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The Parliament of the Commonwealth of Australia

# **Getting Water Right(s) – The future of rural Australia**

**Inquiry into future water supplies for Australia's rural industries  
and communities**

House of Representatives  
Standing Committee on Agriculture, Fisheries and Forestry

June 2004  
Canberra

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**Cover Photo:**

The cover includes details from a painting which shows the River Murray in a low flow period at Berri SA in 1914. The natural condition of the Murray River has historically included such periods of low flow.



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## Foreword

The last ten years have seen significant progress in urban water reform. However, progress with rural water reform has been much slower. The 2002-03 drought, one of the most severe in Australia's history, brought many of these issues to a head.

In many ways this Inquiry was overtaken by events with the announcement by COAG in August 2003 of the new National Water Initiative. I don't say that in a negative way. Quite the opposite. I was very pleased that the Government reacted so quickly and positively as the drought took hold and the issue of rural water supplies became the subject of intense public interest and debate.

From evidence presented to the Committee it became clear that the greatest impact on future rural water supplies would come from: water allocations to the environment; water trading; and additional water 'created' through improvements in water use efficiency. These complex issues are covered in depth in this report. The most pressing issue highlighted by the majority of submissions and public hearings, however, was the need for secure, perpetual water rights, as is highlighted in the title of the report.

In April 2004 the Committee presented an interim report to the Parliament, focussing on the Living Murray Initiative. The interim report recommended the postponement of plans to increase environmental river flows to the River Murray until significant data is collected and analysed to determine the most appropriate way forward.

The Committee is not swayed by the emotions of some commentators who portray the River Murray as dead or dying. Indeed, the steady flows in the River Murray today are in stark contrast to the trickle reported by Sturt in his journals more than a century and a half ago. The Committee understands variations in flow are quite natural and not necessarily an indicator of poor river health. The significant progress which has been achieved in other areas of river health, such as controlling salinity, should be more widely acknowledged and recognised.

Let me make it perfectly clear that the Committee is not against more water for the River Murray. However, we believe that thorough research must be done before future decisions can be made with full confidence. The River Murray has shown great resilience. It is better to take the time now, to make sure we get it right for the future. Rural water and the communities which rely on continuous supply are too important to be subjected to hurried, piece-meal decisions made on the basis of incomplete data.

Today there is widespread agreement that Australia's water resources must be utilised on a sustainable basis, so that future generations can continue to benefit from that resource. However, there is still vigorous and healthy debate about exactly how 'sustainability' should be determined.

Getting the agreement of all stakeholders on the right balance between the needs of the environment and the needs of water users for the long-term sustainability of water resources is the biggest challenge facing Australia's water managers. But I am confident that with goodwill and understanding the right decisions will be made. This report, with its 30 specific recommendations is a useful and timely contribution to the decision-making process.

I would like to recognise and thank the many people who contributed to this Inquiry, and made it such a worthwhile project. I would also like to thank my colleagues on the Committee for the interest they took in this Inquiry and the support and assistance they provided to me. I also want to extend the thanks of the entire Committee to the hard-working, diligent members of the Secretariat who have professionally supported and facilitated our work.

I am confident that through this Inquiry the Committee has been able to make a worthwhile contribution to the debate on the issue of future water supplies for rural industries and communities—an issue of vital importance to all Australians.

Kay Elson, MP

Committee Chair





## **Membership of the Committee**

**Chair** Mrs Kay Elson MP

**Deputy Chair** Hon Dick Adams MP

**Members** Mr John Forrest MP

Mr Patrick Secker MP

Mrs Joanna Gash MP (to  
02/12/2004)

Mr Sid Sidebottom MP

Mrs Sussan Ley MP

Hon Wilson Tuckey MP (from  
02/12/2004)

Mr Harry Quick (from 13 May 2004)

Mr Tony Windsor MP

Mr Alby Schultz MP

Mr Christian Zahra MP (to 13 May  
2004)

## **Committee Secretariat**

**Secretary** Mr Ian Dundas

**Inquiry Secretary** Mr Alex Olah

**Research Officer** Mr Bill Pender

**Administrative Officers** Mrs Marlene Dundas

Ms Jeannie Brooks





## **Terms of reference**

The House of Representatives Standing Committee on Agriculture, Fisheries and Forestry is to inquire into the provision of future water supplies for Australia's rural industries and communities, particularly:

- The role of the Commonwealth in ensuring adequate and sustainable supply of water in rural and regional Australia.
- Commonwealth policies and programs, in rural and regional Australia that could underpin stability of storage and supply of water for domestic consumption and other purposes.
- The effect of Commonwealth policies and programs on current and future water use in rural Australia.
- Commonwealth policies and programs that could address and balance the competing demands on water resources.
- The adequacy of scientific research on the approaches required for adaptation to climate variability and better weather prediction, including the reliability of forecasting systems and capacity to provide specialist forecasts.





## List of abbreviations

ABARE	Australian Bureau of Agricultural and Resource Economics
ABS	Australian Bureau of Statistics
AMC	Australian Management Consolidated Pty Ltd
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
AWA	Australian Water Association
BRS	Bureau of Rural Sciences
CDMO	Centre for Dynamical Meteorology and Oceanography of Monash University
COAG	Council of Australian Governments
CRC	Cooperative Research Centre
CSIRO	Commonwealth Scientific & Industrial Research Organisation
DAFF	Department of Agriculture, Fisheries and Forestry (previously Agriculture, Fisheries and Forestry – Australia or AFFA)
DEH	Department of the Environment and Heritage (previously known as Environment Australia or EA)
EM	EM (Ecology Management) Pty Ltd
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
GMWA	Goulburn Murray Water Authority

IAA	Irrigation Association of Australia
IPCC	Intergovernmental Panel on Climate Change
LWA	Land and Water Australia
MDBC	Murray-Darling Basin Commission
MDBMC	Murray-Darling Basin Ministerial Council
MFAT	Murray Flows Assessment Tool
MIL	Murray Irrigation Limited
NAP	National Action Plan for Salinity and Water Quality
NCC	National Competition Council
NCP	National Competition Policy
NFF	National Farmers' Federation
NHT	Natural Heritage Trust
NLWRA	National Land and Water Resources Audit
NSWIC	New South Wales Irrigators' Council
NWI	National Water Initiative
PIAC	Public Interest Advocacy Centre
QCC	Queensland Conservation Council
QFF	Queensland Farmers' Federation
SAFF	South Australian Farmers Federation
SERP	Socio-economic Reference Panel
SRIDC	Southern Riverina Irrigation Districts Council
SRP	Scientific Reference Panel
VFF	Victorian Farmers Federation
WWF	World Wide Fund for Nature



## List of recommendations

Recommendation 1 ..... 15

The Committee recommends that the Commonwealth Government, through the Council of Australian Governments and in consultation with all key stakeholders, provides clear definitions of the fundamental concepts underlying water resource management.

Recommendation 2 ..... 19

The Committee recommends that a top priority of the National Water Initiative should be to fund the scientific research based on physical data collection necessary to determine what level of water use is sustainable in each of Australia's major working rivers and aquifers.

Recommendation 3 ..... 30

The Committee recommends that Annual Reports of the Murray-Darling Basin Commission contain updated details of the extraction of water in Basin rivers, expressed as a percentage of typical river flows.

Recommendation 4 ..... 50

The Committee recommends that the Commonwealth urges the Council of Australian Governments to:

- undertake a national public communications strategy to disseminate the policies and goals of the National Water Initiative; and
- provide formal avenues for public feedback and consultation under the National Water Initiative.

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**Recommendation 5 .....55**

The Committee recommends that the Commonwealth, as part of the National Water Initiative, ask the Council of Australian Governments to provide:

- that requirements for receipt of National Competition Payments are transparent and clearly spelt out in each phase of the reform process and developed in consultation with water users, including farmers and should include positive initiatives that have the potential to provide more water, such as stormwater harvesting and grey water recycling;
- the tagging of National Competition Payments to specific verifiable outcomes, and supplied directly to the end-users; and
- that National Competition Payments are withheld where those outcomes are not met.

**Recommendation 6 .....55**

The Committee recommends that the Commonwealth, as part of the National Water Initiative, considers direct funding for natural resource management, including National Competition Payments, directly to regions according to their targeted needs.

**Recommendation 7 .....61**

The Committee recommends that the Commonwealth urge the Council of Australian Governments, to adopt a national water pricing framework as part of the National Water Initiative, based on the principle of full cost recovery, and that:

- Water pricing reflect operational costs and asset renewal, with externalities dealt with through water use licences;
- The implementation of full cost recovery pricing take into account different historical and regional circumstances such as monopoly markets without market discipline; and
- All pricing regimes are transparent and open to full public scrutiny.

**Recommendation 8 .....63**

The Committee recommends that the Commonwealth, working through the Council of Australian Governments, develop a comprehensive national vision for water in Australia, balancing the needs of the environment, irrigated agriculture and rural and urban communities.



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- Recommendation 9 .....66**
- The Committee recommends that, as a matter of priority, the Commonwealth Government create a ministerial portfolio for water, with clear responsibility for the formulation and management of water policy at the federal level.
- Recommendation 10 .....78**
- The Committee recommends that the Commonwealth urge the Council of Australian Governments to give top priority to the establishment of a clearly defined and robust system of perpetual water access rights under the National Water Initiative, and that the Robust Separation model proposed by the CSIRO be evaluated as a possible system for establishing such water access rights.
- Recommendation 11 .....84**
- The Committee recommends that the Commonwealth Government, working through the Council of Australian Governments, ensures that the system of uniform water access entitlements adopted under the National Water Initiative are fully transferable and tradable, where practical.
- Recommendation 12 .....85**
- The Committee recommends that the Commonwealth ask the Council of Australian Governments, as part of the National Water Initiative, to develop a strategy in consultation with stakeholders, which deals with ‘sleeper’ and ‘dozer’ entitlements.
- Recommendation 13 .....88**
- The Committee recommends that the Commonwealth, as part of the National Water Initiative, ask the Council of Australian Governments to assess the need to develop policies and measures to prevent undue concentration of ownership of water entitlements in the marketplace.
- Recommendation 14 .....91**
- The Committee recommends that the Commonwealth ask the Council of Australian Governments, as part of the National Water Initiative, to:
- facilitate the expansion of water markets and water trading to the greatest extent possible;
  - establish appropriate trading rules and administrative systems in full consultation with market participants and rural communities; and

- establish trading in water free from constraints, other than in accordance with the prescribed trading rules.

**Recommendation 15 ..... 97**

The Committee recommends that the Commonwealth Government, working through the Council of Australian Governments, seek to establish a national scheme for investment in on-farm water use efficiency, utilising established on-farm planning processes, with water savings becoming the property of government in direct proportion to the level of public investment.

**Recommendation 16 ..... 103**

The Committee recommends that the Commonwealth Government facilitate the establishment of a Cooperative Research Centre for Groundwater Management which would:

- Map Australia's groundwater resources;
- Investigate the current and potential use of Australia's groundwater resources; and
- Research the use of aquifers for water storage purposes.

**Recommendation 17 ..... 105**

The Committee recommends that the Commonwealth Government, working through the Council of Australian Governments, seek to establish a national scheme for investment in water infrastructure, giving priority to the development of more efficient water storage and the piping of open channels.

**Recommendation 18 ..... 106**

The Committee recommends that the Commonwealth ask the Council of Australian Governments, as part of the National Water Initiative, to ensure that income accruing to governments from the sale of 'saved' water, either on-farm or off-farm, should be used to upgrade other water-related infrastructure, rather than go into consolidated revenue.

**Recommendation 19 ..... 113**

The Committee recommends that the Commonwealth Government investigate the introduction of a scheme of investment in National Water Bonds, with a view to implementing said scheme in 2005, as part of the National Water Initiative, and seek to encourage fund managers to invest in water infrastructure.

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**Recommendation 20 ..... 115**

The Committee recommends that the Commonwealth Government urge the Council of Australian Governments to establish programs to investigate the development of irrigated agriculture in northern Australia as part of the National Water Initiative.

**Recommendation 21 ..... 120**

The Committee recommends that the National Water Initiative incorporate a national policy on the recycling and reuse of stormwater and treated effluent around Australia.

**Recommendation 22 ..... 123**

The Committee recommends that the proposed national scheme for water infrastructure investment includes solar desalination programs, based particularly on solar energy, but also based on wind and other energy sources. Farm-scale desalination units should also be included in such a scheme.

**Recommendation 23 ..... 128**

The Committee recommends that the Commonwealth Government, working through the Council of Australian Governments, encourages the adoption of rainwater tanks as a mandatory water saving measure throughout Australia, subject to appropriate health codes being in place.

**Recommendation 24 ..... 129**

The Committee recommends that the Commonwealth Government propose that the Council of Australian Governments, as part of the National Water Initiative, develop strategies for establishing a water literate society through:

- public awareness campaigns;
- public information services; and
- the provision of extension services throughout rural and regional Australia to promote water use efficiency techniques and technology.

**Recommendation 25 ..... 131**

The Committee recommends that the Commonwealth Government pursue through the Council of Australian Governments, as part of the National Water Initiative, the development of:

- a national training and education strategy for the irrigation sector; and

- a national system of accreditation for irrigators.

**Recommendation 26 ..... 135**

The Committee recommends that Commonwealth taxation laws be amended to provide:

- that water sold to meet specified environmental objectives, or to an environmental trust, has tax deductible status in the same manner as a charitable donation; and
- the establishment of a system of tax rebates to encourage the uptake of water use efficient technology and practices in households and businesses.

**Recommendation 27 ..... 140**

The Committee recommends that the Commonwealth Government, through the Council of Australian Governments, establishes a special Task Force to identify solutions to the issue of loss of prime agricultural land through ‘urban creep’.

**Recommendation 28 ..... 148**

The Committee recommends that the Commonwealth Government provides funding to investigate the development of, and the funding requirements for, small scale water schemes to assist Councils to provide high quality reticulated potable water to small regional communities.

**Recommendation 29 ..... 180**

The Committee recommends that the Commonwealth Government:

- recognises research into climate issues, including climate change and its potential impact on future water supplies, as a national research priority; and
- encourages relevant research, academic and private sector bodies to develop an application to form a Cooperative Research Centre on Climate, with a key focus on climate modification.

**Recommendation 30 ..... 186**

The Committee recommends that the Commonwealth Government works through the Council of Australian Governments to develop a national research strategy that prioritises and coordinates all research activities on water, as an integral part of the National Water Initiative.

## Introduction

### Overview

- 1.1 The Minister's reference to the Committee in mid-2002 was timely. The issue of rural water supplies was high on the public agenda at that time, with a large part of Australia in the grip of a harsh drought, which continued well into 2003 and in some areas even extended into early 2004.
- 1.2 While periods of low rainfall are recognised as a normal part of Australia's climate cycle, this drought was one of the most severe on record with some commentators describing it as a 'one-in-a-hundred-years' event. This was reflected in the level of government assistance provided to affected farmers—by August 2003 the Commonwealth Government had set aside \$1 billion for this purpose.<sup>1</sup>
- 1.3 This severe drought revived the debate on drought-proofing Australia. There were calls to turn rivers inland and to divert water from rivers in the north to the agricultural regions of the south western and south eastern parts of Australia.

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1 The Minister for Agriculture, Fisheries and Forestry, the Hon Warren Truss MP, media release '*\$1 billion commitment to help farmers in drought*', 15 August 2003

- 1.4 In response, a group of scientists put the counter arguments.<sup>2</sup> They argued that large scale diversion of northern rivers would have ecological implications which needed to be studied and understood before any such action was taken. Furthermore, they pointed out that the cost of diverted water would be many thousands of dollars per megalitre<sup>3</sup> and therefore not affordable to irrigators without huge subsidies.
- 1.5 A vigorous public debate ensued on all aspects of the complex issue of water supplies.<sup>4</sup> This time the drought impacted on urban as well as rural dwellers, with all the major cities introducing water restrictions. Estimates suggest that at least 75 percent of the nation's population has experienced some level of water restriction as a result of this drought.
- 1.6 In November 2002 the Prime Minister identified water as a top priority for his Government. He said:
- There are few issues more important to our nation than water reform ... there is still much to do on the salinity problem, but we are widening our focus to also address the broader question of the efficient and sustainable use of Australia's water resources.<sup>5</sup>
- 1.7 Some experts said that Australia has sufficient water for all its requirements, but that it was not being used efficiently. Attention focussed again on the national water reforms started in 1994 by the Council of Australian Governments (COAG).
- 1.8 The COAG water reforms addressed institutional issues required for efficient, profitable and sustainable water industries in both the urban and rural sectors. Competition in the water industry and environmental management were recognised as two key issues. The initial reforms envisaged a five to seven year implementation period. However, reforms to urban water have been limited to pricing and water restrictions.

