement process has three stages up to and beyond the October 2003 meeting of the Ministerial Council as shown in the diagram on page 45. Community advice is sought throughout this engagement process.

An Independent Community Engagement Panel (ICEP) has been chosen to help effective discussion to take place. These citizens will help make sure people have access to information, understand the issues, and are given the opportunity to have valuable discussions. They will make sure that the views and ideas of the community are listened to and fairly considered in any decisions about recovery of water for the environment.

Details of how to get involved in the discussion are on page 46. Details of how the Murray-Darling Basin Commission will respond to community comment, and release further information on matters of interest and concern are in Chapter 11.

For information and background documents to the issue, visit our website: www.thelivingmurray.mdcb.gov.au or ring 1800 687 044

A second document on environmental flows will be published by the Murray-Darling Basin Commission in 2003, which will clearly set out the costs and benefits of the three reference points so that the balances can be more easily weighed up.
Chapter 2. The River that Shapes Australia

The Murray-Darling ranks among the world’s great river systems in terms of length and catchment area (Fig. 1), yet it carries a comparatively small, and highly variable, volume of water.

For tens of millions of years the waters of the Murray-Darling Basin have shaped the landscape of eastern and southern Australia. They provide the life-force for our unique plants and animals. Its waters sustain life through the landscape, not just along the rivers themselves, but for hundreds of kilometres around, supporting trees, grasses, aquatic plants, birds, marsupials, fish, reptiles and the microscopic animals on which other creatures feed. Migrating birds from China, Japan and beyond depend on the waters of the Basin.

The Murray-Darling Basin is also the source from which Australia draws much of our wealth: agriculture, tourism, recreation and leisure, manufacturing, mining, electricity and many other industries. All communities depend on its continued health, particularly those living in the Basin.

For Aboriginal people, European settlers and recent arrivals from other parts of the world alike, the rivers play a large part in our identity, history and folklore.

**Environmental values**

The bedrock of the Murray-Darling Basin is over 350 million years old. Through eons its waters have carved creeks and river channels through the mountains and plains of this dry continent. These seasonal water movements, swinging from flood to drought, caused unique plants and animals to evolve that depend on these patterns to breed, survive and grow. Murray cod and river red gums are but two examples.

After a dry period, floods rejuvenate the river system. This stimulates the growth and breeding cycles of many native plants, insects and water bugs living in wetlands and on the floodplain. These become an important food source for fish and other aquatic animals, and maintain the variety of species in our river systems.

Today the Basin symbolises our national wish to be sustainable, to pass on to future Australians the landscape we ourselves value and enjoy, to preserve its beauty, its wealth of life and the way it functions and serves us.

In its internationally significant wetland areas and endangered species, the Basin also stands for our responsibility as global stewards, looking after nature to be found nowhere else on earth.

The Murray-Darling Basin is also the source from which Australia draws much of its wealth: agriculture, tourism, recreation and leisure, manufacturing, mining, electricity and many other industries. All communities depend on its continued health, particularly those living in the Basin.

For Aboriginal people, European settlers and recent arrivals from other parts of the world alike, the rivers play a large part in our identity, history and folklore.

**The values of the Murray**

A healthy river with good water quality safeguards our industries, our culture and communities, and the Basin landscape. Below are some of the values people hold for the River Murray as part of the larger Murray-Darling Basin. The community engagement process, outlined in Chapter 11, invites all sectors of the community to speak of these values, and discuss how we can balance our various interests and the environmental needs of the River Murray.
Figure 1: The River Murray System, part of the larger Murray-Darling Basin.
Cultural values

Aboriginal Australians were first to discover the bounty of the Murray-Darling Basin, more than 70,000 years ago. Ever since, they have lived with the rivers, managed and prospered from their natural resources. The River Murray language groups and nations include the Wiradjuri, Yorta Yorta, Wamba Wamba, Wadi Wadi, Barapa Barapa, Muthi Muthi, Latje Latje, Barkinji and Ngarrindjeri. Traditional knowledge about the rivers and their life and culture was learned and passed on over generations. The river and its floodplain shaped, and is a living part of, their beliefs and lives. It contains sacred and significant places which need to be respected, protected and preserved. Indigenous people still occupy traditional lands; with the river, wetlands and floodplain providing food, medicinal herbs and raw materials.

It became the nation’s first great inland transport network, fostering the development of towns and agricultural industry. For generations, families and communities have lived with the river, forging traditions and upholding their values. In the 19th and 20th centuries, much of the wool on which Australia rode to prosperity was grown within the Basin. Its beef, crops, dairy produce and fruit sustained our nation and others in peace and war. The building of dams and weirs on the river made the supply of water more reliable in terms of quantity, allowing large-scale irrigation farming to develop. This made parts of the Basin among the greatest generators of wealth in Australia.

Ever since, life along the rivers and within the Basin has been an important part of the Australian identity.

Heritage values

The River Murray has shaped important elements of our modern history. It was the site of early European settlements, located at crossings with abundant freshwater.

During the second half of the 19th century, a number of factors including an expanding population, closer settlement, and severe droughts, led to a heightened interest in the potential of irrigation and in spectacular projects involving large storage reservoirs and extensive water distribution systems. Governments became heavily involved, and for many years the extension of irrigated land was seen to be of national importance. In the first half of the 20th century, irrigation was also seen as a means of increasing the intensity of farming and thus allowing schemes for the settlement of returned soldiers from the First and Second World Wars which were financed by both the Commonwealth and the States. (Hallows and Thompson, The History of Irrigation in Australia, p7)

1 Ngarrindjeri Culture from the document Murray Mouth Perspectives prepared by the SA Department of Water Land and Biodiversity Conservation, 2002.
2 Hallows P.J. and Thompson D.G., The History of Irrigation in Australia, p7.
Economic values

Today the Murray-Darling Basin enriches Australia by an estimated $23 billion every year. Agricultural produce now exceeds $10 billion, mining $3 billion, tourism and leisure around $6.5 billion, electricity $0.3 billion, commercial fishing and other industries $2.5 billion. About $5 billion is earned through irrigation: dairy, rice, cotton, beef, wine and horticulture. Food processing, Australia’s largest manufacturing industry and employer, depends heavily on irrigation for a steady supply of quality produce.

The wider value of the Basin to the national economy is much greater—around $75 billion a year. This supports an estimated 1.5 million jobs, most of them in the cities. Tourism is burgeoning, with 15 million visitors a year attracted to the National Parks, State Forests, rivers and world-significant wetlands. Boating on the many rivers, lakes, weir pools and reservoirs of the system is popular, including house boats, paddle steamers, fishing and ski boats. Tourists are also drawn to the wine industry, farm holidays, historic and other attractions.

A healthy River Murray also provides many other services, such as cleansing the water so it is suitable for agriculture, industry, local government and domestic use. There would be a direct cost to these users if such services were lost through a further decline in river health.

Also, public perception of an unhealthy river has the potential to harm the image of Australian agriculture. The 1991 blue-green algae bloom on the Darling River is an example of the scale of problems that may arise, and these may undermine consumer confidence in the agricultural products of the Basin.

The Basin also ranks Australia among the world leaders for skills in water, land and environmental management.

Community values

The Basin symbolises important qualities of Australian life and our rural communities. People see it as a place of aspiration and achievement, of hard work, imagination, creativity and problems overcome.

People came to live and work near the river because of its abundant fresh water, food, shelter and fertile soils. They responded to its beauty in painting, stories, poetry, film and song.

The Basin’s communities encompass many Australian beliefs and virtues. The knowledge of Aboriginal people, the courage and vision of the pioneers, the vision and drive of the nation-builders, the care and concern of environmentalists and river-users, the energy and optimism of the Basin’s youth and the peaceful life and progress of its citizens.
Who does the River Murray belong to?

The River Murray belongs to all Australians, present, past and future. It belongs to the two million who live in the Basin, the millions who rely on its water and power, and everyone who prosper from its resources. Its wealth is a primary driver of the economy. It cradles a sixth of the Australian landscape. Its history and culture are part of our identity as a people.

The River Murray is thus a shared responsibility of all Australians, and we must work together to see its health and qualities are still there for our children’s children. In a sense too, it belongs to the peoples of the world. Tens of millions enjoy its excellent food and farm products, its minerals and manufactured goods. Many come as visitors or migrants. It harbours a priceless resource in its internationally significant wetlands, from which birds migrate to distant regions of the globe.

The River Murray ‘belongs’ to all Australians, present, past and future. It is thus a shared responsibility of all Australians.
Chapter 3. The State of Our Rivers

Under natural conditions, around half the run-off from the Murray-Darling Basin used to reach the sea. The rest watered the floodplain, filled wetlands, sustained and regenerated the bush, supported wildlife and recharged groundwater. Much also evaporated. For the last 100 years governments and communities have actively supported the regulation of the Basin’s rivers, controlling its natural variability and allowing the diversion of large amounts of water, chiefly for agriculture. Today, these diversions, 95 per cent of which are used for irrigation, account for about half of the Basin’s annual run-off.

In parts of the river, particularly in South Australia, the flows each year have decreased greatly due to water extraction (Fig.2). In other areas of the river, regulation has not affected the total volume of water much, but has changed the seasonal pattern of the flow (Fig.3).

Between Albury and Yarrawonga, where the river flow is higher than natural due to the Snowy Mountains hydroelectric scheme, the original winter-spring floods have been replaced by high summer flows to provide water for irrigation. Also, a greater proportion of the flow is now contained within the banks of the river. This reduces the amount of water reaching the floodplain and puts additional stress on the river channel, eroding river banks and leading to the formation of larger anabranches.

Use of the Basin’s water has had an impact on river flow patterns.

Figure 2: Destination of run-off in the Murray-Darling Basin under ‘natural’ and ‘current’ conditions (based on modelled data3).

Figure 3: Flows under ‘natural’ and ‘current’ conditions in the River Murray at Albury and at the Murray Mouth in South Australia.

3 Crabb P. 1997 and MDBC data
Water use in the Murray-Darling Basin

Large volumes of water are taken out of most of the key rivers and tributaries in the Basin for human use. The table opposite shows the long-term average diversion (the Cap) in each river valley.

The Cap on diversions

The Cap on diversions was introduced in 1995 and limits the amount of water extracted from the Basin’s rivers. In regulated rivers diversions are limited to what would have been diverted under 1993-94 levels of development. In unregulated rivers the Cap may be expressed as an end-of-valley flow regime.

The Cap has been applied in this way, with small variations, in NSW, Victoria and South Australia which combined account for 94 per cent of the Basin’s diverted water (Table 1). Queensland and the ACT take a total of 6 per cent, and their Cap and the way it is determined has not yet been finalised.

The Ministerial Council implemented the Cap as a first step towards striking an appropriate balance between the economic and social benefits obtained from the development of the Basin’s water resources, and the environmental uses of water in the rivers.

The proportion of available water taken from each river varies widely, in some cases it is below 20%, in others above 50%. In the case of the River Murray, New South Wales and Victoria share its water 50:50 and also equally share the responsibility to supply South Australia. However, they actually use different amounts of water.

* Independent Audit Group, 2002
Table 1: Murray-Darling Basin long-term diversion Cap by valley.

<table>
<thead>
<tr>
<th>State &amp; Valley</th>
<th>Long-Term Diversion Cap (GL per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NEW SOUTH WALES</strong></td>
<td></td>
</tr>
<tr>
<td>Barwon-Upper Darling</td>
<td>177</td>
</tr>
<tr>
<td>Lower Darling</td>
<td>119</td>
</tr>
<tr>
<td>Border Rivers</td>
<td>204</td>
</tr>
<tr>
<td>Gwydir*</td>
<td>345</td>
</tr>
<tr>
<td>Namoi</td>
<td>284</td>
</tr>
<tr>
<td>Macquarie</td>
<td>474</td>
</tr>
<tr>
<td>Lachlan*</td>
<td>339</td>
</tr>
<tr>
<td>Murrumbidgee</td>
<td>2 289</td>
</tr>
<tr>
<td>NSW Murray</td>
<td>1 877</td>
</tr>
<tr>
<td>Total New South Wales</td>
<td>6 108</td>
</tr>
<tr>
<td><strong>VICTORIA</strong></td>
<td></td>
</tr>
<tr>
<td>Goulburn/Loddon/Broken</td>
<td>2 084</td>
</tr>
<tr>
<td>Murray/Kiewa/Ovens</td>
<td>1 656</td>
</tr>
<tr>
<td>Campaspe</td>
<td>122</td>
</tr>
<tr>
<td>Wimmera-Mallee*</td>
<td>162</td>
</tr>
<tr>
<td>Total Victoria</td>
<td>4 024</td>
</tr>
<tr>
<td><strong>SOUTH AUSTRALIA</strong></td>
<td></td>
</tr>
<tr>
<td>Country towns</td>
<td>50</td>
</tr>
<tr>
<td>Reclaimed swamps</td>
<td>100</td>
</tr>
<tr>
<td>Other</td>
<td>457</td>
</tr>
<tr>
<td>Total South Australia (except metropolitan Adelaide)</td>
<td>607</td>
</tr>
<tr>
<td><strong>QUEENSLAND MDB</strong></td>
<td>654#</td>
</tr>
<tr>
<td><strong>AUSTRALIAN CAPITAL TERRITORY</strong></td>
<td>38@</td>
</tr>
<tr>
<td><strong>TOTAL (except metropolitan Adelaide)</strong></td>
<td>11 431</td>
</tr>
</tbody>
</table>

* These valleys contribute little or no water to the main stem of the River Murray.
# Cap yet to be finalised; provisional estimate of actual diversions in 2000/01 shown.
@ Cap yet to be finalised; proposed Cap shown.

**SOUTH AUSTRALIA (metropolitan Adelaide)**
Adelaide - rolling 5 year total 650 GL over five years
The current flow regime in the River Murray is the result of diversions spread across the Basin.

The flow to the sea from the Murray Mouth in a typical year under natural conditions was around 11,300 GL. In a typical year under current conditions it is about 3,000 GL or 27% of what it was before regulation. Diversions do not exactly match the reduction in flow at the Mouth, as some of the water that is now diverted would never have made it to the sea.

The effect of regulation on flows along the River Murray and in tributaries as they join the River is shown in Figure 4. This reflects both the diversions throughout the Basin and the availability of water in these rivers.

The current flow regime in the River Murray is the result of diversions spread across the Basin. It means that restoring the river's health will rely on changes to varying degrees in the major tributaries, as well as in the Murray itself. Further analysis will be required to find the most effective way of introducing changes throughout the Basin to provide environmental flows to the River Murray.
**Agricultural profits**

The Murray-Darling Basin accounts for almost one third by value of Australia’s agricultural output. Irrigation is a major contributor to the profitability of agriculture within the Basin. This can be seen from Figures 5 and 6.

---

**Figure 5:** Profitability of Australian agriculture in the 5 years to 1996 expressed in terms of ‘profit at full equity’ (PFE) (source: www.environment.gov.au/atlas)

**Figure 6:** The agricultural area of Australia with the area contributing 80% of farm profits (expressed as ‘profit at full equity’) (PFE) highlighted (1996/97 data, source: www.environment.gov.au/atlas).

---

Statistics highlight the importance of irrigation to the profitability of Australian agriculture.
Figure 5 shows the ‘profit at full equity’ across Australia for the 5 years to 1996 (note this was a period of major drought in much of northern Australia).

In Figure 6, the areas of the Australian landscape contributing 80% of the total farm profit, measured in this way, are highlighted. This shows 80% of farm profits were generated from around 2% of the landscape during this period—and this was largely irrigation areas in the Murray-Darling Basin. This information highlights the importance of irrigation in the Basin to the profitability of Australian agriculture.

**Use of the Basin’s water resources has brought huge benefit to Australia.**

**Threats to the values we prize**

Use of the Basin’s water resources has brought huge benefit to Australia. Yet the changes in flow also have ecological, cultural, social and economic consequences.

The effects of these changes in flow vary widely along the river, because the location of irrigation districts, dams and weirs, results in different flow patterns in different places. They can also take many years for their full impact to be realised.

These have led to the following changes in river health which are discussed in more detail below:

- widespread increases in nutrients and sediment in the water;
- river flows rated poor in all zones of the River Murray;
- vegetation and wildlife significantly impaired along 40% of the total river length in the Basin;
- 16 of the Basin’s 35 native fish species listed as threatened; and
- salinity in the Lower Murray is projected to rise by 50% and more than 100% in many smaller rivers in the coming 50 years.

---

5 The ‘profit at full equity’ of a farming enterprise is the amount of farm profit generated assuming there are no debts to pay off. It provides an indication of the underlying profitability of different landscapes and industries.

6 Norris et al., 2001, p x

7 Norris et al., 2001, p xi

8 Norris et al., 2001


10 MDBC Salinity Audit, 1999
Poor water quality
Changes to river flow patterns have led to poorer water quality. Combined with the effects of weirs and dams, this has adversely affected native plant, bird and fish life. Evidence for this has emerged in scientific investigations over more than a decade.\footnote{See Thoms et al., 2000; Jensen A. et al., 2000; Norris et al., 2001 and Jones G. et al., 2002}
Declining water quality affects all users, as well as the environment. Good water quality is essential for productive irrigation, fishing and manufacturing industries, for tourism and recreation, for drinking and for the town water supplies delivered by local governments. Without it, all our values—economic, environmental, cultural and social—suffer.
Salinity, turbidity, nutrients, algal blooms and water temperature changes are signs of declining water quality, and all are affected to some extent by the amount of flow in the river. Salinity affects the water’s use for industry and drinking. Changes in water temperature impact on fish; while murky, nutrient-rich water alters the balance of plant and animal life in the water.

Improved catchment management is needed to address the causes of water quality decline. Improving the flow pattern will also help\footnote{Jones G. et al., 2002} and is one part of this strategy.

Unseasonal flows
In its natural state the River Murray received most water in winter and spring. Releasing water in summer for irrigation alters the timing of flows from the natural pattern. These unseasonal flows have their biggest effect close to the main dams and weirs (Figure 3). High summer flows permanently flood some wetlands and parts of the floodplain, which need a wetting-and-drying cycle to sustain their plants and animals. High water levels upstream of weirs and locks have a similar effect. This may result in:
- loss of plant communities, such as river red gums;
- declining numbers of native birds, animals and fish;
- the spread of exotic weeds and pests;
- greater erosion of river banks and scouring of new channels; and
- loss of the natural signals that tell native fish, birds, plants and aquatic insects when to breed.

Damaged wetlands
Wetlands recharge the river and surrounding landscape with life, and they cleanse the water by absorbing nutrients, silt and pollutants. Many wetlands need flooding and drying cycles. The flooding releases food for plants, fish, birds and animals, and encourages them to breed. Receding water then carries new life into the river.
Drying out is equally vital for some parts of the floodplain, for the health of plants and trees and the life cycles of many birds, animals and insects.
The River Murray System has five wetlands of world significance. River regulation has caused changes in the flow pattern to these and other wetlands that include floods occurring less often and lasting for a shorter time than they did naturally. These smaller, shorter floods mean native birds, plants and animals do not breed as often, or as successfully. For instance, many waterbirds
require floods lasting 3–5 months for the hatchlings to leave the nest. When floods are artificially shortened, the adult birds abandon their nests and the chicks starve or are eaten by predators.