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2 'The Wentworth Group of Concerned Scientists', so-called because their first meeting took place at The Wentworth Hotel in Sydney on 12 October 2002, comprises eleven recognised land and water experts. It is convened and supported by the World Wide Fund for Nature Australia (WWF).

3 Common terms used in relation to water are: Kilotre (KL) =1000 litres; Megalitre (ML) = one million litres (or 1,000 cubic metres); Gigalitre(GL) = one billion litres. An Olympic-size swimming pool of 50x25x1.6 metres holds 2,000 cubic metres or 2 ML of water. The volume of Sydney Harbour is approx 500,000 ML (or 500 GL).

4 Dr Don Blackmore, Chief Executive of the Murray Darling Basin Commission described the complexity of water in Australia as '*about 3 times as complicated as rocket science*' (transcript of evidence, p. 419.)

5 The Prime Minister, the Hon John Howard MP, '*Strategic Leadership for Australia*', address to the Committee for Economic Development of Australia, Sydney, 20 November 2002

Notwithstanding substantial dividends to State Government revenues, very little has been done on stormwater harvesting or grey water recycling. Rural water reforms have a considerable way to go.

- 1.9 The rural water reforms advocated changes such as the charging of full cost-recovery for rural water and the provision of specified water allocations for rivers, to ensure their health and sustainability.
- 1.10 COAG announced the National Water Initiative (NWI) on 29 August 2003, whose prime focus is rural water. The NWI will revitalise the reform process and provide the momentum to implement necessary reforms in this sector.
- 1.11 The Australian Constitution gives the States and Territories responsibility for water. Section 100 of the Constitution reads:

The Commonwealth shall not, by any law or regulation of trade or commerce, abridge the right of a State or of the residents therein to the reasonable use of the waters of rivers for conservation or irrigation.
- 1.12 Nevertheless, recognising the essential nature of water to all social and economic activity, the Commonwealth has played an important role in the development of Australia's water resources through the facilitation and coordination of policies, the provision of financial assistance to the States/Territories, and the funding of research.
- 1.13 Apart from its involvement in COAG, the Commonwealth is directly involved in water issues through its membership of the Murray-Darling Basin Commission, the Natural Heritage Trust, the National Action Plan for Salinity and Water Quality, and research bodies such as CSIRO.
- 1.14 The Environment Protection and Biodiversity Conservation Act (1999) (EPBC Act) gives the Commonwealth jurisdiction where there are environmental issues of national environmental significance, such as Ramsar wetlands of international significance, and nationally listed threatened species and ecological communities.
- 1.15 There was overwhelming support in the submissions<sup>6</sup> received by the Inquiry for four broad principles:
  - the management of Australia's natural resources, particularly water, be placed on a sustainable basis;

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6 The inquiry received 181 submissions from around Australia. Copies are on the Committee's website: [www.apb.gov.au/house/committee/primind/waterinq/index.htm](http://www.apb.gov.au/house/committee/primind/waterinq/index.htm)

- the Commonwealth continue to work with State and Territory governments to implement the COAG water reforms to ensure long term, sustainable water resources;
  - the Commonwealth maintain funding to programs such as the Natural Heritage Trust and the National Action Plan to assist regional communities which have water quality and sustainability problems; and
  - the Commonwealth continue to fund research into areas such as the impact of rural water usage on biodiversity; farming practices; irrigation techniques; and weather forecasting and climate prediction.
- 1.16 The Committee notes that the media in Australia is taking a much greater interest in all aspects of water, both urban and rural, and the fundamental value of water is being recognised. For example, the editorial in Sydney's Daily Telegraph on 12 September 2003 supported the NSW Government's introduction of water restrictions under the title 'Obvious Solution'. The first sentence of the editorial read:
- The most precious natural resource in this arid land is not coal, nor wool, or iron ore, not even gold. It's water.<sup>7</sup>
- 1.17 No doubt this greater interest by the media is a reflection of the increasing public interest in environmental issues generally, and specifically in sustainable natural resource management.
- 1.18 2003 was declared by the United Nations as the International Year of Freshwater, and that heightened media and public attention at the time this Inquiry was taking place. For the last ten years, a 'National Water Week' has been organised around Australia in October incorporating events such as workshops and conferences related to water. All that activity has undoubtedly also helped to increase public and media interest in this subject.
- 1.19 If 'development' was the catchcry for most of the 20th century, 'sustainability' is the catchcry of the early part of the 21<sup>st</sup> century. Submissions from virtually all stakeholders, be they environmentalists or irrigators, agree that water resources must be managed on a sustainable basis to survive for the benefit of future generations. But there are marked differences in how sustainability is defined and the measures required to achieve it.
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7 The Daily Telegraph, 12 September 2003, Editorial 'Obvious Solution', p. 28.



- 1.20 One of the challenges faced by the Committee during the course of this Inquiry was to ensure that opinions from all sides of the debate were canvassed, recognising the wide range of stakeholders involved and the emotive nature of this issue both to environmentalists and irrigators.

## Previous Parliamentary Reports

- 1.21 The Committee notes two recent reports by the House of Representatives Standing Committee on Environment and Heritage on related subjects. They are:
- ‘Coordinating Catchment Management’, tabled in December 2000; and
  - ‘Public Good Conservation’, tabled in September 2001
- 1.22 In 2001-02 the Senate Environment, Communications, Information Technology and the Arts References Committee undertook an Inquiry into Australia’s urban water management. Its comprehensive report, titled ‘*The Value of Water*’, was tabled in December 2002 and made a number of useful recommendations.
- 1.23 The Senate Standing Committee on Rural and Regional Affairs and Transport commenced an Inquiry into ‘*Rural water resource usage*’ on 21 October 2002. This Inquiry has been running in parallel with our own and covers much the same ground.
- 1.24 The Committee believes that it is a matter of regret that the Senate chose to conduct an Inquiry into such a similar topic, just 4 months after the commencement of the House Inquiry.
- 1.25 At 30 June 2003 the Senate Inquiry had received 49 submissions, many from organisations which had already made submissions to the House Inquiry. In comparison, the House Inquiry had received 166 submissions by 30 June 2003.
- 1.26 From feedback received it is obvious that this kind of overlap only serves to confuse the public and make them wonder why such duplication takes place. The Committee hopes that such duplication can be avoided in future.

## **Inquiry background**

- 1.27 On 26 June 2002 the Minister for Agriculture, Fisheries and Forestry, the Hon Warren Truss MP, wrote to the Chair of the House of Representatives Standing Committee on Agriculture, Fisheries and Forestry, Kay Elson MP, requesting that the Committee undertake an Inquiry into future water supplies for rural industries and communities.

## **Conduct of the Inquiry**

- 1.28 In July 2002 details of the Inquiry were advertised in national newspapers and newspapers with a rural and regional focus. The Inquiry generated considerable interest with a total of 181 submissions from across Australia.
- 1.29 The Committee held inspections and public hearings in Canberra, Tasmania, Queensland, Victoria, New South Wales, and South Australia. The Committee also visited the River Murray, with inspections in Renmark, Mildura and Wentworth and inspections and a public hearing in Deniliquin. A public hearing by video conference was held with witnesses in Western Australia.
- 1.30 At public hearings which took place between February and November 2003, the Committee heard from representatives from all levels of government, as well as irrigator, research, environmental and community groups involved with water.
- 1.31 During inspections, the Committee met with a range of interested persons including farmers and bulk water supply agencies to discuss on-ground issues such as best practice in on-farm irrigation practice and bulk water delivery systems.

## **Interim report**

- 1.32 On 5 April 2004 the Committee presented an interim report to the Parliament, focussing on the Living Murray Initiative. The interim report addresses urgent issues that the Committee believed could not await the publication of its full report.

- 1.33 During the course of its inquiry, the Committee received a considerable amount of evidence questioning the science underpinning the Living Murray Initiative. Concern was expressed, both within the scientific community and the general community, that the scientific evidence presented to justify increased river flows was not sufficiently robust. In the Committee's view, at this stage the science is not adequate on which to base far-reaching decisions, possibly including the reallocation of water from irrigation to the environment.
- 1.34 Any decision to allocate water to increased river flows will have a long term impact on rural industries and communities. Without proper research it could even have detrimental effects upon the river itself. The Committee believes that we owe it to the people of the Murray–Darling Basin, the vital industries they undertake, and the nation as a whole, to make the best possible choice about the allocation of water resources in the River Murray. That means collecting comprehensive data before making any commitment to increase river flows.
- 1.35 The interim report recommends that the Australian Government urge the Murray–Darling Basin Ministerial Council to postpone plans to commit an additional 500 gegalitres in increased river flows to the River Murray until:
- A comprehensive program of data collection and monitoring by independent scientists is completed;
  - Non-flow alternatives for environmental management are considered and reported upon more thoroughly; and
  - A full and comprehensive audit focussed specifically on the Murray–Darling Basin's water resources, including all new data, is conducted.
- 1.36 The interim report also recommends that the Australian Government ask the Murray–Darling Basin Ministerial Council to allocate sufficient funds out of the \$500 million allocated to the River Murray by COAG to the abovementioned tasks, prior to proceeding with the proposal to obtain increased river flows.
- 1.37 The Committee believes that adequate research must be done to enable future decisions to be made with confidence. It is better to take more time now, to get things right for the future. Rural water and the communities which rely on it are too important to be subjected to hurried, piece-meal decisions made on the basis of incomplete data.

## Structure of the report

- 1.38 The Inquiry found that agriculture represents 80 percent of water usage in Australia, with the other 20 percent used by urban and industrial users.<sup>8</sup> Of the water used for agriculture, 93 percent is used in irrigation—so water for irrigation is the focus of much of this report.
- 1.39 From evidence presented to the Committee it became obvious that the greatest impact on future rural water supplies would come from:
- water allocations to the environment,
  - water trading,
  - water ‘created’ through improvements in water use efficiency, and
  - cloud seeding as a potential generator of additional water.
- 1.40 The report is structured around these potential key impacts on future supplies of rural water.
- 1.41 Chapter 2 looks at environmental issues, including proposals for environmental allocations.
- 1.42 Chapter 3 examines the policy framework surrounding water, the Commonwealth’s role, and the COAG water reform agenda.
- 1.43 Chapter 4 looks in detail at two key issues, namely water rights and water trading.
- 1.44 Chapter 5 examines the important issue of ‘creating’ additional water by improving the efficiency of water use in Australia. Also discussed in this chapter are the options for water recycling and reuse and the prospects for desalination.
- 1.45 Chapter 6 reviews the impact of ‘urban creep’ on agricultural land, the issue of potable water supplies for rural communities, and the issue of competing demands on water storage facilities.
- 1.46 Chapter 7 looks at cloud seeding prospects, and future research requirements related to climate and other water-related issues.

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8 National Land and Water Resources Audit, *Australian Water Resources Assessment 2000*, Table 14, p. 56.

## Proposals for ‘environmental’ allocations

### Background

- 2.1 The fundamental issue is how to achieve sustainable water resources while satisfying consumptive demands. The submission from the Australian Bureau of Agricultural and Resource Economics (ABARE) expressed the issue this way:

Maintaining sufficient water in rivers and streams that provide for irrigation uses as well as meeting the ecological needs of the riverine environments is a growing public policy issue ... Many in rural and urban Australia see allocation of water between consumptive and environmental uses as a critical issue.<sup>1</sup>

- 2.2 The ABARE submission noted that allocation of water to the environment has become, by default, a government responsibility:

Many of the benefits provided by environmental flows are not valued in a market, and are therefore unlikely to be provided by individuals or private entities seeking to make a profit. Hence, the COAG reforms committed Australian governments to allocating water to the environment.<sup>2</sup>

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1 Submission no, 94, p. 10.

2 Submission no. 94, p. 10.

- 2.3 Much of the evidence the Committee received on environmental issues concerned the specific question of so-called ‘environmental flows’, particularly in the context of the *Living Murray* process. Irrigators are particularly concerned at how the current debate about putting more water back into rivers could impact on their traditional access to water.
- 2.4 During the course of the Inquiry, the Committee came to the conclusion that there is too much focus on specific volumes of water. The Committee believes that recent consideration of specific amounts of additional flows (350, 750 or 1,500 GL) has confused the issue, which should be about what combination of measures will result in river health and sustainable rivers rather than trying to pick the right figure out of three options.

### COAG and the environment

- 2.5 The 1994 Council of Australian Governments (COAG) Water Reform Framework was a significant development in water policy in Australia. The key objective was to achieve an efficient and sustainable water industry by establishing integrated and nationally-consistent approaches to water resource management throughout Australia.
- 2.6 COAG announced a new National Water Initiative (NWI) on 29 August 2003. On environmental matters, the Joint Communique on the NWI set two key environmental aims— ‘returning over-allocated systems to sustainable allocation levels’ and ‘ensuring ecosystem health by implementing regimes to protect environmental assets at a whole-of-Basin, aquifer, or catchment scale’.
- 2.7 The NWI includes new funding of \$500 million over five years to address what was said to be over-allocation of rivers in the Murray-Darling Basin. The Joint Communique said:

Recognising the declining health of the River Murray system in particular, COAG noted that member jurisdictions of the Murray-Darling Basin have agreed to provide new funding of \$500 million over five years to address water over-allocation in the Basin.<sup>3</sup>

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3 Council of Australian Governments, Joint Communique, 29 August 2003.

## Sustainable water resources

- 2.8 There is no doubt that the attention given to environmental issues in recent years has had a significant impact on the management of water resources. There is now a much stronger recognition by stakeholders of the need to take environmental issues into account when determining policies related to natural resource management.
- 2.9 Several State-based farmer organisations made submissions to the Committee and expressed strong support for the principles of sustainability. Farmers realise that, for their long-term viability, they must have continuing access to water of the required quantity and quality. For example, the submission from the Queensland Farmers Federation advised:
- QFF strongly supports and advocates sustainable farming practices, and recognises the need for protection of environmental values through the sustainable use of natural resources ... Ensuring the sustainable use of Queensland's natural resources will maintain this viable industry into the future.<sup>4</sup>
- 2.10 The submission from the South Australian Farmers Federation listed three key priorities in regards to water, of which the environment came first. It said:
- Simply put, the South Australian Farmers Federation believes that water management in Australia must ensure the following:
- Environmental flows
  - The real value of water used in primary production is used to assess industries' viability; and
  - potable supplies which are of suitable quality and quantity<sup>5</sup>
- 2.11 Mr Fred Tromp, representing the Western Australian Department of Environment, told the Committee:
- I hope we all agree that there is a need to elevate water and environmental policies and programs at both Commonwealth and state levels if our Australian society is to enjoy existing benefits into the future. Without the recognition of environmental values in our health and governance systems, Australia would not maintain the present high quality of life which we enjoy.<sup>6</sup>

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4 Submission no. 116, p. 3.

5 Submission no. 33, p. 1.

6 Transcript of evidence, p. 646.

2.12 The comments in the submission from Hydro Tasmania indicate how seriously environmental issues are taken:

Hydro Tasmania takes its environmental responsibilities very seriously and has initiated a series of projects under the banner of its Aquatic Environment Program. Typical projects may be to:

- assess the impact of hydro dams on fish passage;
- evaluate the environmental flow requirements in waterways affected by diversions;
- monitor and assess the impacts of hydro operations on water quality;
- investigate options to mitigate the impacts on hydro operations on threatened species; and
- assess the impacts of pest species in hydro reservoirs or water ways.

These projects are ongoing and provide an updated assessment of the environmental impacts of its activities on the environment and develop measures to address any significant adverse impacts since the schemes were originally built.<sup>7</sup>

2.13 The fundamental issue is how to achieve the right balance of water use between agriculture and the environment. Farmers have built businesses and communities, often over several generations, based on historic access to water. Their strong preference is that allocations to agriculture are not reduced—if additional water is required to improve river health, then that water should come from other sources.

2.14 While in recent years the environment has been recognised as a legitimate user of water in its own right, historically water in a river has been allocated first for consumptive use (domestic, industrial or agricultural) and the excess served biodiversity needs and flowed out to the ocean.