Murray Mouth closure

The Coorong and Murray Mouth now receive far less water than they did under natural conditions\(^1\). The Mouth has only closed once, in 1981, since regulation started on the River Murray. However the loss of flow causes the Murray Mouth to approach closure far more frequently, risking major environmental, cultural, economic and social consequences.

Some species of fish need to move between the ocean and the freshwater Lower Lakes to breed. The Barrages near the Murray Mouth limit their migration and reduce their abundance. Closure of the Murray Mouth would limit them further and affect the fishing industry, tourism and leisure.

The Barrages have also changed the ecology of the Lower Lakes, reducing the estuarine area of the Murray to 11% of its natural size\(^1\). Recent studies reveal that estuarine bird habitat is still declining in both size and quality. If this continues, Australia will fail to meet its obligations under international wildlife agreements.

Fish losses

Sixteen of the Basin’s 35 native fish species are listed as threatened in the Basin, with the trout cod rated critically endangered\(^1\). The natural range of other species has dwindled sharply.

Native fish numbers are falling because of:

- loss of habitat;
- loss of the natural water temperature and flow signals that tell them when to breed;
- dams, weirs and structures that block their migration paths;
- lack of flooding and food sources for young fish;
- overfishing; and
- predation and competition from exotic fish.

Floodplain salinity

Once the River Murray acted as a major outlet for the region’s groundwater. Today the weirs and locks maintain unnaturally high river levels, and this holds back the groundwater from entering the river. The groundwater then rises to the surface of the nearby floodplain, bringing salt with it. Combined with salinity problems caused by irrigation, floodplain salinity threatens the survival of native bush, the productivity of farming systems, and whole industries and communities in some areas. Also, reduced flooding means salt is no longer effectively flushed from the landscape.

Though not directly related to river flow management, regional groundwater pressures and dryland salinity are major problems across the Basin. Since much of this salt will eventually end up in the river, it emphasises the importance of an integrated approach to managing the whole Basin.

---

\(^1\) See Walker D.J., 2002 and Close A.F., 2002

\(^2\) Jensen A. et al., 2000, p 19

\(^3\) MDBMC, Draft Native Fish Strategy for the Murray-Darling Basin 2002-2012, 2002
Chapter 4. Creating a Healthy Working River

Vision and Objectives
This discussion paper looks at ways we might create and preserve a healthy working River Murray.

In March 2001, the Murray-Darling Basin Ministerial Council agreed to a vision and set of objectives for the River Murray, originally put forward by members of the community. Their aim is to seek a balance between all the values the Australian community has for the river.

**Vision:**
... a healthy River Murray system, sustaining communities and preserving unique values.

Objectives:

<table>
<thead>
<tr>
<th>River health objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Protect and restore key habitat features in the river, riparian zone, floodplain and estuary to enhance ecological processes.</td>
</tr>
<tr>
<td>2. Protect and restore healthy riverine and estuarine environments and high-value floodplain and wetlands of national and international importance.</td>
</tr>
<tr>
<td>3. Prevent the extinction of native species from the riverine system.</td>
</tr>
<tr>
<td>4. Overcome barriers to the migration of native fish species.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental flow objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Reinstate ecologically significant elements of the natural flow regime.</td>
</tr>
<tr>
<td>6. Keep the Murray Mouth open to maintain navigation and fish passage and to enhance estuarine conditions in the Coorong.</td>
</tr>
<tr>
<td>7. Significantly improve connectivity between and within riverine, wetland, floodplain and estuarine environments.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water quality objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Substantially improve water quality in the Murray system to a level that sustains ecological processes, environmental values and productive capacity.</td>
</tr>
<tr>
<td>9. Manage salinity to minimise impacts on ecological processes and productivity levels.</td>
</tr>
<tr>
<td>10. Manage nutrient levels to reduce the occurrence of blue-green algal blooms.</td>
</tr>
<tr>
<td>11. Minimise the impact of potential pollutants such as sediment and pesticides within riverine environments.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Human dimension objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. Gather, evaluate and disseminate the community’s living, scientific and intuitive knowledge to optimise environmental flow strategies.</td>
</tr>
<tr>
<td>14. Ensure participation of the entire community by recognising the cultural and historical relationship to the river, its landscape and its people and acknowledging the past to affect the future.</td>
</tr>
<tr>
<td>15. Recognise the importance of a healthy River Murray to the economic, social and cultural prosperity of communities along the length of the river.</td>
</tr>
</tbody>
</table>
Water quality objectives

One way to tell if a river is healthy or not is to look at water quality. How we manage river flows has a big influence on water quality, especially in a highly-regulated river like the Murray. As a rule, larger flows lead to better water quality. However, when the environment needs lower flows—for instance, to dry a wetland for a time—this may also reduce water quality temporarily. Having agreed water quality objectives is one way we can assess these trade-offs.

Agreed water quality objectives are a way that the community states its values for water in relation to human health, uses and the needs of the environment. The Murray-Darling Basin Commission is developing draft water quality objectives for the River Murray to encourage discussion as part of its statutory duties. They will be integrated with relevant State and Commonwealth process such as the National Action Plan for Salinity and Water Quality (NAPSWQ) and catchment planning processes.

The draft water quality objectives are available on our website and will be published later in 2002. The views of the community and stakeholders will be sought between now and October 2003, allowing final water quality objectives to be agreed. The Commission has assessed the effects of environmental flows on water quality using these water quality factors:

- salinity;
- turbidity;
- risk of algal blooms; and
- temperature effects.

This list will be expanded so that the effects of environmental flows on water quality in the River Murray can be better identified and separated from other issues that affect water quality.

Together, this assessment and the water quality objectives help us to see how well environmental flows meet the water quality values of the community and the needs of local government. They can also be used as a guide for other catchment actions such as agricultural land use, which also affect water quality.

What is a healthy working river?

The Vision and Objectives of the Ministerial Council help us seek an acceptable balance between competing values for the river. They stress the importance of the ‘economic, social and cultural prosperity of communities along the length of the River’, as well as the importance of a healthy River Murray.

The idea of a healthy working river also seeks these balances:

- a healthy working river is one that is managed to provide a sustainable compromise, agreed to by the community, between the condition of the river and the level of human use.16

The table opposite provides examples of the sort of differences we might see between a healthy working river and an unhealthy river. For example, summer irrigation flows will remain a feature of the river between Hume

---

16 Jones, G. et al., 2002
and Yarrawonga. However environmental flow initiatives will seek to reduce the adverse impacts of unseasonal flooding on wetlands and floodplains.

In the Lower Murray, the locks, weirs and barrages will remain in place for irrigation and navigation—but water levels above them will be varied to encourage healthy riverside vegetation and to prevent algal blooms.

Some wetlands will still be used for agriculture; others will be retained for the environment. The health of both types of wetland stands to benefit from environmental flows.

A healthy working river would also allow us to swim in it, catch fish from it and take drinking water from it.

Possible futures for the River Murray

<table>
<thead>
<tr>
<th>A healthy working River Murray may mean</th>
<th>An unhealthy River Murray will contribute to</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Active regional communities, where a healthy environment and a thriving economy go hand-in-hand</td>
<td>• A community in conflict, declining cultural and heritage values</td>
</tr>
<tr>
<td>• Prosperous, water efficient irrigation industries</td>
<td>• Less efficient irrigation industries with ageing infrastructure</td>
</tr>
<tr>
<td>• Tourism and recreation, with people fishing, safely swimming and boating</td>
<td>• Reduced incidence of tourism and leisure activities</td>
</tr>
<tr>
<td></td>
<td>• Lots of money spent purifying water to make it drinkable</td>
</tr>
<tr>
<td>• Dams, locks and weirs operated to provide for irrigation, navigation, and where possible, the environment</td>
<td>• Dams, locks and weirs operated to provide for irrigation, navigation, with no regard for environmental impacts</td>
</tr>
<tr>
<td>• A healthier (but not pristine) river environment, including:</td>
<td>An unhealthy river environment, including:</td>
</tr>
<tr>
<td>• healthy diverse riverside vegetation extending onto the floodplain, however parts of the floodplain will still suffer</td>
<td>• eroding and collapsing riverbanks, dead or dying trees</td>
</tr>
<tr>
<td>• anabranches, billabongs and wetlands that fill up and dry out often enough for breeding events, but not as often as under natural conditions</td>
<td>• stressed floodplain vegetation where the floodplain is too dry or there is increasing salinity</td>
</tr>
<tr>
<td>• diverse bird and fish species</td>
<td>• weeds taking over, severe toxic blue-green algal blooms</td>
</tr>
<tr>
<td>• Murray Mouth open to allow fish passage and navigation</td>
<td></td>
</tr>
</tbody>
</table>
Chapter 5. What is an Environmental Flow?

An ‘environmental flow’ is any river flow pattern provided with the intention of maintaining or improving river health. Better use of water currently available and new water made available for the environment, are forms of environmental flows. Examples include:

- modifying floods in the river system (in particular small to medium floods), to increase the benefit to the environment by changing:
  - how often they occur,
  - how big they are,
  - how long they last for, and
  - when they occur.
- restoring low-flows in parts of the river system where low-flows used to occur naturally;
- altering water levels above weirs so they resemble the natural seasonal changes that occurred prior to regulation;

Modifying the pattern of floods does not mean creating floods from a ‘standing start’. An environmental flow generally means making relatively small changes to parts of the flood’s pattern, so it helps the environment more.

The complexity of river and floodplain interactions is shown in Figure 7. Different parts of the river and its floodplain may require different treatment. They may also have to ‘take turns’ to be watered depending on the amount of water available.

To be effective, an environmental flow must:

- be timed to occur in the right season to trigger breeding of plants and animals;
- occur often enough and last long enough to allow breeding to succeed;
- be large enough to link the river to its floodplain, wetlands, billabongs, anabranches, estuaries and the sea; and
- vary water levels to provide wetlands and riverbanks with wet-and-dry cycles.

Environmental flows: any change to a river’s flow pattern intended to maintain or improve river health.

Figure 7: Cross-section typical of parts of the River Murray, showing the interactions that occur between the river and its adjacent floodplain wetlands during high and low flows, and the plant and animal communities that depend upon these exchanges for survival.
Chapter 6. Runs on the Board

A change in our attitudes

By the early 1990s it was clear that the Basin's rivers were in trouble. Native fish populations were in severe decline, wetlands were contracting and water quality degrading.

The level of water use (diversions) and changed flow patterns in the river became a hot topic. Many people could see a need to strike a balance between water use and the environment, and Australians generally started to recognise the amount of water in the Basin was limited.

The Ministerial Council responded to these issues by introducing the Salinity and Drainage Strategy, a Water Quality Policy, an Integrated Catchment Management Policy, the Cap on diversions, water pricing reforms, an Algal Management Strategy, scientific assessment of the rivers and their environment and other measures.

The most important change has been in the views and values of the people of the Murray-Darling Basin. This has emerged as strong support for land and water management plans, Landcare, Rivercare and catchment management. It has been encouraged by initiatives like the Natural Heritage Trust and National Action Plan for Salinity and Water Quality. Much can be learned from these projects.

The Basin's farmers have become world leaders in water use efficiency. Ricegrowers, for example, have cut their water use per hectare by around 30 per cent in ten years, while rice yields per megalitre have risen by over 60 per cent.17 Gains have also been made in the dairy, cotton, wine grape and horticulture industries.

A recent stakeholder survey found there is high concern for the current state of the River Murray and general awareness that it will take many years to improve the situation.18 There was strong support from 95 per cent of those surveyed for the principle of environmental flows for the River Murray. However, support dropped to less than 40 per cent if water users, interested people, and local people were excluded from the decision-making process. This has sent a clear signal that the community must be involved in the decision.

The Basin states have recognised the importance of river health and have been introducing processes to achieve environmental flows:

• New South Wales, Water Sharing Plans are being prepared under the Water Management Act 2000;
• in Victoria, Bulk Entitlements and Streamflow Management Plans are coming in under the Water Act 1989;
• in South Australia, The State Water Plan 2000, Catchment Water Management Plans and Water Allocation Plans are coming in under the Water Resources Act 1997; and
• in Queensland, Water Resource Plans are being prepared under the Water Act 2000.

These actions aim to allocate and sustainably manage water to meet future needs. These include protecting the environment and assuring a secure supply to water users. These state-based moves use the Cap as a reference, but otherwise do not focus on the health of the River Murray.

This discussion about environmental flows aims to make sure that the overall health of the River Murray is not overlooked in all the processes surrounding it.

This process is run by a Project Board made up of members of the Murray-Darling Basin Commission. They are advised by a Community Reference Panel, scientists and the Commonwealth, State and Territory governments.

Examples of what we have already done for the River Murray

Significant environmental flows have already taken place in the River Murray. Here are two cases showing how we can create environmental benefits in specific parts of the river:

18 Nancarrow B.E. and Syme G.J., 2001
Barmah-Millewa Forest

In 1993 it was agreed to put 100 GL of water each year from NSW and Victorian irrigation supplies into an account to improve watering of the Barmah-Millewa Forest. In 2001 this was increased to a maximum of 150 GL a year. This environmental water was first used in 1998, when 97 GL was used to top up a minor flood in the forest caused by high flows in the Ovens and Kiewa Rivers. While many floodplain plants and birds responded well, it was generally felt that the flood wasn’t large enough and didn’t last long enough to deliver full benefit to the ecosystem.

A second environmental flow was applied from October 2000 to January 2001. A total of 341 GL was released to extend a 1-in-5 year flood event that was occurring naturally in the forest (Fig.8). This was the largest release of water ever made to the environment in Australia.

The water was not used to increase the peak of the flood, but rather to slow the rate it drained out of the forest following natural flood peaks in October and November 2000 (Fig.8). This provided longer, more natural conditions for bird breeding and forest renewal.

Though it sounds like a lot of water, the environmental flow was in fact only 8 per cent of the total flow at that point in the river from September 2000 to January 2001. The success of bird breeding equaled what might have occurred during a 1-in-10 year flood. The great egret bred in the forest for the first time since 1979, and bird populations generally increased. Nine species of frogs bred in key areas of the forest. The timber and grasslands of the forest flourished. Native fish took advantage of the flood to breed—but so did the introduced pest, the carp.

Despite inconvenience from flooding in some areas, the community responded positively to the environmental benefits that followed the event.

Chowilla Floodplain, South Australia

The floods of October and December 2000 provided opportunities for the Murray-Darling Basin Commission, together with SA Government agencies, to increase flows into South Australia to increase watering of the floodplain.

During October, the flow to South Australia was increased by about 9 000 ML a day, using water from Lake Victoria, upstream of the SA border. Further flooding was...
achieved by raising the upstream pool level of Lock 5 (near Renmark) by about 0.5 m. This increased the area of flooding by about 8 per cent.

In the larger December event, the peak of the flood was also raised by about 9 000 ML a day. Parts of the floodplain that had not been soaked for four years were watered during this event allowing many wetland species to regenerate.

Other achievements
Other recent environmental flow measures on the River Murray include:
• development of a long-term waterway management plan for Hume to Yarrawonga;
• implementation of modified flow patterns for Dartmouth Dam releases to achieve environmental benefits in the Mitta Mitta River;
• controlling flows through the Menindee Lakes to imitate natural flows in the Lower Darling;
• opening gates at Torrumbarry Weir during high river levels, to let fish swim freely past the weir; and
• agreement of an operating strategy for Lake Victoria, which aims to balance the competing needs of Cultural Heritage, the environment, and water supply.

Examples of what we have already done for the tributaries

The Murrumbidgee and Goulburn Rivers are the two most important tributaries for enhancing environmental flows to the River Murray, followed by the upper Darling River though its contribution to the River Murray is smaller. Here are two cases of environmental flows:

Murrumbidgee River, NSW
The Murrumbidgee River receives increased river flows outside the irrigation season by releasing part of the inflows to Burrinjuck and Blowering Dams. The target for the flow at Balranald, where the Murrumbidgee joins the Murray, was raised and extra water was made available to the environment. These changes mean irrigators have returned almost 4% of their diversions to the river. A similar process is taking place across NSW, with irrigators on the Macquarie River returning the highest proportion of their diversions to the River (16%).

Goulburn River, Victoria
Environmental flow provisions have been introduced in the Goulburn River to improve its health. These provisions will see improvements made to the flow patterns below Eildon Dam, Goulburn Weir and where it reaches the Murray. They have been designed to provide flushing flows to simulate small spring floods and to protect the water quality of the River. Further work is being done to improve the environmental effectiveness of these provisions.

Better use of existing water for river health
In 2001, there was a major study of the dams, locks and weirs of the River Murray. It found ways we can improve the health of the river by changing the way these structures are operated and constructed. As a result, in April 2002, the Ministerial Council saw the need for $150 million to be spent on structural measures to achieve the best environmental outcomes from the water currently available to the River Murray.
These actions will take about seven years to implement and will result in:

- improved floodplain health;
- better management for fish; and
- better management of the Murray Mouth, Coorong and Lower Lakes.

The Ministerial Council said:

These actions will improve the health of the River Murray while not affecting the security of consumptive water uses. This approach underscores the Council’s desire to focus management of the structures and resources of the River Murray to improve the environment while maintaining the social and economic benefits obtained from resource use (Corowa Communique, 12 April 2002).

Examples of the changes that might occur are:

- reducing the impact of unseasonal flooding of the Barmah-Millewa Forest through structural modifications at Yarrawonga Weir and nearby;
- improving the way the river connects with the floodplain;
- seasonally lowering weir pool water levels to allow areas that have been wet for decades to dry out. This includes actions to offset impacts on people using the river; and
- further investigation of how water can be supplied more efficiently to water users on the Great Anabranch of the Darling River, to partially restore the natural flow pattern and return the water saved to the environment.

Much work is already going on to improve the environment of the River Murray, including the development of fish-ways on weirs, salt interception works, ways to minimise the impact of cold water releases from Hume Dam and ways to enhance wetland health.

We can achieve local benefits to the Murray environment just through these structural and operational changes at key locations, without recovering more water. However, the gains that can be achieved are small with the amount of water currently available for environmental use.

For this reason the community of the Murray-Darling Basin is being asked to consider the recovery of water from users to return water to the environment, so we can achieve benefits along the full length of the River Murray. For how to put forward your views, see Chapter 11.

* Murray-Darling Basin Ministerial Council–Corowa Communique, 12 April 2002*
Chapter 7. What We Can Do

Though it will not solve every problem facing the River Murray, providing extra water to the environment will yield benefits along its full length. Key issues are: how much water do we need to attain a healthy working river, and where do we get it from? The Ministerial Council chose annual volumes of 350 GL, 750 GL and 1500 GL to serve as reference points to start community discussion about whether or not water should be recovered from water users for the environment, and if so, how much. These are not ‘options’ but merely serve to give the community a base from which to consider the costs, benefits and issues involved. Further details of these costs and benefits will be available in a second document on environmental flows to be published in 2003. Public input will help the Ministerial Council in considering the issue at its meeting in October 2003.