2.15 Some commentators, such as The Wentworth Group, are calling for the environment to have a ‘prior right’ to water. That is, that water for the environment should be the first to be allocated, followed by allocations to other users. They believe the river should come first on the basis that there must be a sustainable resource of good, clean, water before it can be allocated for use. Professor Peter Cullen, a member of the Wentworth Group, told the Committee:

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7 Submission no. 40, p. 9.



... in a lot of the water allocations that have been happening over the last decade the security of existing irrigators was guaranteed and any residual was left for the environment. In no way did it provide enough for the environment, nor did it meet the COAG agreements of 1994 ... [T]he environment was not another optional extra, another competing pressure. Unless you had some environmental security, you did not have a river at all ... [and] unless you have a reasonably healthy environment, you cannot hang agriculture or town water supply off those rivers.<sup>8</sup>

- 2.16 On this question representatives of the National Farmers Federation suggested that stock and domestic use should have first priority access to water resources.<sup>9</sup>
- 2.17 There is now widespread recognition in Australia of the need to manage natural resources, including water, on a sustainable basis. Sustainable rivers are a fundamental prerequisite for the long-term well-being of rural communities and irrigated agriculture. To be sustainable, a river must be 'healthy'.
- 2.18 The question of what level of river flow ensures health and sustainability has great potential to impact on the future supply of water for rural industries, which is the focus of this Inquiry.

#### What determines river health?

- 2.19 The health of a river is determined by a combination of its flow regime, the condition of its catchment and floodplain lands and in-channel habitats, and its water quality and water temperature. These attributes must be considered holistically.
- 2.20 The actual volume of flow in a river is an essential component of river management, but is not sufficient in itself to ensure the health of a river.<sup>10</sup>

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8 Transcript of evidence, p. 677.

9 Transcript of evidence, p. 690.

10 This definition is taken from the CRC for Freshwater Ecology report prepared for the MDBC "Independent Report of the Expert Reference Panel on Environmental Flows and Water Quality Requirements for the Murray River System", February 2002, p. 4.

### What is a working river?

- 2.21 A working river is a river whose natural flow has been altered through human intervention (such as dams or weirs) and whose waters are used for consumptive purposes, for example for domestic, industrial or agricultural uses.

### What is a healthy working river?

- 2.22 The concept of a ‘healthy working river’ has gained currency in recent years. It describes rivers whose waters are extracted by humans for various uses, but whose health is maintained to ensure its sustainability for future generations.
- 2.23 Dr John Whittington of the Cooperative Centre for Freshwater Ecology is an authority on this subject. His definition of a healthy working river is: “A healthy working river is a managed river in which there is a sustainable compromise, agreed to by the community, between the condition of the natural ecosystem and the level of human use”.<sup>11</sup>
- 2.24 Dr Whittington believes that the more a river’s waters are used for consumptive purposes the more its ecosystem services—such as the provision of clean water, nutrient cycling, sustaining river and coastal fisheries and providing an aesthetically appealing environment for tourism and recreation—are impacted.
- 2.25 One of the issues in achieving ‘healthy working river’ status is that the timeframes related to economic gain and river health can be quite different, as Dr Whittington highlights:

Therein lies a major difficulty in determining the trade-off between economic production and river health - economic returns can be immediate, or at least in the lifetime of the current generation, whereas the consequences of a loss of river health and ecosystem services may take decades to impinge on the human community.<sup>12</sup>

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11 Dr J Whittington, article titled ‘*Working Rivers*’ published in *Watershed*, February 2002, a magazine of the CRC for Freshwater Ecology.

12 Dr J Whittington, article titled ‘*Working Rivers*’ published in *Watershed*, February 2002, a magazine of the CRC for Freshwater Ecology.

- 2.26 When the Committee asked representatives of the National Farmers' Federation (NFF) for their definition of a 'healthy working river' Mr Ralph Leutton, a member of the NFF's Water Task Force, told the Committee that they are still searching for a meaningful definition of what the phrase means. He said:
- I do not think we can actually say what a healthy river is. We are all looking for a definition of a healthy working river. We have asked our scientists and our research corporations to give us the parameters of a healthy working river ... We are looking for that answer.<sup>13</sup>
- 2.27 The Committee found it disturbing, but not surprising, that a key stakeholder such as the NFF is still not able to find a working definition of one of the fundamental concepts in the national debate on rural water.
- 2.28 The Committee believes that it is most important that all major stakeholders agree on the definition of terms such as 'sustainability', and 'healthy working river' so that a proper, informed, debate can take place.
- 2.29 COAG's new National Water Initiative is an ideal opportunity to ensure that all the stakeholders understand and agree to the meaning of fundamental concepts such as 'healthy working river'. The Committee urges the Department of Prime Minister and Cabinet (which is coordinating the details of the NWI) to ensure that fundamental concepts of water resource management are clearly defined and that those definitions are fully understood and agreed by all stakeholders. The agreed definitions should also be communicated to the media and general public so that everyone understands the terminology and what is being said.

### Recommendation 1

- 2.30 **The Committee recommends that the Commonwealth Government, through the Council of Australian Governments and in consultation with all key stakeholders, provides clear definitions of the fundamental concepts underlying water resource management.**

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13 Transcript of evidence, p. 689.

### What flow is required to achieve a healthy working river?

- 2.31 One question facing river managers and communities is: ‘How much water does a river need to be healthy (or, if assessed to be in poor health, to become healthy again and to remain healthy?)’
- 2.32 Professor Gary Jones, Chief Executive of the CRC for Freshwater Ecology, has studied this issue over several years. He believes that a healthy working river retains an ‘ecological character’ that is generally accepted as being healthy.<sup>14</sup>
- 2.33 Professor Jones believes that water flows for a healthy working river must be considered at different geographic scales. Important factors are:
- flow volume
  - flow distribution or pattern
  - flow variability
  - connectivity (within and between the river, floodplains, wetlands, forests and their component parts)
  - flow-related water quality
- 2.34 Each of these attributes can be characterised by a number of hydrological indicators, which together provide a description of the flow regime of the river at a local scale and a whole-of-river scale.
- 2.35 Professor Jones and colleagues concluded that, if river habitat conditions and water quality are being well managed, a long term flow level of more than 67 percent of natural flow will give a high probability that a working river is healthy. When 50 percent of the natural flow is present the probability of a working river being healthy is moderate. Long term flow regimes of less than 50 percent-natural will mean that it is highly unlikely that a river will be capable of remaining healthy.
- 2.36 But Professor Jones cautions that these figures should be taken as a general guide only, with individual cases needing to be examined separately:
- This simple risk-based framework is a starting point - a rule of thumb - for consideration of environmental flows in any river valley. The validity of the framework should always be considered on a case
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14 Prof G Jones, article titled ‘*Setting environmental flows to sustain a healthy working river*’, published in Watershed, February 2002, a magazine of the CRC for Freshwater Ecology.

by case basis using a combination of the best available scientific data and knowledge, and community experience and judgement.<sup>15</sup>

- 2.37 The Committee asked representatives of the National Farmers' Federation if they agreed with the estimate that a river needs at least 50 percent of its natural flow for long-term health. In reply it was suggested that more research was required before a definitive answer could be given.<sup>16</sup>
- 2.38 Dr Jennifer Marohasy from the Institute of Public Affairs, quoting from MDBC sources, estimates that 'in an average year, under current conditions, total inflow [into the River Murray] is 12,607 GL. About 24 percent of this water is lost from the system through evaporation and transmission, 34 percent is diverted, mostly for irrigation, and 41 per cent flows out to sea.'<sup>17</sup> Dr Marohasy also refers to an often quoted figure of 80 per cent diversions from the River Murray. The Committee notes other information provided by the MDBC which suggests that diversions from the River Murray in NSW are 81 per cent but that overall, diversions from the Murray-Darling system are only 46 per cent.<sup>18</sup> This shows that the system is not in the state of crisis some have suggested.
- 2.39 All stakeholders agree that rivers and aquifers must be used in a sustainable manner. Despite significant advances in scientific methodology, such as development of the Murray Flows Assessment Tool<sup>19</sup>, there is still controversy among scientists about the actual state of the health of the River Murray.
- 2.40 The Committee believes that the question of what flow regime is required to produce a 'healthy working river' is of fundamental importance to the whole issue of sustainable water resource management. This is a complex issue and it is too simplistic to work on general 'rules-of-thumb'.
- 2.41 The Committee is also concerned at the extent to which the concepts of 'pristine' or 'natural condition' appear to drive the environmental debate. There have been enormous engineering developments in southern Australia in the last century which mean that 'natural condition' is an ideal which,

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15 Prof G Jones, article titled '*Setting environmental flows to sustain a healthy working river*', published in Watershed, February 2002, a magazine of the CRC for Freshwater Ecology.

16 Transcript of evidence, p. 689.

17 Institute of Public Affairs backgrounder '*Myth & the Murray*', December 2003, p. 27.

18 Table 2 in 'Murray-Darling Basin Water Resources Fact Sheet', MDBC web site accessed December 2004, reproduced in Appendix D of this report.

19 See para 2.103 for an explanation of the MFAT.

realistically, can never be re-created. And yet these terms are still used in relation to river health.

- 2.42 Rivers in southern Australia are characterised by high variability in water flow due to highly inconsistent rainfall patterns. Floods and droughts are common occurrences. Australia’s ecosystems are adapted to highly variable and unpredictable river flow patterns.
- 2.43 The Committee noted that there are historical accounts of the River Murray ceasing to flow during periods of severe drought, and yet the ecosystems were able to survive and rebound when normal conditions returned.
- 2.44 The introduction of engineering developments, such as dams, weirs and locks, salt interception schemes, and dredging of the Murray mouth, have meant that those pre-development flow patterns have changed significantly and forever.
- 2.45 Dr Don Blackmore, Chief Executive of the Murray-Darling Basin Commission (MDBC) told the Committee that under natural conditions the River Murray would have stopped flowing at Albury during 2003 due to the severe drought. He continued:
- ... So the river would have stopped. That is not a service any of us want. We do not want to go back to natural conditions. ... It is a waste of time, in my judgment, even having a conversation about natural conditions. The argument is what is the benchmark in terms of environmental equity, what set of environmental services does our nation need, what is reasonable and how do we get to that?<sup>20</sup>
- 2.46 The controversy surrounding the science behind the Living Murray highlighted the urgent need for more work to be done on determining, to use Dr Blackmore’s phrase, ‘the set of environmental services our nation needs’ for sustainable development. That vexed issue prompted the Committee to table an Interim Report which was presented to Parliament on 5 April 2004.<sup>21</sup>
- 2.47 The aim of the NWI “to return over-allocated systems to sustainable allocation levels” can only be pursued if we know what those sustainable levels are. The Committee believes that a priority of the NWI should be to determine exactly what is required to manage the major rivers in a sustainable manner. Those determinations should be expressed in plain-english so that all stakeholders, be they scientists, landholders, or the
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20 Transcript of evidence, p. 413.

21 See Chapter 1, paras 1.37 – 1.42 for details of the interim report.

general public, can fully understand what is required and why. The science underlying these decisions has to be robust, transparent, and well-communicated. That research needs to be done before informed decisions can be made on the need for additional water flows.

## Recommendation 2

- 2.48 **The Committee recommends that a top priority of the National Water Initiative should be to fund the scientific research based on physical data collection necessary to determine what level of water use is sustainable in each of Australia's major working rivers and aquifers.**

## The concept of 'environmental flow'?

- 2.49 An 'environmental flow' is defined by the MDBC as 'any managed change in a river flow pattern intended to maintain or improve river health'.<sup>22</sup> However, the Committee found that the term 'environmental flows' is commonly used in a variety of contexts. Some commentators appear to use the term 'environmental flow' in the context of just a specific volume of water, while most scientists and water managers use it in the context of a range of management practices relating to flow regime (of which the actual volume of flow of water is an essential part), and water quality.
- 2.50 A report of the Victorian Parliament described environmental flows in the following terms:

The needs of river systems for water are commonly described in terms of 'environmental flows' ... flow regime, temperature and water quality, as well as total water flow, is important to stream and wetland ecosystems. In general terms, the aim of an environmental flow ... maintains or enhances biological diversity and water quality.<sup>23</sup>

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22 MDBC website accessed October 2003, *The Living Murray, Frequently Asked Questions: What is an Environmental Flow?*

23 Environment and Natural Resources Committee of the Victorian Parliament, '*Report on the Inquiry into the allocation of water resources for agricultural and environmental purposes*', tabled 21 November 2001, para. 3.141

- 2.51 Dr Blackmore of the MDBC told the Committee that this term can be confusing. He said:

Do we have the balance right for sustaining our rivers? I do not like to use the words 'environmental flows' because it is a currency which is not all that useful. We are trying to make sure that the services we need from our rivers can be sustained and trying to determine what flows we need to do that.<sup>24</sup>

- 2.52 At the public hearing on 26 November 2003 the Committee reminded Dr Blackmore of his earlier statement, and asked if he could suggest a clearer way to describe what is meant by 'environmental flows'. He responded:

I think it is a very difficult question ... There are 4,000 or 5,000 gegalitres of water left in rivers now, which is an environmental flow. What we are doing is supplementing it with additional water to give an increased environmental dividend. So which part is the environmental flow? It is the package of things that deliver environmental outcomes ... So I do not have an answer to that which I think is helpful at the moment.<sup>25</sup>

- 2.53 This exchange confirms the urgent need to get clear, accepted definitions of key terms so that everyone understands what is being said. This should be a key priority for the Department of the Prime Minister and Cabinet in developing the National Water Initiative (see Recommendation 1).

#### Is there a need for additional 'environmental flows'?

- 2.54 Rivers which are perceived to be in an unsustainable or unhealthy condition, due primarily to a high degree of development or overdevelopment, are usually regarded as needing additional environmental flows.
- 2.55 According to the National Land and Water Resources Audit, 30 percent of Australia's groundwater management units are either highly developed or overdeveloped when compared with their estimated sustainable yield.<sup>26</sup> In relation to surface water management areas, 26 per cent are either highly

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24 Transcript of evidence, p. 396.

25 Transcript of evidence, p. 739. Earlier in the public hearing Dr Blackmore said the three key elements of an environmental flows package were 'you have to deliver water, you have to deliver the works to maximise it and you have to deliver the intellectual capacity to make sure that your choices are right.' (Transcript p. 734).

26 National Land and Water Resources Audit report "*Australian Water Resources Assessment 2000*", June 2001, p.75. 'Highly developed' refers to over 70% of sustainable yield; 'overdeveloped' is over 100% of sustainable yield.



- developed or overdeveloped when compared with sustainable flow regime requirements.<sup>27</sup>
- 2.56 The vast majority of aquifers and rivers which are classified as highly developed or overdeveloped are in areas where water resource development has been a viable option (such as in the Murray-Darling Basin).<sup>28</sup>
- 2.57 In 1995 the Murray-Darling Basin Ministerial Council (MDBMC) imposed a 'Cap' on water extraction in the Murray-Darling Basin to stop further deterioration in the health of Basin rivers.
- 2.58 Further scientific studies convinced the MDBMC that the River Murray needed increased environmental flows to improve its health and make it a sustainable resource. That was the trigger for the *Living Murray* Initiative.
- 2.59 The Committee questioned a number of scientists on the use of the term 'over-allocation'. The scientists agreed that 'allocation' and 'over-allocation' are concepts useful in resource management in terms of making water available for industrial and agricultural use, but these terms do not relate to environmental needs. Ecosystems are already adapted to highly variable and unpredictable flow patterns.
- 2.60 The Committee is very concerned at the conflicting conclusions reached by scientists on crucial questions such as what is the health of the River Murray, and whether additional flows are needed. Some scientists have questioned the methodologies used to assess river health, and the conclusions reached by bodies such as the MDBMC on the basis of that research. They have put a different interpretation on the scientific findings and have concluded that the River Murray is in reasonable health and that the case for additional environmental flows is not proven.
- 2.61 The Committee presented an interim report to highlight the urgent need to resolve these fundamental differences before decisions on additional environmental flows can be made with confidence.<sup>29</sup>

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27 National Land and Water Resources Audit report "*Australian Water Resources Assessment 2000*", June 2001, p.71. 'Highly developed' is over 70% of sustainable flow regime; 'overdeveloped' is over 100% of sustainable flow regime.