Prospects for a healthy working river—three reference points

The Ministerial Council’s three reference points help focus our discussion of the benefits and costs of recovering different amounts of water for the environment. They include the changes to dam, weir and lock operation and other measures previously described. Scientists estimate, from an ecological perspective, that further water would be needed to give a high likelihood of achieving a healthy working River Murray. The smaller the amount of water recovered, the lower the overall prospects of river health. However, even relatively small amounts of water can benefit particular places.

The Ministerial Council’s three reference points were selected to provide a basis for developing a balance between viable irrigated agriculture, the social and economic consequences and our current understanding of the river’s needs. Any level of recovery, if adopted, would be introduced in an adaptive management framework (‘learning by doing’), and the outcomes monitored and reviewed. The consequences of implementing these reference points are being investigated further in order to develop a better understanding of the effect of water recovery for environmental flows. Your views will help the Ministerial Council in its consideration of this issue in October 2003.

Although a particular annual volume of water may be mentioned, this would not be used as a constant flow. Rather, it would be used to vary flows in ways that more closely resemble the natural river patterns. Work leading to the choice of these reference points is detailed in the Report on the Development of Options, prepared by the Murray-Darling Basin Commission for the Ministerial Council meeting in April 2002. The related scientific advice is contained in the Independent Report of the Expert Reference Panel on Environmental Flows and Water Quality Requirements for the River Murray System. Both reports can be obtained from the Murray-Darling Basin Commission or the Living Murray website.

<table>
<thead>
<tr>
<th>Reference Points - Average amount of extra water provided to the River Murray environment</th>
<th>Estimated timeframe for implementation</th>
<th>Likelihood of a healthy working river from an ecological perspective</th>
</tr>
</thead>
<tbody>
<tr>
<td>350 GL a year</td>
<td>10 years</td>
<td>Low</td>
</tr>
<tr>
<td>750 GL a year</td>
<td>10 years</td>
<td>Low-Moderate</td>
</tr>
<tr>
<td>1500 GL a year</td>
<td>15 years</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

20 Jones G. et al., 2002
21 Jones G. et al., 2002
22 MDBC, Report on the Development of Options, April 2002
23 Jones et al., 2002
Working out the impacts

The Ministerial Council has asked the Murray-Darling Basin Commission to make sure any water recovery achieves the best result for the environment, with the least impact on water users.

Some water savings might be achieved by reducing losses in transmission, such as evaporation and seepage from irrigation channels.

We need to establish what water already recovered for the environment will be counted towards the reference points. One option is to count all water that has been recovered for the environment since 1993-94 (the year the Cap was introduced).

The reference points will however include the 70 GL a year to be recovered for the River Murray through the Snowy River environmental flows process, and the 30 GL a year that Victoria and South Australia agreed jointly to pursue for the River Murray.

A comprehensive analysis is being carried out to help us understand the costs and benefits of each reference point. This will include:

- looking at ways to change the operation of the tributaries (the Goulburn and Murrumbidgee Rivers and also the upper Darling River recognising its contribution to the River Murray is smaller) and River Murray, to maximise environmental benefits;
- identifying how water can best be recovered to maximise environmental outcomes, while ensuring that it would be recovered fairly between the Murray and its tributaries;
- identifying environmental benefits along the length of the river as well as local benefits at sites such as the Murray Mouth, Coorong, Chowilla Floodplain, Gunbower/Perricoota Forest, Barmah-Millewa Forest (refer Figure 1, page 6), and for native fish populations, such as Murray cod;
- understanding the delay between implementing an environmental flow and seeing an improvement in the environment;
- understanding what we cannot achieve for the environment, as well as what we can; and
- identifying benefits to cultural and heritage values, economic values, environmental values and community values;
- identifying the costs of various reference points to each state, territory and the Commonwealth and finding ways to manage the social and economic impacts; and
- identifying and addressing key issues such as fairness, access rights to water and water trade.

Making sure that water recovery achieves the best result for the environment, will involve a careful choice among the range of benefits and impacts along the river.

Different ways of managing the river system will be tried using a computer-based modelling process that takes account of all the main influences on flow in the river such as operation of the dams and weirs, loss of water by evaporation and the diversion of water from the river. This process aims to achieve the best result for the environment, with the least impact on water users.

The Murray-Darling Basin Commission will work with state, territory and Commonwealth agencies, scientists and locals and seek comment from the community.

It will be vital to continually monitor and review any changes to river management, so we can be sure we are achieving the best possible outcomes. See Chapter 9 for further discussion on this matter.

Looking for ‘win-win’ solutions

One of the first steps in the analysis will be to look for smart, ‘win-win’ ways to meet the needs of environments along the river with the least possible impact on industry.

By way of illustration, a lot of work was done prior to Council’s March 2001 decision on watering of Barmah-Millewa Forest to maximise the benefit to the Forest while minimising the impact on irrigation supplies and the community. This decision was based on a considerable effort, over a period of years, to identify a ‘win-win’ outcome24.

Another example is the work going on to better understand the behaviour of the...
Murray Mouth under different flow conditions. This is giving us a better idea of how to manage and care for the Mouth and its environment. However, we have to be careful that a benefit in one place does not create a problem somewhere else.

These examples show there are continual opportunities to improve and refine the way we manage water to the benefit of both the environment and industries like agriculture, tourism and fishing.

**Catchment care**

A healthy river depends not just on its flow pattern, but also on the condition of its catchment, floodplain, surrounding and in-stream ecosystems and water quality. Although environmental flows are a vital part of river health, they cannot ensure a healthy river on their own.

They are only part of our **Integrative Catchment Management Policy** for the Basin. Through this, landholders, communities and government are already tackling many issues that affect river health through ‘on ground’ actions. These include changes in:

- land-use (e.g. grazing, cropping);
- use of groundwater;
- town and farm run-off;
- floodplain salinity;
- stock access to river banks;
- river bank vegetation;
- wildlife habitat; and
- control of introduced pests (e.g. carp, rabbits and weeds).

The **Integrative Catchment Management Policy** also links with other initiatives like the **Draft Native Fish Strategy**, which aims to restore native fish populations to 60% of their natural levels over 50 years.

The community of the Murray-Darling Basin has already made a great commitment to catchment management and environmental care. Environmental flows are one way to capitalise on these efforts.

**Climate change**

Climate change may still have a major impact on our river system and environment, whatever we do with environmental flows and catchment management. Scientists predict climate change may bring lower rainfall, higher evaporation and lower river flows, particularly in the southern part of the Basin. This may reduce the amount of water available for both the environment and water users alike, and is another reason for beginning to plan how we can safeguard our rivers in the long-term.

**Sound catchment management is still absolutely vital.**

---

25 MDBMC Integrative Catchment Management in the Murray-Darling Basin 2001-2010, 2001
27 Jones R. et al., 2001
Chapter 8. Our Balancing Act

There is no perfect solution to the challenges facing the River Murray and its community. Many balances must be considered if we are to contemplate recovering water for the environment from current uses. The choices that need to be made will reflect our many values, and we recognise these values will change over time.

There is more at stake than a trade-off between irrigation and the environment. Balance must be sought between the many different values we hold for our water.

Some of these balances are outlined below. These will be further studied over the coming months. A second document on environmental flows will be published by the Murray-Darling Basin Commission in 2003, which will clearly set out the costs and benefits of the three reference points so that the balances can be more easily weighed up.

The second document will seek input and ideas from as many Australians as possible, so we can collectively seek an acceptable balance and spread the costs and benefits fairly. Further information about the second document and how to contribute ideas and voice concerns is in Chapter 11.

Striking the right balance

Irrigated agriculture

The Ministerial Council wants to consider how we might strive for a sustainable, highly productive Basin with improved river health, with minimum impact on irrigation and its surrounding communities.

If more water is used for environmental flows, rather than to irrigate crops, there may well be economic loss. But there will also be economic loss if water quality for irrigation continues to deteriorate. However if water is saved through more efficient farming, as some farmers have already proved possible, it will help offset the impact on irrigation communities. However such efficiency savings may not yield enough water to support a healthy working River Murray.

There may be opportunities for industry restructuring, new industries, greater investment in research and technologies to improve water use efficiency and productivity, and upgrading of ageing infrastructure. Through this investment, the future of irrigation could be more prosperous. There will also be opportunities to meet global pressures for environmentally friendly produce.

There may be trade-offs between different irrigation areas. For example, the value of irrigated agriculture downstream may rise because environmental flows enable farmers to use better quality water at the same time as the asset base of upstream irrigators reduces because of water recovery.

Drinking water

One of the most important concerns is about the right of future Australians to enjoy clean, fresh drinking water—and to identify the changes needed along the whole river to
achieve this. There are many communities throughout the Basin that rely upon water drawn from rivers for domestic use. The higher the quality of water drawn, the lower the cost to treat the water for drinking. However, if town and urban water users wish to benefit from improved water quality, they must also contribute to environmental flows as well as with improving their water use efficiency.

Manufacturing industry
Manufacturing, especially in food products, is a growth industry in the Basin. It adds value to farm produce and creates jobs. It also relies on a secure supply of clean, fresh water. Along with urban water users and irrigators, manufacturing industries will be expected to use best technologies to improve water use efficiency and reduce water use.

Tourism and recreation
A healthy Murray that is safe for swimming and boating and well-stocked with fish and birdlife is beautiful to the senses. It will stimulate tourism and recreation along the length of the river. This implies a balance in some communities between growing tourism and less water for irrigation, industry and urban use. Varying water levels to improve river health may require a trade-off between the environment and activities like boating.

Different parts of the river
Environmental flows tend to concentrate their effect in particular stretches of the River Murray: a flood at one place does not always mean a flood at another place downstream.

During floods, water spills over the banks and spreads out across forests and floodplains, filling backwaters and billabongs, creeks and anabranches. Some of this water will be absorbed by the environment and some will evaporate. Much of it will gradually rejoin the river—often after the ‘front’ of the flood has passed. In this way, the flood becomes smaller as it passes down the river, but lasts longer. The Barmah-Millewa Forest is an example of this process. Because the forest holds back its water, it is hard to use environmental flows from Hume Dam to improve flooding along the river below the forest. The best way to wet downstream areas is by increasing River Murray flows with water from tributaries like the Goulburn, Murrumbidgee and Darling Rivers and using water held in storages like Menindee Lakes and Lake Victoria.

In building an approach for the whole River Murray, it may be better to focus environmental flows on significant sites initially, to ensure they are looked after. This means using different tactics to achieve specific benefits in different parts of the river. It also means different environments may have to ‘take turns’ to be watered.

However, developing an environmental flow plan that cares for the whole of the river system, not just sections of it, is a central issue for the community to consider. If water is not recovered from existing uses, the extra water needed to maintain upstream wetlands and floodplains will reduce the flow to the lower river and Murray Mouth, risking downstream environments and drinking water quality. If more water is provided, environmental benefits can be achieved along the entire river.
The river and its tributaries

The states are currently looking at the environmental flow needs of the tributaries independently of the Murray. Yet all changes in flows out of the tributaries affect the Murray itself to a greater or lesser degree, so it is vital to ensure that state and local decisions also consider downstream needs.

It is important to remember that the volumes discussed in Chapter 7 are the amounts to be returned to the River Murray, and not the amounts to be recovered from water users. The two are often different due to losses in the system. This means that larger amounts of water may need to be recovered from water users in different areas to return the agreed amount to the River Murray.

It is also important to remember that much of the water that once used to flow down the River Murray is now taken from tributaries, as well as the Murray itself. Water recovered from different locations across the Basin is subject to many considerations and trade-offs. An issue the community needs to consider is whether we can recover water fairly from all the water users, regions and states that divert it and if so, how.

Trade-offs between states

Water is diverted from the rivers of the Basin through a system of state licences. Each state has a different water licensing system, and different types of licences. The amount of water recovered may depend on where it comes from, and the type of licence.

Given the complexity, it is possible that the best result for the River Murray with the least overall impact on water users may be to concentrate impacts on only a few regions or communities. Other possible approaches could provide for a wider sharing of the impacts between states and regions, but at an overall greater cost to achieve an equivalent environmental benefit to the River Murray.

In deciding on environmental flows for the River Murray, the Ministerial Council will need to consider a range of options in order to achieve an acceptable balance of overall costs, sharing of impacts and environmental benefits.

Sovereignty of the states

Quite apart from the necessary trade-offs to be addressed in recovering any water for the environment, there is the matter of states’ sovereignty over water. The Murray-Darling Basin Agreement has the effect of modifying the exercise of the sovereign rights of the states in their ownership of water. By legislative compact, NSW and Victoria agree to share water equally at Albury, reserve the right to use their own tributary flows, and jointly commit to, as a minimum requirement, meeting fixed entitlements to South Australia.

The Ministerial Council’s decision on the Cap effectively limited any increase in diversions of water for use of tributary flows by states and the use of River Murray System waters, without changing the fundamental water sharing principles of the Agreement. These provide that the Murray-Darling Basin Commission, in exercising its powers of control over the waters of the Murray system, must ensure South Australia’s entitlements and overall system reserves are met, and must meet the requirements of NSW and Victoria to be able to use the waters to which they are entitled.

Any decision to change adopted River Murray operating procedures, for example to reduce use to provide environmental benefits, must be taken in the context of these provisions of the Agreement. This would require the agreement of NSW and Victoria on any proposal which had the effect of changing the volume or security of existing water entitlements. Resolution of this issue and the associated economic and social implications will be a critical matter for Ministerial Council’s consideration.

How should water be recovered?

One important issue is whether water recovery will be voluntary, compulsory or some combination of the two. The Ministerial Council seeks community views on this.

---

28 The Murray-Darling Basin Agreement provides the foundation for the Murray-Darling Basin Initiative. It puts in place a process for the effective management of the water, land and other environmental resources on a Basin-wide basis. The current version of the Agreement dates from 1992 (with later amendments) and sets out the powers of the Murray-Darling Basin Ministerial Council and Murray-Darling Basin Commission.
If it is decided to retrieve water for environmental flows compulsorily, the following mechanisms are available:

- reduction of entitlements without compensation;
- reduction of entitlements with compensation (compulsory acquisition of access rights); or
- targeted structural adjustment (closure of uneconomic irrigation areas).

If voluntary retrieval is decided on, the mechanisms could include:

- water efficiency savings by individuals;
- incentives to reduce water use; or
- government buy-back through the water market.

When environmental flows were established on the Snowy River, it was decided that in this case, governments would pay for the water acquired.

Any water recovery is bound to take place over a number of years. This could take around 10 years for smaller amounts (such as 350 GL and 750 GL a year) and 15 years for larger amounts (1500 GL a year). This would give water users and the market time to adjust.

The Ministerial Council has made it clear that it will develop approaches to water recovery that maximise benefits and minimise costs to water users.

The Cap, access rights to water and water trade

The Cap

The Cap has been determined for NSW, Victoria and SA whilst it remains to be finally determined in Queensland and the ACT. Complete implementation of the Cap throughout the Basin will guarantee security to water users, and protect environmental water from growth in diversions.

Access rights and water trade

In April 2002, the Council noted the importance of establishing water trading arrangements to best share the scarce water resources of the Basin. It acknowledged that the effectiveness of such arrangements will depend significantly on clear definition of access rights of water users, often called water property rights.

While the term ‘property rights’ is widely used, it is not well defined. In common usage people associate property with ownership, whereas rights to water have historically been rights to access.

The states and territory of the Murray-Darling Basin each have laws providing access rights to water, and allowing access rights to be altered. The laws in each State differ from one another, and some laws provide for compensation to be paid under certain circumstances where access rights might be altered.

- In NSW and Queensland, for example, access rights are guaranteed for up to 10 years under their various arrangements, and changes within that period can attract compensation rights. They both have provisions for the Government to compulsorily acquire rights, and to pay compensation for that acquisition.

- In Victoria access rights differ significantly depending whether they are issued from an unregulated stream or dam under a stream flow management plan, or whether they are part of a bulk entitlement owned by a Water Authority. Some access rights may be altered without compensation at any time a stream flow management plan is changed, or in order to meet the Murray-Darling Cap. Others may not be permanently altered and would have to be bought from their owner.

- In SA and the ACT access rights may be altered without compensation when a management plan is changed or where there is a demonstrated environmental need to permanently reduce water use rights.

There is a need to clarify the nature of the Basin’s many kinds of access rights to water, and to establish a way to relate different types of rights. This is vital so that any recovery is on a fair basis and allows for efficient water trading.

The names of these rights vary, as does the security of supply, the uptake of these rights and the tenure of these rights. Examples are:

- New South Wales—‘high security’ and the less secure ‘general security’ rights;
• Victoria—‘water right’ and the less secure ‘sales’ water;
• South Australia—‘high security water entitlements’; and
• Queensland—‘water allocations’.

The resolution of the question of access rights to water is a major issue facing the Ministerial Council and Basin governments. Developing a single access right for the Basin, while attractive, is probably less practicable than developing a single, unified system of access rights in which the rights associated with each of the many water products in the Basin are clarified and clearly communicated. This clarification should clearly explain the process for:
• changing these rights—including provision for compensation; and
• conversion of these rights (e.g., trading between different rights).

The advantages of a unified system of access rights are:
• a common understanding of what it means to have a right to extract water in the Murray-Darling Basin;
• more certainty about the nature of the right held and the provisions for compensation if these rights are changed in a specified period;
• to support the development of an efficient and expanded water market in the Murray-Darling Basin restricted only by the rivers’ geography; and
• improved effectiveness of water use throughout the Basin.

In April 2002, the Council of Australian Governments (COAG) agreed to investigate opportunities and impediments to better define and implement access rights to water regimes throughout Australia. The Murray-Darling Basin Commission will use and build upon this work as it relates to its work on environmental flows.

The impact of water recovery

Before any decision is made about recovering water for the environment, a clear understanding of costs and benefits, and of community attitudes and wishes is essential. Work is planned to study the social and economic consequences of recovering water from users. This will explore both the social and economic effects of the three reference points: 350 GL, 750 GL and 1500 GL a year on average.

Many issues and questions need to be resolved before the costs and benefits to different parts of the community are clear. These include things like how water is to be recovered, cost sharing arrangements, access rights to water and structural adjustment packages. Some implications of water recovery are outlined below.

Your thoughts on these matters are central and are sought during the community engagement process (see Chapter 11).

The cost of doing nothing

The consequences of doing nothing more than we have already done for environmental flows were considered by the Murray-Darling Basin Commission’s scientific advisers. They found:

Doing nothing more than maintaining the current Murray-Darling Basin Cap on diversions, and maintaining current river operations, will lead to a continuing decline in ecological condition. If no further imposts on the river system are allowed (i.e. no increases to water abstraction, no more dams, no worsening of water quality, no more exotic pests) then ecological condition will stabilise at a level worse than today within a few decades.29

Doing nothing is also costly. The continued degradation of river health and water quality will cut into agricultural production, recreational activities, fishing, tourism, cultural and social values.

Costs and benefits

The social, economic and cultural costs and benefits of the three reference points chosen by the Ministerial Council as indicators for the possible recovery of water for the River Murray (350 GL, 750 GL and 1500 GL a year) will be thoroughly assessed between now and October 2003.