28 National Land and Water Resources Audit report "*Australian Water Resources Assessment 2000*", June 2001, p. iv.

29 Chapter 1, paras 1.32 – 1.37 give background to the interim report.

### Where would water be sourced for additional flows?

- 2.62 If required, additional flows can be achieved through:
- Making the 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, particularly irrigation.<sup>30</sup>
- 2.63 While it is difficult to gauge the amounts of water involved in the first option (*ie making the best use of water currently available to the environment*), this course of action is being actively pursued. In April 2002 the MDBMC agreed to an expenditure of \$150 million over seven years to make infrastructure in the Basin more environmentally-friendly through the modification of dams, weirs and locks and other improvements.
- 2.64 With regard to the second option for sourcing water for the environment (*ie saving water lost in channels and other distribution systems and redirecting it to the environment*), improving the efficiency of water use both in distribution systems and on-farm can make more water available. But the costs involved, the volumes saved for consumptive use, and how much of the savings would be available for additional environmental flows, are issues which are still being debated.
- 2.65 Dr Blackmore advised the Committee “there will be another 20 percent improvement in irrigation efficiency over this decade ... The issue is whether some of that efficiency dividend should go back into sustaining our rivers.”<sup>31</sup>
- 2.66 Mr John Howe of Murrumbidgee Irrigation told the Committee that the easy and most productive improvements in water use efficiency have already been made. The way he phrased it was “the really low-hanging fruit is gone”<sup>32</sup>, and he suggested that significant new savings will be more difficult to find.

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30 Prof G Jones, article titled “*Setting environmental flows to sustain a healthy working river*”, published in Watershed, February 2002, a magazine of the CRC for Freshwater Ecology.

31 Transcript of evidence, p. 405.

32 Transcript of evidence, p. 513.

- 2.67 Dr Blackmore expressed the belief that there are likely to be attempts to find water savings by improving current delivery systems. While expensive, such an approach would have the added benefit of upgrading the efficiency of Australia's water infrastructure. He said:

What I think will happen in any intervention is that if you are going to invest—following the Snowy paradigm—you will invest in savings first. Savings are generally more expensive than the market price, but they are probably an important investment in the future of Australia because you do not want systems that are grossly inefficient.<sup>33</sup>

- 2.68 Dr Blackmore provided an example of how 45,000 ML of water could be 'saved' on the Darling Anabranh by piping the system, and suggested that other similar projects could be undertaken which would produce additional water for environmental flows. He commented:

Let us take the Darling Anabranh as an example. There is an area where about 50,000 megalitres go down the Darling Anabranh below Menindee and less than 5,000 megalitres are consumed. If you install plastic pipes, you have 45,000 megalitres. It will probably cost you about \$800 a megalitre for that secure water. Those projects are available, but they will not get us fully to 1,500 gigalitres.<sup>34</sup>

- 2.69 This figure of \$800/ML is within commercial parameters for traded water and this work should be given priority. Chapter 5 contains a detailed discussion of water use efficiency and how improvements in efficiency could impact on future supplies of rural water.
- 2.70 In relation to the third option for sourcing water for the environment (*ie reducing the amount of water removed from the river for human use, particularly irrigation*), some of the evidence received by the Committee suggested that, realistically, a significant proportion of any additional environmental flows would have to come from allocations to irrigators, as irrigation represents by far the largest single use of water.

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33 Transcript of evidence, p.403.

34 Transcript of evidence, p.403.

2.71 Irrigators strongly favour the first two options over the third. Mr Lawrence Arthur, Chairman of Irrigators Inc., expressed this preference to the Committee at the public hearing in Deniliquin:

The intention to improve the Murray Darling Basin river health needs to be achieved without impacting on water available for productive use, and consequently the wellbeing of communities like Deniliquin. We believe this can be achieved by infrastructure investment, operational efficiency improvements and ecological measures like riparian zone management.<sup>35</sup>

2.72 To take water from irrigation would involve a 're-balancing' of water use, particularly in overdeveloped rivers. For example, the submission from ABARE pointed out that:

In most cases, an increase in environmental flows will have to be sourced from existing or potential irrigation uses. Governments can achieve this in several ways, including:

- Withdrawing water entitlements from irrigators;
- Purchasing water entitlements in water markets; and
- Retaining some or all of the water savings from improved irrigation efficiency, through, for example, reducing conveyance losses.<sup>36</sup>

2.73 Dr Blackmore told the Committee that he believes the debate about environmental flows should be seen as an opportunity by irrigators. He commented:

At the moment the move towards environmental flows or the Living Murray and a healthy, working river is seen as a huge threat to the irrigation industry. I am trying to explain to people that, in my judgment, it is the greatest opportunity this industry will have in the next 20 years, provided that governments do what they have done so far in the Snowy debate and establish a relationship with the community, which means that they will bring resources along to manage their intervention with that community in a structured and stable way.<sup>37</sup>

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35 Transcript of evidence, p. 499.

36 Submission no. 94, p. 10.

37 Transcript of evidence, p. 397.

2.74 The ABARE submission noted that increasing environmental flows at the expense of irrigation can generate external benefits which help to offset the value of foregone production. It advised:

Increased environmental flows may dilute existing salt loads in a river system to the benefit of remaining irrigators. Further external benefits may be generated if a reduction in irrigation also reduces the level of salt exports to the river from surface and subsurface drainage. These benefits can be substantial. Heaney, Beare and Goesch (2002) report the scenario where these external benefits offset more than 40 percent of the value of foregone agricultural production.<sup>38</sup>

2.75 The ABARE submission went on to recommend that a trading system for water should factor in environmental impacts. It said:

A direct implication is that institutional arrangements for water trade that do not account for the environmental impacts of trade will be an impediment to obtaining water for the environment at the lowest social opportunity cost.<sup>39</sup>

2.76 The complex issues of how and where to source additional water for the environment and how it should be managed are vital components of the new National Water Initiative announced by COAG on 29 August 2003. Details of the NWI are being drafted by five task forces working under the auspices of the Department of Prime Minister and Cabinet, in preparation for the next COAG meeting (scheduled for mid-2004). The Committee believes that all stakeholders must be fully consulted in the planning/drafting process of the NWI. The Committee does not believe that ABARE's position is sufficient and does not present a preferred option.

### **Is there a need for additional flows in the Murray-Darling Basin?**

2.77 The vital importance of the Murray-Darling Basin to the national economy makes it imperative that the Basin's natural resources are managed on a sustainable basis. It is crucial that the rivers in the Basin are in 'healthy working rivers' condition, so that they can continue to contribute to the productive capacity of the region for future generations.

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38 Submission no. 94, p. 11.

39 Submission no. 94, p. 11.

- 2.78 Dr Blackmore of the MDBC reminded the Committee of the significant position held by the Basin in water matters— “70 percent of the water consumed in Australia is consumed in the Basin”.<sup>40</sup>
- 2.79 In June 1995 the Murray-Darling Basin Ministerial Council imposed an interim Cap (which became permanent in 1997) on diversions. The Cap was defined as the volume of water that would have been diverted, on average, under 1993-94 levels of development.
- 2.80 An independent review of the operation of the Cap was undertaken in 2001. The review found the Cap had stopped further environmental degradation in the Basin, but noted that the Cap (set arbitrarily at 1993-94 diversion levels), did not necessarily reflect a sustainable level of diversion. To determine the level of diversion which would result in a sustainable and healthy River Murray would require further study—which in turn led to the *Living Murray Initiative*.
- 2.81 At its meeting in March 2001 the Murray-Darling Basin Ministerial Council enunciated its vision— ‘a healthy River Murray system, sustaining communities and preserving unique values.’ To aid its deliberations the Council commissioned a scientific report on the condition of the rivers in the Basin.
- 2.82 The report for the Council was compiled by the CRC for Freshwater Ecology and the CSIRO’s Division of Land and Water under the title ‘*Snapshot of the Murray Darling Basin river condition*’, September 2001.
- 2.83 The *Snapshot* reported evidence of degradation both on a whole-of-basin basis, and of the River Murray itself, including the Lower Darling.
- 2.84 A review of the *Snapshot* by the Independent Sustainable Rivers Audit Group (comprising 4 academics) found that the *Snapshot* provided ‘a clear, unequivocal indication that the current general state of the ecological health of rivers in the Murray Darling Basin is less than what is required for ecological sustainability’.<sup>41</sup>
- 2.85 Mr Peter Cosier, Director of WWF and member of the Wentworth Group, told the Committee that ‘the future of rural Australia is healthy river systems and healthy landscapes’, and went on to make the following remarks about the River Murray:

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40 Transcript of evidence, p. 400.

41 ‘*Snapshot of the Murray Darling Basin river condition*’ Report to the MDBC, September 2001, page 2. Accessed on the MDBC web site March 2004.

The River Murray is a working river. What it needs to be is a healthy working river. It is not healthy. It is not healthy for two reasons: one is that key environmental assets, such as Ramsar sites and other wetlands of national significance, are not receiving the amount and quality of water they need to maintain river health; secondly, we are suffering the scourge of salinity, which is not the fault of irrigator communities; it is the fault of land clearing further up in catchments.<sup>42</sup>

- 2.86 Several witnesses at the public hearing in Deniliquin in July 2003 questioned the scientific findings on the health of the River Murray. An example is the following comment by Mr Hetherington of Murray Irrigation Ltd:

I just want to mention this fact for the rest of the committee to read: in the last two weeks in forums in Canberra—there was one on Friday—MDBC figures were disclosed at that forum that the salinity has actually improved by 100 per cent in 20 years ... since starting recording in 1978 of turbidity, phosphorous and nitrate, there has been no change. Can you believe that after reading the papers during the last few months? 'We're ruined, doom and gloom. It's dead. So salined you can't move.' By the way, I just want to mention the fact that those figures are at Morgan, the area where South Australia's water comes from.<sup>43</sup>

- 2.87 In fact, the Committee had questioned Dr Blackmore of the MDBC about salinity levels on 28 May 2003. He responded at that time:

In the river down to Morgan the salinities everywhere have been lower than people would have experienced in living memory. There is almost no irrigator who is alive who would have seen salinities or turbidities at this level ... (because) there is simply no drainage water. The ground water level is down because of the drought. All the water comes out of the Snowy and/or Dartmouth, which is pretty flash water.<sup>44</sup>

- 2.88 Earlier in that public hearing Dr Blackmore had described to the Committee the magnitude of the salt problem in the Basin and the engineering solutions attempted by the MDBC. Despite making good progress he expressed pessimism at the final result:

We generate three to four million tonnes of salt in our system a year, which we have to either store within the landscape in the Basin or

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42 Transcript of evidence, p. 680.

43 Transcript of evidence, p. 506.

44 Transcript of evidence, p. 406.

dispose of somewhere ... At the moment we are pumping 1,100 tonnes of salt away from the River Murray every day. We are investing another \$67 or \$68 million to pump another 900 tonnes to buy the next 15 years of salinity management so that we can get our catchment management in the Murrumbidgee system, the Goulburn system and the Namoi system in order. I do not think we can get there.<sup>45</sup>

- 2.89 In December 2003 the Institute of Public Affairs (IPA) published a 'backgrounder' compiled by Dr Jennifer Marohasy, head of its Environment Unit, titled '*Myth & the Murray – measuring the real state of the river environment*'. Dr Marohasy examined the available information on the condition of the River Murray and found that its condition was reasonable. She concluded that claims that the River Murray is degraded are greatly exaggerated.

#### How much water is being extracted from Basin rivers?

- 2.90 Evidence was received from witnesses about the proportion of water being extracted from rivers in the Murray-Darling Basin, which showed the existence of a range of different perceptions on this issue.
- 2.91 The MDBC submission provided the following comment on the amount of water being extracted from Basin rivers:

In 1993 the Ministerial Council directed the Commission to carry out an audit of water use in the Basin. The audit report (MDBMC 1995) indicated that the median annual flow from the Basin to the sea had been reduced by over 70%, and that if the existing management regimes were maintained, average diversions would increase by a further 14.5% if all existing water entitlements were fully developed.<sup>46</sup>

- 2.92 At the public hearing on 31 July 2003 Mr Arthur of Irrigators Inc. questioned the amount of water being diverted. He said:

One thing I would really like to bring to the fore is that we hear reports that the consumptive use of water from the river is 80 per cent of inflows. I want to put on the public record that this is an absolutely ridiculous figure ... if we were using 80 per cent of inflows into the river it would certainly be an extraordinary thing. I

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45 Transcript of evidence, p. 396.

46 Submission no. 144, p. 2. On 26 November 2003 the Committee approved a slight amendment to the wording in the original submission (see Transcript of evidence, p. 724.)



have these reports from the MDBC and the Department of Land and Water Conservation that clearly refute those claims.<sup>47</sup>

- 2.93 Ms Jacqueline Knowles of the NSW Irrigators Council made a similar point during the public hearing in Sydney on 15 August 2003. she said:

Often we see figures stating that the irrigators use 80 per cent of the water, but it is actually 80 per cent of the water that is extracted from New South Wales ... For most systems the extraction is between 50 per cent and 65 per cent.<sup>48</sup>

- 2.94 In supporting these comments, Ms Michelle Ward, also representing the NSW Irrigators Council, gave the following estimate of water extracted in the rivers of northern NSW:

Ours [rate of extraction] is actually low. Like a lot of the northern rivers, it starts at around 26 per cent or 28 per cent in the Macquarie and 40 per cent in the Border Rivers. That is 40 per cent of the total flow-in in the system.<sup>49</sup>

- 2.95 At the public hearing on 26 November 2003 Dr Blackmore tabled a new '*Murray Darling Basin Water Resources Fact Sheet*'. He said that, in view of the different figures which had been quoted during the Inquiry, the MDBC had compiled this Fact Sheet to clarify exactly how much water is being diverted.<sup>50</sup>

- 2.96 Table 2 of the MDBC Fact Sheet (reproduced in Appendix D) shows the percentage of average annual runoff which is extracted or diverted for use in the Murray-Darling system. The table shows large variations between individual rivers and between States, but that overall an average of 46 per cent of water in the rivers in the Murray-Darling Basin is diverted for use.

- 2.97 It is clear to the Committee that there is a considerable lack of agreement about how much water is being extracted from the Murray-Darling system, although annual diversions are published in the MDBC's Water Audit Monitoring Reports. To avoid such confusion the Committee believes that the MDBC should also publish the latest figures on extraction rates of water in Basin rivers in its Annual Report, expressed as a percentage of typical river flows.

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47 Transcript of evidence, p. 498.

48 Transcript of evidence, p. 576.

49 Transcript of evidence, p. 577.

50 Transcript of evidence, p. 724. A copy of the Fact Sheet is shown in Appendix D.

### Recommendation 3

- 2.98 **The Committee recommends that Annual Reports of the Murray-Darling Basin Commission contain updated details of the extraction of water in Basin rivers, expressed as a percentage of typical river flows.**

#### The Living Murray Initiative

- 2.99 At its meeting in April 2002, the MDB Ministerial Council determined that the Basin rivers were not being used in a sustainable manner. To rectify this situation the Council adopted a strategy to improve the health of the River Murray which it called The *Living Murray* Initiative. The submission from the MDBC described the aims of the *Living Murray* Initiative as follows:

... to improve environmental flows in the River Murray and achieve a better balance in water uses. Activities include major studies on the environmental, social and economic impacts of various environmental flow scenarios for the River Murray, development of policy options for recovery of water for the environment, and an extensive public education and consultation exercise.<sup>51</sup>

- 2.100 To make the Basin community and other stakeholders aware of the issues the MDBC released a discussion paper in July 2002 titled '*The Living Murray: a discussion paper on restoring the health of the River Murray*'. The *Living Murray* Initiative is not just about environmental flows. It also focuses on the need to develop a strong Basin water market as a basis for achieving the flows and facilitating adjustment processes. In turn, to work properly such a market will require clearly defined water access rights, trading and market arrangements, and exchange rates for inter-valley and interstate trade.<sup>52</sup>

- 2.101 To aid consideration of the impact different levels of additional water would have on the health of the River Murray, the Ministerial Council directed that a scientific study do a cost/benefit analysis for three 'reference points': 350, 750 and 1,500 GL of additional water per annum. However this approach only responds to two of the twenty two activities that the River Murray Scientific Panel identified as threatening river floodplain ecosystem health. The threat to river health also involved activities not related to the volume of river flows. Dr Lee Benson pointed out that the River Murray Scientific Panel itself concluded that increases in flow will not aid, or are not the best

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51 Submission no. 144, p. 6.

52 Submission no. 160, p. 31.

way to address, many of the recognised in-river problems.<sup>53</sup> He also noted that there is a 'raft of non-flow and non-volumetric options which ... will improve river and floodplain health ...'<sup>54</sup>

- 2.102 Dr Benson pointed out that the Ministerial Council communiqué that announced a commitment to provide 500 GL of additional flows "... did not specifically mention non-flow actions at all and is strongly focused on how the committed volume might be obtained."<sup>55</sup>
- 2.103 The committee agrees with Dr Benson's conclusion that if the ultimate aim is to secure sustainable environmental health, with minimum socio-economic impact then all potential impacts which can significantly assist should be included.<sup>56</sup> Clearly the approach adopted by the Ministerial Council in its directions to the Scientific Reference Panel (and subsequently in its communiqué) was deficient.
- 2.104 The Ministerial Council established three expert Panels to assist with the *Living Murray* initiative:
- an Independent Community Engagement Panel to provide advice on the appropriateness of the community consultation process;
  - a Socio-Economic Reference Panel was established to advise on the socio-economic impact of the three environmental flow reference points; and
  - a Scientific Reference Panel to look at the ecological impact of the three 'reference points'.

### SRP Interim Report

- 2.105 The Interim Report of the Scientific Reference Panel (SRP) titled '*Ecological Assessment of Environmental Flow Reference Points for the River Murray System*' was released in October 2003 and provided an indication of the potential ecological benefits from additional flows based on the three 'reference points'. The final report is due in mid-2004.

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53 'The Science behind the Living Murray Initiative' by Ecology Management Pty Ltd, published by Murray Irrigation Limited, October 2003, p. x.

54 'The Science behind the Living Murray Initiative, Part 2' by Ecology Management Pty Ltd, published by Murray Irrigation Limited, February 2004, p. 57.

55 'The Science behind the Living Murray Initiative, Part 2' by Ecology Management Pty Ltd, published by Murray Irrigation Limited, February 2004, p. 57.

56 'The Science behind the Living Murray Initiative, Part 2' by Ecology Management Pty Ltd, published by Murray Irrigation Limited, February 2004, p. 59.

- 2.106 The ecological assessments were undertaken on a reach-by-reach basis as well as on a system-wide basis and examined likely impacts on six ‘icon sites’ identified by the Ministerial Council in April 2002—the Murray Mouth, Coorong and the Lower Lakes, Chowilla Floodplain, Gunbower/Perricoota, Barmah-Millewa, the River Murray Channel, and the Murray cod.

*Scientific approach to the assessment – Murray Flow Assessment Tool*

- 2.107 The SRP’s ecological assessment of the environmental flow reference points for the River Murray system was based on the Murray Flow Assessment Tool (MFAT)<sup>57</sup>. Using this methodology, it was claimed in the Interim Report that estimates could be made of how native fish, waterbirds, wetlands, floodplain vegetation and algal blooms would respond to different flow scenarios, smarter operational rules, more focus on flow variability and connecting floodplains to the river, and to infrastructure works that make best use of the water available.
- 2.108 The SRP Interim Report noted that the assessment process will be continuously reviewed and that the MFAT results are indicative rather than prescriptive. It said:

The SRP and REGs have developed a detailed review and critique of the assessment processes used, including the MFAT. The Murray Flow Assessment Tool (MFAT) is a ‘decision support system’ designed to help demonstrate in a reproducible and transparent manner the potential benefits of increased environmental flows. It focuses on changes to habitat condition, rather than population dynamics or recruitment. It is developmental, and outputs should be seen as indicative rather than prescriptive. Assessments made using the MFAT are a synthesis of opinion, in that the performance of the model is weighed against expert opinion (the process is circular in that regard).<sup>58</sup>

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57 A detailed description of the development and scope of the Murray Flows Assessment Tool can be found in Chapter 3 of the Interim Report of the Scientific Reference Panel ‘*Ecological Assessment of Environmental Flow Reference Points for the River Murray System*’, October 2003.

58 Interim Report to the MDBC ‘*Ecological Assessment of Environmental Flow Reference Points for the River Murray System*’, October 2003, para. 51, p. 13.

- 2.109 Dr Roy Green, President of the MDBC, wrote in his Foreword to the Interim Report that the MFAT will be further refined. He said:

In the short term, the interim report provides confidence that flows targeted at these significant ecological assets will provide local benefits. For the longer term the scientific reviewers have been clear in saying that while the MFAT is a valid decision-support tool, there is more developmental work before we can have an ecological model for river management.<sup>59</sup>

- 2.110 The assessment process was facilitated by the formation of eight Regional Evaluation Groups (REG) along the River Murray and two of its major tributaries, the Goulburn and Murrumbidgee Rivers. Each REG comprised scientific experts with specific local and regional ecological knowledge. A total of over 60 scientists contributed to the findings in the Interim Report.

- 2.111 At the public hearing on 28 May 2003 the Committee questioned the MDBC representatives about the benchmarks used for the MFAT calculations. Mr Kevin Goss, Deputy Chief Executive of the MDBC, replied:

A very deliberate decision was taken to benchmark it at the cap and to benchmark it today ... We have been very careful not to use natural conditions as some sort of goal or benchmark. It is accepted in all that we do that what is past is past and that we start from today or somewhere where we have the benchmarks, such as the cap on diversions of 1995.<sup>60</sup>

- 2.112 The Committee also sought assurance that personal value judgements of the scientists involved would not impact on the MFAT process. Dr Blackmore outlined the approach adopted by Professor Jones, the Chair of the SRP:

Professor Gary Jones, the CEO of the Cooperative Research Centre for Freshwater Ecology, has a very strict rule that the science community cannot be advocates for the environment; they have to be advocates for objective science. They have an evidence trail for every bit of evidence, and you can follow it.<sup>61</sup>

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59 Foreword to the Interim Report to the MDBC '*Ecological Assessment of Environmental Flow Reference Points for the River Murray System*', October 2003.

60 Transcript of evidence, p. 410.

61 Transcript of evidence, p. 411.

2.113 In support of these comments, Mr Goss made the point that the MFAT had been rigorously constructed, with about 90 percent of its evidence base coming from data which has been published in recognised scientific journals. He said:

At the end of the day, its [MFAT's] power is not in the answer it spits out. The power is in going back into it and applying sufficient scrutiny that all the assumptions and all the evidence pass certain tests and therefore there is a confidence in the options it is throwing up.<sup>62</sup>

*Key Findings in the SRP Interim Report*

2.114 The key findings in the SRP Interim Report can be summarised as follows:

- A further 350 GL environmental allocation, however operationalised, will provide little 'whole of river' ecological benefit.
- If fully optimised from an operational perspective, a further 750 GL may provide some whole of river ecological benefits.
- A further 1500 GL can provide considerable whole of river and local ecological habitat benefits.<sup>63</sup>

2.115 The Interim Report concluded:

Based on a combination of MFAT analyses and scientific knowledge and experience, it is the considered opinion of the SRP that at the whole of river scale, the 1500 GL flow option alone (ie. without structural, operational and water quality improvements) will deliver, at best, a moderate improvement for the plant and animal communities assessed.

However, combined with improved structural, operational and water quality management – including all options currently being assessed by the MDBC – there is a possibility that a further 1500 GL of environmental flow allocation, could deliver a healthy working River Murray system.<sup>64</sup>

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62 Transcript of evidence, p. 412.

63 A full description of the interim assessments is available in the Interim Report to the MDBC 'Ecological Assessment of Environmental Flow Reference Points for the River Murray System', October 2003, p. 11-14.

64 Interim Report to the MDBC 'Ecological Assessment of Environmental Flow Reference Points for the River Murray System', October 2003, para. 44 - 45, p. 12.

2.116 The Interim Report cautioned that any improvement in river health would take considerable time. In this regard it said:

The decline in health of the riverine ecosystems along the River Murray has occurred gradually over more than 50-100 years. Likewise, any recovery in health will also occur over many decades, and might not be noticeable for many years after any allocation of extra water for the environment has been introduced.<sup>65</sup>

*Minister's Reaction to the SRP Interim Report*

2.117 While noting the finding that a well-managed additional 750 GL would produce good results, the Hon Warren Truss MP, Minister for Agriculture, Fisheries and Forestry welcomed the release of the Interim Report as an important part of the community consultation process about the *Living Murray*. He said:

The report does not make recommendations. Rather, it provides scientific comment on the results of an examination of three amounts of water being returned to the Murray - 350, 750 & 1,500 GL ... The (MDB Ministerial) Council also needs to get a better understanding of the social and economic effects of returning water to the environment before it makes any decision on recovering water ... The Council is committed to consulting with stakeholders and the wider community before any final commitments are made regarding the Living Murray initiative. This interim report is an excellent addition to that process.<sup>66</sup>

*Response of the MDB Ministerial Council to the SRP Interim Report*

2.118 The Murray-Darling Basin Ministerial Council met on 14 November 2003 to consider developments in the *Living Murray* process. The Communique following this meeting announced a 'historic First Step decision to address the declining health of the River Murray system', by providing up to an additional 500 GL to give environmental benefits to six key ecological sites, namely:

- Barmah - Millewa Forest;
- Gunbower and Perricoota-Koondrook Forests;
- The Hattah Lakes;

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65 Interim Report to the MDBC 'Ecological Assessment of Environmental Flow Reference Points for the River Murray System', October 2003, para. 50, p. 13.

66 Press release by the Minister for Agriculture, Fisheries and Forestry, 15 October 2003.

- Chowilla Floodplain (including Lindsay-Wallpolla);
- The Murray Mouth, Coorong and Lower Lakes; and
- The River Murray channel.<sup>67</sup>

2.119 The Communiqué noted that funding would be made available under the \$500 million set aside in COAG's new National Water Initiative to address what it refers to as over-allocation in Basin rivers. Additionally, the \$150 million which the Ministerial Council had earmarked in 2002 for capital works would be re-focused on infrastructure improvements related to these six icon sites.

2.120 Regarding the sourcing of the proposed additional 500 GL of water, the Communiqué noted:

The water for this First Step will come from a matrix of options with a priority for on-farm initiatives, efficiency gains, infrastructure improvements and rationalisation, and market based approaches, and purchase of water from willing sellers, rather than by way of compulsory acquisition.<sup>68</sup>

2.121 At the public hearing on 26 November 2003 the Committee asked Dr Blackmore if 500 GL would be sufficient, given the finding in the SRP's Interim Report that 750 GL may provide some whole-of-river benefits and that 1,500 GL would provide considerably more benefits. Dr Blackmore replied that the 500 GL is a 'fantastic start' and that realistically it is probably as much as the MDBC could handle at this stage. Furthermore, the beneficial results of the additional 500 GL of environmental flows must be clearly demonstrated to stakeholders before next steps can be considered. He said:

We can make a massive change with 500 gigalitres and the investment of capital. Our council is very considered in its response to this because they believe that this is a first-step decision. They will want to have evidence of what they have got out of that investment, as will the basin community. Can we make massive change? Absolutely ... Is it enough? At the end of the day, in five years, we will sit down and ponder that. Hopefully, we will ponder it on the basis of having real life experience, real life monitoring ... So my summary is that it is a fantastic start. It is about as big a bite as any of us can deliver.<sup>69</sup>

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67 Murray Darling Basin Ministerial Council Communiqué, 14 November 2003, p. 1.

68 Murray Darling Basin Ministerial Council Communiqué, 14 November 2003, p. 2.

69 Transcript of evidence, pp. 733-4.



- 2.122 The Committee also asked Dr Blackmore where he thought the 500 GL could be sourced. He responded:

My personal judgment ... 300 to 350 gigalitres of water is recoverable by strategic investment. That is fixing up some of the baggage of the past, pipelining stock and domestic systems and so on and cleaning up some channel systems which are pretty untidy. That is constrained by how long it will take to do. ... That leaves 150 gigalitres to stand in the market. We are currently trading on the annual market about 700 or 800 gigalitres and about 100 to 120 gigalitres on the permanent market. So that seems to be doable over five years if you design proper market instruments.<sup>70</sup>

- 2.123 Dr Blackmore then spoke about the need to plan with great care if the Government eventually enters the market to buy water for the environment. He said:

My paranoia ... is that right now, if we were to enter the market in a willy-nilly way and not as an intelligent purchaser, we could be a predator. We have deep pockets; governments have deep pockets ... The worst thing that can happen, in my judgment, is that we end up driving the price of water up because of a lack of discipline in the way we enter the market. That might make a hell of a lot of people wealthier in the short term, but it means that our ability to adjust our industries using that instrument will be eroded. So we have to be very careful. I like what I see in the way that Adelaide entered the market recently when they hit their cap ... So there are lots of ways to do it where, at the end of the day, you make people winners without distorting the market.<sup>71</sup>

- 2.124 The Communiqué specified that community consultation and involvement would be a key component in the implementation of the 'First Step'. Dr Blackmore acknowledged to the Committee that developing community trust is a crucial issue. He said:

We have to make sure that we have arrangements which cement trust in the community because at the moment that is fractured, and it is fractured for a whole lot of reasons. I have to commend the Council of Australian Governments for trying to bring that back on track. It was pretty untidy until then. So what we have to do is work

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70 Transcript of evidence, p. 735.

71 Transcript of evidence, p. 735.

out how we will source water in ways that provide agricultural benefits and leave a better system out there.<sup>72</sup>

- 2.125 Dr Blackmore summed up his presentation to the Committee on 26 November 2003 on a very positive note. He said:

We have got the largest experiment in environmental management the country has ever seen, which I think will challenge us all as it is implemented. But I think we have an opportunity now with the capital available from government to make everybody a winner. That is certainly what we are trying to achieve.<sup>73</sup>

### Irrigator's response to the *Living Murray Initiative*

- 2.126 At the public hearing in Deniliquin in July 2003, Mr Hetherington advised the Committee that Murray Irrigation Ltd (MIL) had commissioned a review of the scientific information underpinning the *Living Murray* initiative. This review was undertaken by EM (Ecology Management) Pty Ltd, whose report titled '*The science behind the Living Murray Initiative*' was released by MIL on 31 October 2003.

- 2.127 The review examined the methodology, assumptions and findings of three reports most often quoted in *Living Murray* literature.<sup>74</sup> Amongst other findings, the EM review queried the scientific basis of the 'expert panel' approach, and asserted that there was too much focus on finding extra water and not enough on alternative solutions such as habitat restoration.

- 2.128 At the public hearing on 26 November 2003 the Committee asked Dr Blackmore for his reaction to the review undertaken by EM. He said that he 'rates the scientist [Dr Lee Benson] very highly' and agreed with some of Dr Benson's reservations of the expert panel methodology used in the past. However, Dr Blackmore noted that the Murray Flows Assessment Tool methodology used in the latest study (the SRP's Interim Report of October 2003) is much sounder. He said:

... there have been over 67 scientists working on elements of it [MFAT] and there are 3,100 knowledge fields now in that report so that you can find where every bit of data came from ... you can go

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72 Transcript of evidence, p. 729.

73 Transcript of evidence, p. 730.

74 The three reports examined by EM were—*Report of the River Murray Scientific Panel on Environmental Flows* (June 2000); *Snapshot of the Murray Darling Basin River Condition* (September 2001); and *Independent Report of the Expert Reference Panel on Environmental Flows and Water Quality Requirements for the River Murray System* (February 2002).

through every field, if you want to, and say, 'We don't believe this,' or 'There's not sufficient evidence in that,' or whatever.<sup>75</sup>

- 2.129 Murray Irrigation next commissioned EM to review the SRP Interim Report released in October 2003. That review, titled '*The science behind the Living Murray Initiative, Part 2*' was published in March 2004.
- 2.130 The two reviews conducted by EM raise a number of questions about the methodology used by the scientists, including the application of the Murray Flows Assessment Tool. Specific criticisms of the MFAT included:
- that MFAT primarily models flow related habitat, hence is very limited in its real world application, where more variables actually exist,
  - that the outputs of MFAT cannot be validated in the real world so it has little application to target setting or adaptive management, and
  - that MFAT is an expert opinion based model hence does not increase our data but simply formalises the expert panel process.<sup>76</sup>

The EM reviews also disagree with some of the conclusions reached in the four scientific reports studied.