Our scientific advisers30 have assessed the likely ecological outcomes of water recovery

---

29 Jones G. et al., 2002
30 Jones G. et al., 2002
and we have begun to investigate the economic and social implications. As described in Chapter 7, more work will be carried out in the coming year to make sure we understand the specific benefits and costs of the three reference points, so the community can be involved in making the best choices.

The aim of all these investigations is to ensure any environmental measures developed yield the greatest benefits with the least impact on water use. However, impacts on particular parts of the community will vary, depending on how much water is recovered, where from, how it is recovered (whether voluntary or compulsory), the way access rights to water are clarified and whether or not recompense is provided to affected communities.

The Ministerial Council will need to consider how an acceptable balance between the overall costs, sharing of impacts and environmental benefits can be achieved.

Other costs and benefits and strategies to manage the impacts will be developed through discussions with the community. If properly implemented, environmental flows will be a positive investment in the long-term future of the river and the prosperity of the communities it supports.

Who will pay?

The answer to the question ‘who is going to pay?’ for environmental flows will depend on responses to this issue throughout the community engagement process. Once the methods of water recovery and payment have been resolved, cost-sharing arrangements can be developed between governments, water users and other sections of the community. If governments are going to contribute, we need to consider how the financial responsibility should be shared amongst them. It could be:

- shared equally;
- determined by the volume of water used in each state/territory;
- determined by the location and extent of environmental benefits in each state; or
- some other arrangement.

We also need to determine how the financial responsibility will be shared between water users and the Australian community. The Ministerial Council is keen to have your views on the case for and against various ways to recover water for environmental flows, and how we can best achieve a healthy River Murray.
Chapter 9. Making it Work

One Basin, one river system, one environment

It is important to recognise we are dealing with one Basin, one river system, one environment. Individual states and regions are making good progress in protecting their own rivers and catchments, but none of them look at the overall interactions between the tributaries and the resulting impact on the River Murray.

This environmental flows discussion is important to make sure that the River Murray is not overlooked in all the processes surrounding it.

Any water recovered for environmental flows must be looked after with one Basin, one river system, one environment in mind. This could be done in a number of ways, such as:

- establishing an independent 'bank' for environmental water;
- through the Environmental Manager function within the Murray-Darling Basin Commission; or
- managing the water through community groups such as the NSW Murray Wetlands Working Group.

The Council is keen to have your views on the best way to ensure that environmental flows are managed for the benefit of the River Murray.

Lifting our game

The provision of water to the environment needs to be well-targeted so that it delivers the maximum benefit and maintains the different natural habitats along the river. In the last decade a huge amount of knowledge has been assembled on the environmental needs of the River Murray and its floodplain.

As we continue to expand this knowledge, our ability to get ever-better ecological results from the flows and other actions will increase.

It has been proposed that the 'environmental water' that has been used along the River Murray and its tributaries, and the environmental benefits achieved, be reported annually. This report would also cover changes to structures and other environmental flow initiatives to increase or decrease flows to wetlands, as well as an estimate of the water consumed or saved.

Using this information, the Murray-Darling Basin Commission can study the cumulative effectiveness of environmental flows. The Sustainable River Audit (SRA) being developed by the Murray-Darling Basin Commission will describe and monitor river health and ecological condition for each major river valley and will include indicators like hydrology, water quality, insects, fish and habitat. Each state and territory is also undertaking improvements in its river health monitoring programs to reflect the specific requirements of each catchment. These programs will show whether the ecological condition of our rivers is improving or not.

The precise environmental flow needs of the River Murray are not yet known. However there is plenty of evidence that the way we currently manage the rivers will cause their health to deteriorate further. An annual environmental flow report, combined with the SRA, will give vital feedback to guide future decisions in an adaptive management framework ('learning by doing') and improve the effectiveness of environmental flows in the River Murray and the Murray-Darling Basin as a whole.

Identifying environmental water

An essential task in managing environmental flows is to know where the water is held, where it is going, how it is being used and—above all—what benefits we and our environment gain from it.

Whether environmental water comes from water savings or from water users, clear guidelines will be developed on how and where the water is stored and the conditions under which it may be held, released or loaned to irrigators. These are being tested with the environmental water for the Barmah-Millewa Forest. One possibility is to identify environmental water, so we can
protect it as it makes its way down the Murray, performing its various environmental tasks.

Another possibility is to enable environmental water to be used by irrigators after it has performed an environmental function. This approach may reduce the cost of retrieving water, and the impact on irrigators, particularly if the water is unlikely to perform any real environmental function further down the river.

If we do nothing, river health will inevitably deteriorate.
Chapter 10. New Horizons and Opportunities

If the community of the Murray-Darling Basin develops and puts into action a plan for a healthy working River Murray, it will be the first time such an undertaking has been successful in one of the world’s great river catchments. This will be something for all Australians to take pride in—as they were proud of the engineering feats of the Snowy Mountains hydroelectric scheme half a century ago, and the 1956 Melbourne and 2000 Sydney Olympics.

This undertaking, combined with other changes taking place in society, will allow opportunities to flow—to lift irrigation to a whole new level of efficiency and sustainability and to revitalize communities with new industries and modern technology. It can help build new industries, jobs and skills across the Basin, bolster the community’s prosperity, attract new residents and create a better environment for our children.

The Basin community will need to be supported with new tools and skills to enable them to adjust—new products and plant varieties, new technologies, computing skills and better export arrangements.

This chapter outlines a few of the opportunities to build a more prosperous, strong and sustainable community in the Murray-Darling Basin, building upon the changes needed to create a healthy working River Murray.

Knowledge exports

The world is becoming desperately short of freshwater, arable land and trees. All countries are seeking ways to produce more food from less land and water, and to conserve their environments. Answers to their needs could come from the people and sustainable industries of the Murray-Darling Basin.

Our mining industry now earns $2 billion a year in exports of knowledge about cleaner, more efficient ways to mine. Likewise, the Basin could become a leading source of advice and technology for better ways to manage land and water, plants and animals, for cleaner, greener ways to live and operate our industries. Creating a healthy working river offers an opportunity to turn our knowledge about landcare, catchment and water management, and sustainable production into a major export industry.

New industries

There are many opportunities for new industries in a more sustainable Basin. Some examples follow.

Global demand for new flavours and spices is booming—and Australia, in its native plants, has many unfamiliar and exotic products. Scientists, farmers, Aboriginal people and supermarkets are already working to build a native foods industry which, like flowers or wine, can bolster farm income while helping to save water.

The CSIRO says that our saline groundwater contains valuable minerals and industrial chemicals as well as common salt. Extracting these will not only save Australia hundreds of millions of dollars in industrial imports, it will also help pay for the fight against salinity.

Advances in smart food technology are creating new ways to add value to many of our traditional products before they leave the Basin, so retaining the value and jobs close to home. This means we can make more money for a given amount of water.

Farm livestock once produced mostly meat, milk or wool. They are now being used to produce high-value pharmaceuticals and industrial chemicals—yielding higher returns from the water used to grow them and their feed. Aquaculture in both salt and freshwater is expanding as wild fish stocks dwindle and prices rise.
Chapter 11. Over to You

The decisions

The Ministerial Council is asking for the advice of the community about how governments should respond to the issue of environmental flows for the River Murray. There are three main decisions to be made:

• Do we, as a community, wish to recover water for the environment and other values of the River Murray?
• If so, how should we recover water?
• If we recover water, how do we fairly share the costs and benefits across the community and nation?

Any decision (including one to do nothing) will affect the environment, the economy, communities and individuals. It is not just about how much (if any) water we recover, but about the trade-offs we are willing to make between the different values we hold for the River Murray.

How will a decision be made?

The Ministerial Council, in consultation with its governments and having listened to what the community has to say, intends to consider this issue at its meeting in October 2003.

The Council recognises this is a very important and complex matter and wants the community closely involved. This will allow community values, knowledge and aspirations to be combined with scientific and technical knowledge in the search for the best options.

A Community Reference Panel has worked with the Commission throughout the development of this discussion, providing a range of community viewpoints. Its members come from across the Basin, from many industries, interests and perspectives. Also, the Community Advisory Committee of the Ministerial Council (CAC) will continue to provide advice on the process and issues associated with environmental flows.

An Independent Community Engagement Panel (ICEP) has been chosen to help effective discussion to take place. These citizens are there to help the community gather the information it needs to discuss the issues, and make sure that its views and information are taken into account in any decisions made.

Independent Community Engagement Panel (ICEP)

Pam Robinson, Chair
Graeme Kelleher
George Warne

Website: www.thelivingmurray.mdbc.gov.au/icep
Email: icep@mdbc.gov.au
Phone: 1800 687 044
Facsimile: 02 6248 8053
Mail address: The Living Murray, GPO Box 409, Canberra ACT 2601

Community engagement will be carried out in three stages. Each of the stages will feed into the decision-making process including the Ministerial Council meeting in October 2003, when the Council will consider the issue of environmental flows. The three stages are shown in the flow chart on page 45.
Stage 1: Inform and engage–July to December 2002

During Stage 1 the Murray-Darling Basin Commission will work to inform the community of the work and knowledge that has led to the recognition of the need for the Australian community to consider what it wants for the future of the River Murray. Community engagement in this Stage will also enable the community to inform the Murray-Darling Basin Commission of its knowledge, values, aspirations, issues, information needs and concerns.

During Stage 1 the environmental, social and economic implications of each of the three water recovery reference points (350 GL, 750 GL and 1 500 GL a year) will be explored with local communities and the broader Australian community. The direction of this ongoing work will be guided by the knowledge gained from communities as well as the outcomes it produces.