- 2.131 The Committee urges the Scientific Reference Panel to take the opportunity in its final report, due in mid-2004, to address the key questions raised in EM's review of their Interim Report. There appear to be serious differences of opinion. It is vitally important that the *Living Murray* process is seen to be accountable and transparent. The questions raised in the EM reviews must be responded to, completely and honestly. Valid points made in the EM reviews should be acknowledged and adopted.
- 2.132 The Committee would like to state categorically that it is not opposed to increased flows. However, it believes that a robust methodology, based on sound physical data, must be devised to fully support future natural resource management in Australia. The Committee notes the comments of Dr Green that the MFAT would benefit from further development, and urges the MDBC to continue funding its development so that its full potential is realised.

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75 Transcript of evidence, p. 737.

76 'The Science behind the Living Murray Initiative, Part 2' by Ecology Management Pty Ltd, published by Murray Irrigation Limited, February 2004, p. ix.

- 2.133 The Committee is concerned at the apparent gaps in the scientific knowledge underpinning the *Living Murray*. The reasons for this concern are outlined in the Committee's interim report presented to the Federal Parliament on 5 April 2004.<sup>77</sup> The Committee believes that much better data and evidence is required to help COAG make decisions on the most efficient and effective ways to spend the \$500 million it has set aside.
- 2.134 In the Committee's view the doubts about the science must be removed before far-reaching commitments to reallocate water from irrigators to the environment can be made with any level of confidence.
- 2.135 Any decision to allocate water to increased river flows will have a long term impact on rural industries and communities. Furthermore, the possible impacts upon the river itself are not clear, with suggestions that there could even be negative effects on the environment unless understanding and management are improved. Much better data is required before making any commitment to increase river flows.
- 2.136 The Committee's interim report recommends that the Australian Government urge the Murray–Darling Basin Ministerial Council to postpone plans to commit an additional 500 gegalitres in increased river flows to the River Murray until a comprehensive program of data collection and monitoring by independent scientists is completed; non-flow alternatives for environmental management are considered and reported upon more thoroughly; and a full and comprehensive audit is conducted focussed specifically on the Murray–Darling Basin's water resources and taking into account all new data found.
- 2.137 The interim report also recommends that the Australian Government ask the Murray–Darling Basin Ministerial Council to allocate sufficient funds out of the \$500 million to the abovementioned tasks, prior to proceeding with the proposal to increase river flows.
- 2.138 The Committee believes that if, contrary to the recommendations in the Committee's interim report, the decision is still made to immediately allocate additional environmental flows to the River Murray such flows must be closely monitored and the impacts carefully measured to clearly show the outcomes. The communities which rely on this water for their livelihood, and indeed every Australian citizen, deserve nothing less.

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77 Chapter 1, paras 1.32 – 1.37 contain details of the interim report.

- 2.139 The Committee would like to emphasise its belief that any decisions by COAG or the MDBMC on future additional flows must take into consideration all the environmental, social and economic impacts of such flows. The methodology and resulting scientific conclusions underpinning such decisions must be transparent and able to stand up to the closest scrutiny.



## **Water policy framework**

### **Background**

- 3.1 Water policy in Australia is founded upon a range of Commonwealth and State instruments and bodies which, taken in their entirety, present a complex and sometimes contradictory mosaic of policies and initiatives.
- 3.2 Water policy and related natural resource management issues are primarily the responsibility of the States, and through them, of local government and other local bodies. As well as having independent policy development frameworks of their own, the States contribute to the development of water policy at a national level through COAG, the Natural Resources Management Ministerial Council (NRMMC), and the Murray-Darling Basin Ministerial Council (MDBMC). The States, through their membership of COAG, define their policy objectives in terms of nationally agreed goals.
- 3.3 On a national level, the overarching policy instrument is the Council of Australian Governments (COAG) water reform framework – now called the National Water Initiative. This sets the national policy parameters and direction of the water reform process.
- 3.4 The Commonwealth plays an extensive role in water management issues through the Natural Heritage Trust (NHT), the National Action Plan for Salinity and Water Quality (NAP), and through the activities of various government departments and agencies.

- 3.5 The resulting policies and policy frameworks have been diverse in their objectives and outcomes. A plethora of legislation, State water plans, and local management plans of various sorts govern water management in Australia, with a greater or lesser degree of overall coordination and funding.
- 3.6 It is the view of the Committee that facilitating and achieving greater coordination upon this array should be one of the principal objectives of future policy development.

## **Stakeholder reactions to rural water reform**

- 3.7 During the course of its investigations the Committee received a considerable amount of evidence on the success or otherwise of the implementation of the COAG Water Reform Framework which commenced in 1994. Much of this related to the crucial questions of water rights and water trading which are dealt with in the next chapter, but also indicated a general sense of frustration with the wider water reform process.
- 3.8 According to the National Competition Council (NCC), rural water reform relates primarily to water used in irrigated agriculture. The reforms are designed to:
- address damage to river systems and groundwater resources and increased salinity (which have resulted from excessive allocations to irrigators in the past) by ensuring adequate water is available to the environment;
  - ensure water infrastructure is efficiently maintained and developed;
  - ensure new dams are economically viable and ecologically sustainable; and
  - establish a system of tradable water rights to help ensure water is used where it is most valued.<sup>1</sup>
- 3.9 The water reform process has now been in train for nearly a decade, but, on the whole, the results have been less than ideal. In its 2002 assessment, the NCC noted:
- When adopting the water reform framework in 1994, CoAG stated that the reforms could be implemented within five to seven years, although it acknowledged that the speed and extent of reform

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1 NCC, *Annual Report 2001–2002*, p. 46.



depended on the availability of financial resources to facilitate structural adjustment and asset refurbishment.

- 3.10 The COAG agreement established completion dates for the major reforms (1998 for urban water pricing, the institutional reforms, water trading and allocations for the environment, and 2001 for reform of rural water pricing), but some of these deadlines were later extended. In particular, the timetable for environmental water allocations was extended to 2001 for stressed rivers and 2005 for all river systems and groundwater.
- 3.11 The initial timetable was overly optimistic; it underestimated the reform task. Significant constraints on the implementation of the reform framework included:
- the complexity of some of the reforms (for example, those that required much research and analysis before effective application);
  - the need for extensive consultative and educative processes;
  - the demands that the reforms placed on governments, institutions and stakeholders, including financial demands; and
  - the low base from which many of the reforms were initiated.
- 3.12 State and Territory jurisdictions have introduced the reforms at different rates and in different ways. Variances in implementation have reflected differences in jurisdictions' starting points (in their legislative frameworks for water, for example) and in the health of their river systems; the diversity of administrative and legislative environments across States and Territories; and differences in the interests and strengths of the relevant stakeholder groups.
- 3.13 According to the NCC:
- Progress in implementation of the reforms has been satisfactory generally, given unforeseen difficulties and the implications of some reforms for the interests of key stakeholders. CoAG (2002) noted that 'substantial progress' was being made on the national water reforms, but that 'water management is currently in a transition phase as jurisdictions implement new water allocation arrangements'.<sup>2</sup>

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2 National Competition Council 2002, *Assessment of governments' progress in implementing the National Competition Policy and related reforms, Volume one: assessment*, AusInfo, Canberra, pp. 3.47–8.

- 3.14 The NCC's view is that the process of urban water reform is nearly complete.<sup>3</sup> On the other hand, progress in rural water reform has been much slower. For example, price reform of rural water is less well advanced than urban water, and has proceeded at an uneven rate across jurisdictions.<sup>4</sup> As noted in paragraph 1.8, the Committee believes that this is a narrow view of water reform.
- 3.15 The question of water allocations for environmental purposes is also yet to be settled. Given the complexity of the environmental issues, gains from the reforms have taken longer to achieve, and proved more expensive and challenging than the other elements of the reform framework. Moreover, the knowledge base is still limited, and the nature and extent of the environmental improvements less predictable than other outcomes from reform.<sup>5</sup>
- 3.16 Nonetheless, the NCC believes that governments are now taking integrated approaches to natural resource management and, in the process, spending much more on research.<sup>6</sup>
- 3.17 In evidence presented to the Committee, Professor Cullen said of the COAG water reforms:
- The tragedy is that they have only been half-implemented and we need to reinvigorate that water reform agenda. If you look at the pricing aspect of COAG, I think we have the full cost charging in the urban area, but probably not quite so full cost for waste water services. As to full cost in the rural sector we have made very limited progress in most jurisdictions, so we are not necessarily covering the full cost there...A comprehensive system of water entitlements was a cornerstone of the COAG water reforms and where we have failed. When we talk about the agenda which will go forward, setting out those water rights is fundamental.<sup>7</sup>
- 3.18 Overall, Professor Cullen rated the results of COAG as 'pretty patchy. There are some very good principles on the table but we have not done all that well with them'.<sup>8</sup>

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3 NCC, *Annual Report 2001–2002*, p. 46.

4 NCC, *Annual Report 2001–2002*, p. 48.

5 NCC, *Annual Report 2001–2002*, p. 49.

6 NCC, *Annual Report 2001–2002*, p. 50.

7 Transcript of evidence, p. 1.

8 Transcript of evidence, p. 2.

- 3.19 Mr Leutton of the National Farmers' Federation told the Committee that with the advent of the 2003 National Water Initiative, COAG was now where it should have been in 1996.<sup>9</sup>
- 3.20 Similar views were expressed in other evidence presented to the Committee. In its submission, the Twynam Agricultural Group, an agricultural enterprise with substantial holdings in New South Wales and Queensland, was critical of the States (particularly NSW) for failing to carry out their obligations under COAG, and the Commonwealth for failing to enforce those obligations.<sup>10</sup> Nekon Pty Ltd, an investment company in Tasmania was critical of the Tasmanian Government's failure to implement price reform.<sup>11</sup> C. R. and S. P. Dyke, citing instances where the Tasmanian Government has failed to live up to its COAG obligations, called for the tightening of the NCC's assessment processes, and for National Competition Payments to be based on verifiable compliance with the COAG water reform agenda.<sup>12</sup> In their submission, the Combined Environment Groups (World Wide Fund for Nature—WWF, Australian Conservation Foundation, Nature Conservation Council of NSW, and the Inland Rivers Network) called for a new COAG agreement, citing the importance of the full implementation of the water reform agenda to securing better environmental outcomes.<sup>13</sup>
- 3.21 In its submission, Boonah Shire Council, highlighted a range of problems related to the COAG water reforms.<sup>14</sup> In evidence before the Committee Boonah Shire's Mayor, Councillor John Brent, reiterated these shortcomings and emphasised the confusion created in rural communities through the often-thoughtless implementation of the COAG reforms.<sup>15</sup>
- 3.22 Others saw problems in the reforms themselves, not their implementation. For example, Mr Matthew Arkinstall, of Rathdowney Queensland, wrote:

I believe that COAG and NCP have had a major unintended impact on rural and regional communities. Firstly, that the COAG requirements have resulted in price increases for water but have not brought about sufficient savings for the cost of implementing it, and that tying it to NCP, it has put rural users at a disadvantage. The major disparity here is that urban users only have to change simple

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9 Transcript of evidence, p. 688.

10 Submission no. 99, p. 3.

11 Submission no. 139, pp. 1-6.

12 Submission no.82, pp. 3-4.

13 Submission no. 103, pp. 2-3.

14 Submission no. 65, p. 4.

15 Transcript of evidence, p. 46.

lifestyle habits to reduce their usage and therefore costs, but in rural areas, there are no alternate sources of water, and for rural industries, often the water usage is directly correlated to income, i.e. the more available the higher the income.

COAG has also brought about a drift of water from rural areas to the coasts, and with it jobs and the very survival of some rural communities. Whilst those industries may have higher value uses, it is often outweighed by the negative impacts upon communities where the water once was.<sup>16</sup>

3.23 A similar view was propounded by the Beaudesert Shire Community Advisory Panel:

The current method of assessing the provision of water infrastructure, e.g. the National Competition Policy and The C.O.A.G. Water reforms, effectively devalue the existing social infrastructure and social network of communities. It is believed that this process can result in making decisions, which will have significant impact in the overall sustainability of regional and rural Australia.<sup>17</sup>

3.24 Kalfresh, a vegetable packing company located on south-east Queensland, was scathing in its assessment of COAG, arguing that ‘the mistakes and uninformed decisions of Water Reform will plague us long after this drought has broken’. It added:

Much of the CoAG inspired legislation flies in the face of good economic policy and logical growth paths for regional economies. Moreover it treats those of us who have invested in these regions with contempt and will stifle investment long into the future. It has robbed regional areas of confidence and the desire to press on.<sup>18</sup>

3.25 The submission from the Lockyer Valley Irrigators raised questions about the way reform was implemented in Queensland by the Department of Natural Resources and Mines (DNRM). Their submission contends that in their haste to meet NCC deadlines, DNRM based their decision making on questionable science, a one-size-fits-all approach, and little or no regard for economic impact. No compensation is planned for those impacted, a position the irrigators regard as being inconsistent with the intent of National Competition Policy. The Lockyer Valley Irrigators contend that

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16 Submission no. 24, p. 1.

17 Submission no. 25, p. 2.

18 Submission no. 138, p. 4.

this form of policy making ‘in fact stifles competition and retrospectively penalises small family farmers, the backbone of the area’.<sup>19</sup>

3.26 The Committee visited the Lockyer Valley and inspected water infrastructure and farms there. Local irrigators were particularly critical of the poor standard of some of the engineering designs and sites chosen for local water storage facilities.

3.27 A problem highlighted by Mr Jolyon Burnett, Chief Executive Officer of the Irrigation Association of Australia, in his evidence before the Committee was the lack of understanding in rural Australia of COAG reform processes:

I think that is a significant task that faces us all to raise the level of understanding of what is trying to be achieved at a national level. All too often the responses to inquiries like yours, or the presentations that are made at regional fora, are based on very parochial and local understanding of the issues. While that is important, I think we would get a better outcome if more people understood the broader context of the reform agenda that is happening.<sup>20</sup>

3.28 The Inquiry revealed a great deal of anger and frustration in rural Australia at the way the COAG reforms have been implemented in the past, which brought the reforms themselves into question. Processes need to be employed which make future reforms more transparent and better understood.

3.29 In the Committee’s view, the National Water Initiative presents an important opportunity to review the implementation of water reform and the management of the reform process. It is clear that both the process, and people’s understanding of the process, are deficient in many respects, and that these deficiencies should be urgently addressed. It is essential that the further development of the National Water Initiative follow a process that is open and consultative with all stakeholders.

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19 Submission no. 87, pp. 2-3.

20 Transcript of evidence, p. 598.

## Recommendation 4

3.30 The Committee recommends that the Commonwealth urges the Council of Australian Governments to:

- undertake a national public communications strategy to disseminate the policies and goals of the National Water Initiative; and
- provide formal avenues for public feedback and consultation under the National Water Initiative.

## The need for greater accountability

3.31 The Committee received evidence suggesting that some of the key participants in the reform process, particularly the States, are not sufficiently accountable for their actions. The NCC has responsibility to police the COAG agreements, but only within the broad terms of those agreements, and National Competition Payments are untied.

3.32 Mrs Christine Campbell, Executive Chairman of the Twynam Agricultural Group, in her evidence before the Committee said:

A couple of times, in previous submissions through the water-sharing plan process, we have participated in requesting the federal government to withhold those tranche payments. Each time we have had a report come back from the authority, the NCC, that says that the state governments are working within their legislation and that it has been an ineffective request on our behalf as irrigators. If we were able to say that these blueprints and their obligations has meat in them, that would be a very big plus.<sup>21</sup>

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21 Transcript of evidence, p. 608.