The focus in Stage 1 will be on those communities and sectors most likely to be directly affected by any decision about recovery of water for the environment.

An Issues Log will be created as a central ‘noticeboard’ for community views and information, so it can be fed into the discussion and decision-making process. The Log will be updated regularly and will be publicly accessible on the web, in local libraries and local papers. The community can check the Log to see what issues have been raised and by whom, what information we have on these issues and what work is being done to provide answers.

The initial discussions from this stage will feed into the next Council meeting, in November 2002. A progress report on community engagement will be provided to the Ministerial Council at this time and the response of Council will set a framework for further discussions and investigations.

Stage 2: Propose–April to October 2003

Stage 2 will commence in April 2003, after further information and analysis has been made available. This will include a second document on environmental flows which will clearly set out the costs and benefits of the three reference points (350 GL, 750 GL and 1 500 GL a year) so that the balances can be more easily weighed up.

During this stage, community and government agencies will work together to:
- evaluate the benefits and impacts of the three reference points;
- seek views on a preferred way forward to address local and system-wide issues;
- establish what’s needed to manage and keep track of the social, cultural, economic and environmental impacts of any decision;
- inform the Ministerial Council meeting of October 2003.

There will continue to be a high focus on communities throughout the Basin, but it will also include the wider Australian community. Any decisions made about recovery of water are also likely to come at an economic cost—and this cost needs to be shared in a way acceptable to the Australian community.

Stage 3: Implement–after October 2003

Stage 3 will commence after the October 2003 Ministerial Council meeting where Council will consider the outcomes of the engagement process and the recommendations brought before it by the Murray-Darling Basin Commission. During this stage the details of and timeframes for the implementation of Council decisions will be negotiated with the community.
Community Engagement

Environmental Flows and Water Quality Objectives for the River Murray

Opportunities for community input

**STAGE**

**STEPS**

- **Stage 1: Inform & Engage**
  - inform community of the work and knowledge that has led to the recognition of the need for the Australian community to consider what it wants for the future of the River Murray;
  - inform Murray-Darling Basin Commission of the community’s knowledge, values, aspirations, issues, information needs and concerns;
  - provide progress report on community engagement to Ministerial Council meeting in November 2002 and set a framework for further discussions and investigations.

- **Stage 2: Propose**
  - Community and government agencies will work together to:
    - provide a comprehensive analysis for the provision of water to the River Murray using three reference points (350 GL, 750 GL and 1,500 GL a year);
    - evaluate the benefits and impacts of the three reference points;
    - seek views on a preferred way forward to address local and system-wide issues;
    - establish what’s needed to manage and keep track of the social, cultural, economic and environmental impacts of any decision;
    - inform the Ministerial Council meeting of October 2003.

- **Stage 3: Implement**
  - consolidate period to prepare the documentation necessary to inform Stage 2.
  - negotiate details of and timeframes for the implementation of Council decisions.

**Ministerial Council Meeting**

- will consider the outcomes of the engagement process and the recommendations brought before it by the Murray-Darling Basin Commission.

**Contact**

- Website: [www.thelivingmurray.mdbc.gov.au](http://www.thelivingmurray.mdbc.gov.au)
- Email: icep@mdbc.gov.au
- Phone: 1800 687 044
- Facsimile: 02 6248 8053
- Mail Address: The Living Murray, GPO Box 409, Canberra ACT 2601

---

2002

- July
- August
- September
- October
- November
- December

2003

- April
- May
- June
- July
- August
- September

2003 October

- will consider the outcomes of the engagement process and the recommendations brought before it by the Murray-Darling Basin Commission.

November 2003- Onwards

- consolidate period to prepare the documentation necessary to inform Stage 2.
- negotiate details of and timeframes for the implementation of Council decisions.
Who is involved?
All Australians have interests in the River Murray and the Murray-Darling Basin. A key part of the decision making process is to balance the interests of those living in local communities with what may be seen as the national interests, and try to ensure there is fairness and equity in the result. Community engagement is an opportunity for all interests to be heard. It is essential for those communities and individuals likely to be most affected to be able to participate directly. It is also important to include people who may not normally have a chance to contribute their knowledge, values and aspirations such as Indigenous communities and young people.

How can I be involved?
Anyone wishing to be a part of this community discussion can:
• attend community forums, workshops and information sessions to be held across the Basin and in nearby communities (further information on these sessions is available from the contacts shown);
• send written submissions to the Ministerial Council (at the address shown);
• ask Murray-Darling Basin Commission staff and the Independent Community Engagement Panel (ICEP) to come and discuss the issues with local groups or communities;
• contribute to public debate on our website: www.thelivingmurray.mdbc.gov.au (all comments received will be published here);
• take part in special tele-conferences with scientists, government representatives and community leaders; and/or
• contribute to public discussion through the media.
All comments received, including written submissions, will be made available on our website unless you ask us not to.
For further information on the issue, look on The Living Murray website or contact the Murray-Darling Basin Commission at the address below.

Contacts
Website: www.thelivingmurray.mdbc.gov.au
Email: icep@mdbc.gov.au
Phone: 1800 687 944
Facsimile: 02 6248 8053
Mail address: The Living Murray, GPO Box 409, Canberra ACT 2601
Glossary

Adaptive management – a management approach based upon ‘learning by doing’.

Anabranch – a secondary river channel that usually runs parallel to the main channel, and which flows only during flood conditions.

Basin – the total water catchment area of the rivers of the Murray-Darling.

Catchment – the area of land drained by a river and its tributaries.

Community engagement – a plan for public discussion and debate about the future health of the River Murray and its tributaries.

Cap – the volume of water that would have been diverted under 1993-94 levels of development. In unregulated rivers this Cap may be expressed as an end-of-valley flow regime. This is the way it has been applied, with small variations, in NSW, Victoria and South Australia which combined account for 94 per cent of the Basin’s diverted water. Queensland and the ACT take a total of 6 per cent, and their Cap and the way it is determined has not yet been finalised.

Diversions – the removal and use of water from a river.

Ecosystem – communities of life forms and their physical environment which interact.

Environmental flow – any river flow pattern provided with the intention of maintaining or improving river health.

GL (‘gigalitre’) – 1 billion litres (1000 million litres), the amount of water in 1 000 Olympic-sized swimming pools; the total average run-off in the Murray-Darling Basin is approximately 24 300 GL a year.

Groundwater – underground water, either flowing or still.

Healthy working river - a healthy working river is one that is managed to provide a sustainable compromise, agreed to by the community, between the condition of the river and the level of human use.

Habitat – a type of environment in which particular animals or plants live and grow.

Hydrology – the study of water flows.

ICEP – the Independent Community Engagement Panel, a group of three independent individuals appointed to facilitate and help inform community discussion of this issue.

Integrated catchment management – a process which enables people to act together to manage the natural resources of their catchment.

Median – the value in the middle of a set of values that are ranked from lowest to highest.

ML (‘megalitre’) – 1 million litres, the amount of water in one Olympic-sized swimming pool.

Murray-Darling Basin Agreement – the Murray-Darling Basin Agreement provides the foundation for the Murray-Darling Basin Initiative. It puts in place a process for the effective management of the water, land and other environmental resources on a Basin-wide basis. The current version of the Agreement dates from 1992 (with later amendments) and sets out the powers of the Murray-Darling Basin Ministerial Council and Murray-Darling Basin Commission.

Murray-Darling Basin Ministerial Council – (the ‘Ministerial Council’) consists of the ministers responsible for land, water and environmental resources in each of the Commonwealth, New South Wales, South Australia, Victoria, Queensland and Australian Capital Territory Governments.

MW (‘megawatt’) – a unit of electric power.

Profit at full-equity – the amount of farm profit generated assuming there are no debts to pay off. It provides an indication of the underlying profitability of different landscapes and industries.
Regulation – the control of the natural flow of a river using (e.g.) dams and weirs.

Salinity – the concentration of salt in soil or water.

Sustainability – managing our natural resources in a way that maintains their environmental, economic, social and cultural values so that they continue to be available in the long-term.

Tributary – creek or river flowing into a larger river.

Wetland – land flooded with temporary or permanent water, and the community of plants and animals that lives in it.
References


Crabb P., 1997. Murray-Darling Basin Resources. MDBC.

Department of Water Land and Biodiversity Conservation (South Australia), 2002. ‘Murray Mouth Perspectives’. [Extract from paper ‘Ngarrindjeri Culture’].


The Living Murray

Feedback Form

Please provide your feedback by 1 October 2002 to allow it to be included in the information provided to the Ministerial Council meeting one month later.

What further information would you like?

________________________________________________________________________

How would you prefer to receive information?

________________________________________________________________________

Would you like to be involved in the ongoing process for discussing and deciding about environmental flows?  Yes/No

If yes, how would you like to be involved?

________________________________________________________________________

Which of the following reaches of the River Murray System do you have a particular interest in?

☐ Upper reaches to Albury/Wodonga
☐ Albury/Wodonga to Echuca
☐ Echuca to SA Border
☐ SA Border to Waikerie
☐ Waikerie to river mouth
☐ Lower Darling and Great Anabranch of the Darling River
☐ The whole River Murray System

OR

☐ The whole Murray-Darling Basin
☐ Darling River above Menindee Lakes

The document raises a number of issues and questions that we need to consider (see page 3). Are there other issues you think should be considered?  If yes, what are the issues?

________________________________________________________________________

Your contact details

To receive further information please complete the following:

Name:                                          
Address:                                       
Phone: Email (if available)                    

Please send your completed form by 1 October 2002 to:
The Living Murray, GPO Box 409, Canberra ACT 2601
Fax: 02 6248 8053
Email: icep@mdbc.gov.au