- 3.33 In his submission, Mr Beris Hansberry, of Gould's Country, Tasmania, noted how readily environmental protection policies broke down in the face of State and local expediency.<sup>22</sup> Mr Hansberry also highlighted the pitfalls of the local action dependent on ongoing funding from the NHT:

Currently many beneficial & worthwhile programs for water management are in place, but they are often blighted by funding reductions, uncertainty of future funding & excessive paper work to gain said funding. (Thus using many vital hours which could be spent 'on the ground' providing solutions.)<sup>23</sup>

- 3.34 Dr Gary Sauer-Thompson, in a submission entitled 'Local Government and the Sustainable Governance of Water Resources in South Australia', cites the example of the Eyre Peninsula as a case study of 'a region struggling with its management of water resources to achieve ecologically sustainable development' due to poor planning.<sup>24</sup>

- 3.35 In his submission to the Inquiry, Mr John Hyde, an Eyre Peninsula farmer, also expressed concern about water resource management on the Eyre Peninsula. He cites the approval given to vineyard developments by the District Council of the Lower Eyre Peninsula, despite the absence of a water management plan and an acknowledgement that the water supply is in crisis:

Having listened at the Inquiry to the submissions put before the members, I must comment on the particular submission by Mr Vance Thomas on behalf of the Local Government Association. To make a statement that LEP [Lower Eyre Peninsula] was ideal for horticulture and viticulture must be challenged. There is no doubt the area's climate is ideal, but we lack one essential ingredient, and that is water. Water that is being extracted from our critical catchment creeks in the WPZ [Water Protection Zone]. This hasn't deterred our District Council from proceeding with approvals for irrigation for this purpose. Once more it relates to catchment management, or more precisely the total lack of it.

- 3.36 Mr Hyde further describes the apparent unwillingness of the State Government to interfere in a matter over which the District Council was the prescribed authority under the *Water Resources Act 1997*.<sup>25</sup>

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22 Submission no. 34, pp. 1-5.

23 Submission no. 34, pp. 3-4.

24 Submission no. 62, pp.22-23.

25 Submission no. 156, pp. 1-4.

- 3.37 In its submission, the Eyre Peninsula Catchment Water Management Board was also critical of the role of the State Government:

The State Government water resource agencies have not undertaken to remediate the catchment salinity problem or weed invasion, acid sulphate or erosion problems that also threaten the catchment. The Board believes that no Government has the right to allow a catchment to degenerate to the detriment of present or future generations or the environment...

Whilst the Government subsidises the development of new sources of water but not the sustainable management of existing supplies, there is little incentive for a commercial water supply entity to contribute to catchment management. It is believed that this is not a problem specific to South Australia and for reasons of fair competition, it is considered that Nationwide coordination is appropriate.<sup>26</sup>

- 3.38 There was also some concern expressed over accountability for the monies allocated to the Murray-Darling Basin under the National Water Initiative. In evidence before the Committee, Professor Cullen urged that the money be spent on actually obtaining water for the environment. He stated:

At the moment there are all sorts of people suggesting how the \$500 million should be spent on a whole variety of things ... I fear that a large proportion of the money will go on tarding up infrastructure works and having negotiations and we will not necessarily get the outcomes that I believe we have enough knowledge now to get.<sup>27</sup>

- 3.39 Mr Peter Cosier, fellow member of the Wentworth Group, and Director of Conservation for WWF Australia, put the matter even more directly:

\$500 million is a lot of money and Australians are watching this process. It is taxpayers' money that is being put up. If we do not get \$500 million worth of water in rivers for the \$500 million investment, Australians are hardly likely to come back and say, 'You can have some more.' What we think is absolutely crucial is that the process by which that is done is (a) transparent but (b) done by experts.<sup>28</sup>

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26 Submission no. 97, p. 2.

27 Transcript of evidence, pp. 674–5.

28 Transcript of evidence, p. 675.



- 3.40 The Committee agrees that the outcome of this expenditure in the Murray-Darling Basin is crucial. However, as noted in its interim report the Committee is very concerned at the knowledge gaps which still exist.<sup>29</sup> It believes that, to achieve the best long-term outcomes, part of the \$500 million should immediately be invested in upgrading data and information sets and developing the best possible scientific methodology.<sup>30</sup>
- 3.41 A significant aspect raised in evidence presented to the Committee was the cost of implementing the national water reform agenda at a local level.
- 3.42 In its submission and in evidence provided at a public hearing, the Pioneer Valley Water Board expressed concern that the water reform agenda is being driven by the problems of the Murray-Darling Basin; that the cost of reform is being borne by irrigators 'who can least afford it at this time'; and that none of the payments made to the States for their part in the water reform process are being passed on to local bodies to help them to meet the cost of reform.<sup>31</sup> Their submission noted:

The Pioneer Valley Water Board fully supports the general intent of the Water Reform Agenda but is now confronted with an extremely time consuming process through new legislation and with the potential for increased costs of its operations that will result in significant increases in water charges.<sup>32</sup>

- 3.43 The Eyre Peninsula Catchment Water Management Board was concerned about the equity costs of the current system of environmental management:

South Australian Catchment Water Management Boards are funded through a levy system collected from local land and water users. This fund is collected and spent in each catchment. There is however a serious social inequity in this process

A City Catchment may have a population of 300 000 in an area of 200 square kilometres and have very little natural catchment to manage. Arguably, most of the catchment issues therefore are a result of poor planning, design and construction and are the responsibility of the developers and Local Government to fix. Meanwhile, Eyre Peninsula has a population of about 30 000 and an area of 55 000 square kilometres to manage. The water resource and

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29 The Committee presented an interim report to Parliament on 5 April 2004. See Chapter 1, paras 1.32 – 1.37.

30 See Recommendation 2 in the interim report.

31 Submission no. 9, pp. 2-5.

32 Submission no. 9, p. 2.

water dependent environment of the catchment is not owned by the whole community, but shared by the whole country.

It is clearly the responsibility of every citizen to do their bit to ensure that their use of the environment is sustainable, however there must be a matrix applied to ensure that rural communities are not held responsible for the management of the whole water environment to a greater degree per-capita than the urban community ... Social equity needs to be addressed throughout all areas of Australian life to ensure that rural communities have equitable financial resources to manage local natural and social resources. Rural water supplies are no different.<sup>33</sup>

- 3.44 The Committee shares the concern of local authorities at the apparent ease with which State Governments and statutory authorities can pass on the costs of water reform to local communities. This clearly impacts not only on the ability of local communities to carry out their obligations, but also on their willingness to do so. Indeed, it has the potential to undermine the whole process.
- 3.45 The Committee also believes that under the current framework, rural and regional Australia is bearing a disproportionate amount of the cost of water reform. Water resources management is a national responsibility, with each community given a share of available resources proportionate to their burden of responsibility.
- 3.46 It is the Committee's view that there is a clear need for a more integrated planning process, encompassing different levels of government and different aspects of water management (and other aspects of environmental management) in one vertically and horizontally integrated planning framework.
- 3.47 The key aspect of this must be a combination of national coordination and local ownership and control. For the most part, the necessary parts of this framework are already in place—the task now is to integrate them, and harmonise them within and between jurisdictions. (Aspects of the Commonwealth's possible role in such developments is discussed in the section titled 'Future Directions', below).
- 3.48 The Committee is wholly in sympathy with stakeholder concerns about the National Competition Payments process and the enforceability of the COAG agreements generally. Those charged with responsibility for the implementation of the agreed changes under the Water Reform Framework should be accountable for the discharge of that responsibility.
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33 Submission no. 97, pp. 6-7.

- 3.49 A number of submissions suggested ways to address these issues. Macquarie River Food & Fibre suggested giving the NCC more teeth.<sup>34</sup> C. R. & S. P. Dyke urged that competition policy 'tranche payments be withheld until the actual (rather than theoretical) performance and compliance can be positively demonstrated as meeting progress criteria'.<sup>35</sup> The Victorian Farmers Federation wanted national competition payments tagged to ensure the money was spent on those projects or reforms which formed part of a State's COAG obligations.<sup>36</sup>
- 3.50 The Committee agrees that specifications for tranche payments should be tightened, and where governments fail to meet their obligations, payments should be withheld.

### **Recommendation 5**

- 3.51 **The Committee recommends that the Commonwealth, as part of the National Water Initiative, ask the Council of Australian Governments to provide:**
- **that requirements for receipt of National Competition Payments are transparent and clearly spelt out in each phase of the reform process and developed in consultation with water users, including farmers and should include positive initiatives that have the potential to provide more water, such as stormwater harvesting and grey water recycling;**
  - **the tagging of National Competition Payments to specific verifiable outcomes, and supplied directly to the end-users; and**
  - **that National Competition Payments are withheld where those outcomes are not met.**

### **Recommendation 6**

- 3.52 **The Committee recommends that the Commonwealth, as part of the National Water Initiative, considers direct funding for natural resource management, including National Competition Payments, directly to regions according to their targeted needs.**

34 Submission no. 78, p. 3.

35 Submission no. 82, p. 3.

36 Transcript of evidence, p. 256.

## Pricing of rural water

- 3.53 The Inquiry received a considerable amount of criticism directed at the COAG policy objective of pricing rural water based on full cost recovery, both by those frustrated by the failure to achieve it, and those potentially impacted by it. Current charges for bulk water vary between suppliers.<sup>37</sup>
- 3.54 In its submission, the Australian Water Association (AWA) highlighted the need to achieve water prices that reflected the actual value of the commodity, and the opportunity costs reflected by different uses:
- The current price of water, even in the urban context and particularly in the rural bulk water context, does not reflect a highly valued commodity. The appropriate price, which will promote sustainable management, is uncertain, however, it is most definitely higher than it is now. The value of water is difficult to determine; however we should be actively trying to improve our ability to measure value. In general, it is possible to generate far greater GNP through using water for industrialization than it is for agricultural use, particularly for high water/low cash value crops. There are of course other considerations—this is not a suggestion that we should not have irrigated agriculture. However, we should give greater consideration to the opportunity costs associated with allocation and policy decisions.<sup>38</sup>
- 3.55 According to the AWA's Mr Davis, failure to institute full cost recovery sends the wrong price signals and leads to inefficiency in agricultural production.<sup>39</sup>
- 3.56 Professor Cullen, also stressed the need for prices to reflect the cost of production, including getting 'the real costs of production into the food prices'. He also supported using price signals, such as rebates, to support efficient water use.<sup>40</sup>

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37 Indicative prices charged by two Rural Water Authorities are on the website of the Victorian Water Industry Association [www.vicwater.org.au](http://www.vicwater.org.au) accessed in March 2004. Goulburn Murray Water charges: 'Prices for gravity irrigation supply range from \$17.60/ML to \$28.10/ML, with higher charges for some pumped and pipelined supplies.' Southern Rural Water charges: Macalister Irrigation District \$32.58/ML, groundwater (general) \$1.40/ML, most rivers \$4.30/ML.' (ML= megalitre=1 million litres).

38 Submission no. 71, p. 7.

39 Transcript of evidence, p. 541.

40 Transcript of evidence, p. 9.

3.57 In its submission, the CSIRO emphasised the need to fully implement the original COAG water reform intention of full cost recovery including that needed to cover the cost of “externalities” (i.e. third party impacts and environmental degradation arising from water use).<sup>41</sup> According to the CSIRO:

A combination of full cost recovery, a directed water trading market, an explicit water allocation policy and the development of an ethos that values water conservation will be needed to underpin the stability of water supply and use. This combination represents the balance between the external motivations of pricing and self interest and the moral values associated with notions of “a fair go” and having the opportunity to be involved in the decision making.<sup>42</sup>

3.58 In its submission, ABARE argued that pricing needs to reflect the increasing social costs in water supply and use, and to take account of capacity constraints in delivery systems that may impart costs to all irrigators. ABARE, believed a system of marginal cost pricing and multipart tariffs would better reflect the actual cost of delivering water to individual properties, thus ensuring more efficient water use on-farm.<sup>43</sup>

3.59 On the other hand, there were those critical of the policy objective of full cost recovery in the pricing of rural water.

3.60 Mr James Florent, Policy Manager, Environment, for the NFF, argued before the Committee that factoring environmental impacts into water prices was very subjective and would distort the water market. Environmental objectives were best managed through other policy mechanisms.<sup>44</sup>

3.61 Mr Andrew McMillan, Director of Policy for the Western Australian Farmers Federation, indicated that he believed that full cost recovery was not a viable proposition in Western Australia, with its sparse population. He also emphasised that farmers were price takers when it came to marketing their produce. They could not simply pass on increased water charges to consumers.<sup>45</sup>

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41 Submission no. 59, p. 8.

42 Submission no. 59, p. 12.

43 Submission no. 94, pp. 7-9.

44 Transcript of evidence, p. 688.

45 Transcript of evidence, p. 656.

- 3.62 Mr John Palmer, Manager of the Pioneer Valley Water Board, regarded the current pathway to full cost recovery in Queensland as ‘simply another form of state government taxation on a group of water users who have no capacity to pass on additional costs through their produce’.<sup>46</sup> He also expressed concern at the lack of actual cost data:

The other aspect of rural water pricing in Queensland is that the present price paths have been set with some seriously flawed cost data for the operation of the schemes. The government is refusing to allow access to that data for examination by water users. My board, like most irrigators in the Queensland government owned corporation SunWater run schemes, has indicated to the government that we are prepared to pay the true lower bound costs [i.e. covering operation, maintenance and refurbishment of assets, but not return on capital] of irrigation water supply. The imposition of water charges without details of actual costs of supply is a major impediment in Queensland to the acceptance by irrigators of the COAG water reforms.<sup>47</sup>

- 3.63 The Queensland Farmers’ Federation raised the issue of the speed with which price paths were established and the lack of transparency in the process.<sup>48</sup>

- 3.64 Mr Patrick Murphy, Director of Works and Technical Services, Boonah Shire Council, was concerned that commercial pressures would see water move from rural uses to urban uses under full cost recovery:

If we go on a purely commercial basis, urban will continue to outbid rural with regard to water price. In urban areas there is industrial and domestic use, but there is also garden use, which is about aesthetic value. In rural areas water has more value than just price—it has production value. When you weigh up the total value of water there is more than just the commercial value. COAG is pushing everyone towards a commercial price rather than an actual value of production, or value adding the water.<sup>49</sup>

- 3.65 Boonah Shire Council’s Mayor, Councillor John Brent, put the position even more starkly, stating that rural water pricing was about the future of rural industries in Australia.<sup>50</sup>

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46 Transcript of evidence, p. 109.

47 Transcript of evidence, p. 109.

48 Submission no. 116, pp. 9-10.

49 Transcript of evidence, p. 39.

50 Transcript of evidence, p. 40.

- 3.66 Like Boonah Shire Council, Beaudesert Shire Council believed that unless pricing regimes reflected a broader vision for rural Australia, they would undermine the ability of rural communities to survive:

The drive to a market-based water system, particularly for rural areas fringing on expanding urban areas (a Shire like ours and our neighbours, Boonah Shire) will effectively sound the death knell of those communities. Unless action is taken to change that system, their demise would appear inevitable.

It would appear to be smarter economics to ensure that these small rural communities continue to thrive so that rural production close to urban areas continues, so that the huge investment in community infrastructure is not wasted, so that the critical asset for their continuation is not destroyed, and so that the jobs these people currently enjoy do not need to be provided within the urban area. In addition, without these communities, the 'growth industry' of rural-based tourism will cease to exist as the very things that make these areas 'Australian' or 'the bush' just will not be there.<sup>51</sup>

- 3.67 Mr Vance Thomas, executive officer of the Eyre Peninsula Local Government Association, urged a uniform national approach to water pricing. The alternative was that those districts that acted responsibly on water pricing would be undercut by those that did not. Speaking of the Eyre Peninsula, he stated:

I believe there is a willingness for this region to pay a premium for its water. But should it have to? The other side of that equation is that, as I mentioned, we have difficulties in business and industry because of the size and remoteness of this region. They really have to fight to remain competitive because of those issues alone. If you added an additional impost of higher priced water to that and it was not being paid anywhere else they would lose whatever edge they have; whatever margins they have would be whittled away even further.<sup>52</sup>

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51 Submission no. 18, p. 2.

52 Transcript of evidence, p. 364.

- 3.68 In its submission, the Victorian Farmers Federation supported full cost recovery in principle, but within certain parameters. The price of water should be set to allow water authorities to remain financially viable, but reflect no more than the marginal costs associated with efficient water delivery. There should be no positive rate of return. The VFF also opposed placing environmental charges in price structures. Charges for asset refurbishment were to be based on reasonable time frames and expectations of cost. ‘Gold plating’ was to be avoided.<sup>53</sup>
- 3.69 While the Committee supports the principle of full cost recovery in the pricing of rural water, there are clearly serious issues that must be addressed concerning the implementation of this policy. The Committee agrees that factoring environmental impacts into water prices is both subjective and likely to distort prices. Such costs, unless readily identified on a catchment or regional scale, are better left to the use conditions of individual water licences.
- 3.70 A problem with full cost recovery in areas of government-provided infrastructure is that development frequently occurs outside market discipline and accumulated costs may be excessive. For example, the South East Drainage Scheme in South Australia where farmers believe that they are paying additional costs due to excessive bureaucracy, and environmental demands which should more properly be borne by the wider community.
- 3.71 Moreover, while the Committee also believes that it would be virtually impossible to institute uniform water pricing without extensive price subsidies, there is a clear case for taking into account historical and regional differences in the application of full cost-recovery pricing. Those regions where public investment has historically been low, or where infrastructure condition has declined for lack of recent public investment, have a strong claim to some level of government assistance, at least in the short term.
- 3.72 The Committee believes that water prices should be determined on a uniform basis—a common set of pricing principles—and that charges applied by monopoly suppliers, especially bulk suppliers, should be subject to full public scrutiny.

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53 Submission no. 73, pp. 1-2.



## Recommendation 7

- 3.73 **The Committee recommends that the Commonwealth urge the Council of Australian Governments, to adopt a national water pricing framework as part of the National Water Initiative, based on the principle of full cost recovery, and that:**
- **Water pricing reflect operational costs and asset renewal, with externalities dealt with through water use licences;**
  - **The implementation of full cost recovery pricing take into account different historical and regional circumstances such as monopoly markets without market discipline; and**
  - **All pricing regimes are transparent and open to full public scrutiny.**

## Future directions

- 3.74 From evidence received during the course of the Inquiry, it became apparent to the Committee that the future management of Australia's water resources required four basic factors—
- A national vision for water
  - Commonwealth leadership and coordination
  - Greater public engagement in the reform process
  - A stronger and better coordinated research effort (see Chapter 7)
- 3.75 The Committee believes that as part of the process of developing the National Water Initiative, COAG should outline a national vision for water, and set definite targets for enhancing the other factors.

## A national vision

3.76 The need for a national vision for water was articulated by several witnesses during public hearings of the Inquiry.<sup>54</sup> A number of written submissions also emphasised that water is a national responsibility, and argued for a national vision.<sup>55</sup>

3.77 In his evidence before the Committee, Professor Don Bursill, CEO of the CRC for Water Quality and Treatment, argued that ‘we need a much clearer national vision for what we want to see regarding our water resources in this country, and the consequent objectives and strategies need to be focussed on achieving that vision’.<sup>56</sup> Professor Bursill ‘could not imagine the individual states coming up with a common vision. Maybe I am wrong—I hope I am wrong. That is the point I am trying to make here: I would like to see the Commonwealth show that leadership’.<sup>57</sup>

3.78 In its submission, the CSIRO stated:

Development and conservation of water needs to be directed through enunciation of a set of values. These values should encompass the notions of efficiency, fairness, sustainability and reward for effort within the obligation to others. In every day language these might be expressed as ‘waste not, want not’, ‘a fair go’ (for people and the environment), ‘something for our grandchildren’ and ‘return in proportion to risk and investment’.

The vision should also set out the fundamental principles for water use. It should assert that the primary right to water should be to satisfy the basic human need for sufficient water of adequate quality for drinking and hygiene. It should assert the right of the environment to have adequate water to maintain the integrity of dependent ecosystems.<sup>58</sup>

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54 For example transcripts of evidence, pp. 564–6, 602, 612.

55 For example, Boonah Shire Council, Submission no. 65, p. 2; NSW Irrigators’ Council, Submission no. 105, pp. 8-9; Macquarie River Food & Fibre, Submission no. 78, pp. 2-3.

56 Transcript of evidence, p. 289.

57 Transcript of evidence, p. 297.

58 Submission no. 59, p. 4.

3.79 Twynam Agricultural Group, a major agricultural producer in New South Wales and Queensland, emphasised the need for a national vision—one encompassing rural communities and irrigated agriculture:

To achieve adequate and sustainable water supply the needs and rights of all members of the community and the environment need to be respected. Twynam wish to see positive change in the context of a clearly enunciated ... vision for the environment, irrigated agriculture and rural communities. Without that vision the future for investment in business, people and rural communities is undermined.<sup>59</sup>

3.80 In July 2003, the Wentworth Group articulated a vision for water in Australia comprising three fundamental goals:

- Protecting river health by recovering environmental water in stressed rivers, and avoiding the mistakes of the past in our undamaged rivers;
- Promoting opportunity by fully specifying water entitlements and responsibilities, and then removing impediments to water trading; and
- Engaging communities and ensuring a fair transition, so no group is asked to bear an unreasonable burden.<sup>60</sup>

3.81 The Committee endorses both the concept of water being a national responsibility, and the need for a vision encompassing the environment, irrigated agriculture and rural and urban communities. At present, the people of Australia are presented with a range of partial and sometimes conflicting policies which fail to meet the need for a coherent national vision.

## Recommendation 8

3.82 **The Committee recommends that the Commonwealth, working through the Council of Australian Governments, develop a comprehensive national vision for water in Australia, balancing the needs of the environment, irrigated agriculture and rural and urban communities.**

59 Submission no. 99, p.2.

60 *Blueprint for a National Water Plan*, Wentworth Group, July 2003, p. 6.

### Commonwealth leadership and coordination

3.83 During the course of the Inquiry, the Committee received considerable evidence on the need for the Commonwealth to take a leading role in coordinating national water policy.

3.84 Typical were the comments by Mr Kent Martin, Chair of the Natural Resources Committee of the South Australian Farmers Federation. He told the Committee:

We have always believed that the Commonwealth's role was to show leadership. I live on the border and I see the problem of states squabbling and having different regulations. I guess we have always seen that the Commonwealth has a role to play in leadership and in taking control of some of the border squabbling, where people could not agree to the difficulties of different regulations.<sup>61</sup>

3.85 The need for strong, national leadership of this vital resource is a view with which the Committee concurs. Indeed the Commonwealth already plays an active role through policy formulation and national coordination especially through COAG, and the provision of financial assistance.

3.86 A significant barrier to stronger Commonwealth involvement is that under the Australian Constitution the States and Territories have responsibility for water issues. Commonwealth power over water is specifically limited by section 100, which reads:

The Commonwealth shall not, by any law or regulation of trade or commerce, abridge the right of a State or of the residents therein to the reasonable use of the waters of rivers for conservation or irrigation.<sup>62</sup>

3.87 In a submission the federal member for Sturt, Mr Christopher Pyne MP<sup>63</sup>, argued that the Commonwealth should assume responsibility for water. At a public hearing he said that the States have allowed such a degradation of the health of many rivers that the Commonwealth should challenge the concept of 'reasonable use' under section 100 with the aim of assuming a greater responsibility for water:

What I propose is that the Commonwealth take an action in the High Court to seek from the High Court its opinion on what reasonable use means and whether the states have over the last 102 years used the waters of the Commonwealth reasonably,

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61 Transcript of evidence, p. 327.

62 *Australian Constitution*, s. 100.

63 Submission no. 110.

particularly in relation to the Murray–Darling Basin. If the High Court found that it was not reasonable use, you would argue that, therefore, section 100 no longer protects the states’ power over the Murray–Darling Basin, or the rivers generally, and that power then devolves to the Commonwealth, and the Commonwealth would then have a head of power to control the waters of the Commonwealth.<sup>64</sup>

3.88 A number of submissions supported the appointment of a federal Minister for Water Resources as a means of focusing sharper attention on this vital resource.<sup>65</sup>

3.89 At a public hearing, Mr Davis of the Australian Water Association told the Inquiry:

We would much prefer to see a single minister having the full purview for water. We are conscious of the fact that AFFA and EA are both working much more collaboratively and that they are running the NAP with a joint management team, which is a very positive movement, but, in the long term, it would still be better to have a minister who is solely responsible for water and who can make it more coherent.<sup>66</sup>

3.90 In its evidence before the Committee, the Wentworth Group proposed the appointment of a Minister for Natural Resource Management, emphasising that water management should be integrated with land management. Dr John Williams, a member of the Wentworth Group and chief of the CSIRO’s Land and Water Division, told the Committee:

We really need to make sure we keep water as part of a whole system. That is absolutely important. We have to make sure we integrate clearly the groundwater and the surface water systems and recognise that the water use in either irrigation or urban and the linkage to the river needs to be treated as a whole system.<sup>67</sup>

3.91 The Committee believes that water is of critical importance and it supports the concept of a Minister for Water, who would be responsible for formulating and coordinating policy at the federal level.

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64 Transcript of evidence, p. 302.

65 For example, Boonah Shire Council, Submission no. 65, p. 1; Australian Water Association, Submission no. 71, p. 2; Mr A. S. Davey, Submission no. 61, pp. 1-4.

66 Transcript of evidence, p. 542.

67 Transcript of evidence, p. 667.

## Recommendation 9

- 3.92 **The Committee recommends that, as a matter of priority, the Commonwealth Government create a ministerial portfolio for water, with clear responsibility for the formulation and management of water policy at the federal level.**

### Public engagement in the reform process

- 3.93 In establishing a vision and related policy mechanisms, the Committee believes that process is as important as outcome, that extensive and effective community engagement is required to create a vision. This is a matter which received widespread endorsement in the evidence presented to the Committee.
- 3.94 Part of that process may be through programs such as FutureWater, bringing environmentalists and farmers together in public meetings and irrigation forums.<sup>68</sup> Another is a process recommended by the National Farmers' Federation, where farmers visit different regions to gain an appreciation of the problems faced by others, an important step in creating coherent policies in a diverse but connected system such as the Murray-Darling Basin.<sup>69</sup> Such a scheme was also endorsed by Mr Leon Ashby, a South Australian farmer and convenor of Landholders for the Environment, a group looking at issues of sustainable production and conservation, and land-holders rights, from a grass-roots perspective.<sup>70</sup>

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68 Transcript of evidence, pp. 564–5.

69 Transcript of evidence, p. 696.

70 Transcript of evidence, pp. 185–6.



## Water rights and water trading

### Background

- 4.1 During the course of its Inquiry, the Committee received voluminous evidence on the importance of water rights and water trading to the future of rural Australia. Indeed, it is the Committee's view that defining water rights, or 'water access entitlements',<sup>1</sup> is the critical issue underpinning provision of water for both agriculture and the environment. Likewise, the market mechanisms used to establish water trading will have a profound influence on the future of irrigated agriculture.
- 4.2 The key principles of the new National Water Initiative announced by COAG on 29 August 2003 included references to water rights and water trading. The NWI announcement reiterated the need to improve 'the security of water access entitlements, including by clear assignment of risks of reductions in future water availability, and by returning over-allocated systems to sustainable allocation levels', and ensure 'water is put to the best use by encouraging the expansion of water markets, involving clear rules for trading, robust water accounting and pricing based on full cost recovery'.<sup>2</sup>

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1 Council of Australian Governments Communique, 29 August 2003.

2 Council of Australian Governments Communique, 29 August 2003.



- 4.3 It is the Committee's belief that these aspects of the National Water Initiative should be pursued as a matter of urgency, to create a clearly defined and robust system of water access entitlements, and a free, fair and transparent market for water trading.

## Water Rights

- 4.4 While the various State and Territory water rights all conform to the broad principles of the COAG water reform framework, their differences reflect the historical circumstances under which they have developed over the last century or more. This becomes a particular issue in the Murray-Darling Basin where the members of the Basin are all part of one very large system, yet have different water access rights.
- 4.5 Some have argued that the implementation of the COAG water reforms has been less than satisfactory. In evidence before the Committee, Professor Peter Cullen noted that the question of water rights was the most important issue in the water reform process, yet the one where COAG had failed to deliver. He argued that the clarification of 'access rights' was vital. Without clear entitlements, trading would be difficult, and the question of returning water to the environment would be encumbered by conflict over loss of rights and issues of compensation. Clearly defined entitlements would allow everyone to know where they stood, what degree of access they were entitled to, and what level of remuneration or compensation they were entitled to for the sale or loss of that entitlement.<sup>3</sup>
- 4.6 In its submission, Murray Irrigation stressed the importance of water rights, and the need to establish an effective system of rights before engaging in water trading:

Establishment of property rights to water is fundamental to most of the policy issues facing government. Property Rights issues must be satisfactorily resolved through the COAG agreements before governments pursue a more liberal trade in water entitlements and any further decisions are made about environmental flows for the Murray River. Any decision by governments, Commonwealth or State to interfere with water policy will have impacts and should only occur after rigorous analyses. Any attenuation of irrigators' water rights should at least

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3 Transcript of evidence, pp. 1-3, 19.

be based on just terms compensation. In the case [of the] Murray Darling Basin the starting point should be the 1995 Cap on diversions.<sup>4</sup>

- 4.7 The Committee is concerned that the COAG Water Reform Framework has reduced the security of irrigators' water entitlements, while leaving them with little or no control over the planning processes to which they are now subject. It is also concerned at the lack of clarity and compatibility in the current system of rights.

### Security of tenure

- 4.8 The Inquiry received considerable evidence that security of entitlement is a key issue for farmers. In its submission, the National Farmers' Federation (NFF) urged that water licences be issued to 'all water users in perpetuity'.<sup>5</sup> Other peak farming bodies have also stressed the need for security of access.<sup>6</sup> Mr Clay Manners, General Manager, Policy, for the Victorian Farmers Federation (VFF), told the Committee that:

We—along with, I think, farmers across Australia—believe that secure access rights to water are very important in managing the business so that if farmers purchase water they understand what they are purchasing and know they are purchasing it for the long term and if they make investments on their farm they know they are making them for the long term and can invest with confidence.

- 4.9 Mr Manners emphasised that a system of periodic review of entitlements would not be welcomed in Victoria, stating:

A system with a review of water rights every 10 years would not be seen very well in Victoria. We view water rights as a permanent allocation to farm land and we would be very nervous about any system which implements an automatic 10-year or 15-year review of water rights in this state. That is not the way we have managed water rights for a long period. We would not like to see such a system introduced in Victoria.<sup>7</sup>

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4 Submission no. 161, executive summary.

5 Submission no. 168, p. 2.

6 Transcript of evidence, pp. 569–70.

7 Transcript of evidence, pp. 247–8.

4.10 Similar sentiments were expressed in the submission from the Queensland Farmers' Federation (QFF).<sup>8</sup> In his evidence to the Committee, Mr Ian Johnson, Water Advisor to the QFF, indicated that the QFF wanted certainty and transparency to be built into any process of periodic review.<sup>9</sup>

4.11 In its submission to the Inquiry, Murray Irrigation Limited expressed dissatisfaction with the system of reviewable rights operating in New South Wales:

Irrigators argue that NSW's legislation does not provide the certainty required by farm businesses to operate. The National Australia Bank has recently indicated their concern with uncertainty of water entitlement tenure and its effect on financing arrangements for the rural sector.<sup>10</sup>

4.12 On the other hand, the Queensland Conservation Council (QCC), has opposed the call of farmers and irrigators for perpetual property rights, recommending that:

The Commonwealth government resists calls for entrenched property rights over land and water resources in order to maintain its capacity to deal effectively with environmental problems and in fairness to other members of the community, future generations and other species in the environment.<sup>11</sup>

4.13 According to the QCC:

Farming organisations are currently mounting a sustained attempt to gain statutory rights to automatic compensation when regulations designed to protect the environment affect the way they use the land, or, specific to the topic of this Inquiry, when regulations affect farmers' access to and use of water. Their arguments are largely based on some dubious and erroneous assumptions about the nature of rights and the nature of property.<sup>12</sup>

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8 Transcript of evidence, p. 157; Submission no. 116, p. 6.

9 Transcript of evidence, p. 159.

10 Submission no. 161, pp. 8–9.

11 Submission no. 126, p. 16.

12 Submission no. 126, p.10.

- 4.14 The Committee is in accord with farmers' desire to have security of access to water, believing that security of access is vital to the economic and social development of regional communities. Water entitlements should be granted in perpetuity. This does not preclude effective environmental management, as these entitlements will be subject to environmental planning processes. These planning processes should be inclusive and transparent.
- 4.15 Clearly defined, perpetual water entitlements are fundamental to the whole rural water reform process. This issue has gone unresolved too long. The Committee recommends that the Commonwealth Government, together with its COAG partners, make the establishment of a national system of perpetual water access entitlements a top priority under the National Water Initiative.

### Compensation

- 4.16 For water users, the question of defining rights is critical not only for defining use, but also for defining what is lost when entitlements are removed and how that loss will be compensated.
- 4.17 In its submission to the Inquiry, the VFF indicated its strong belief that where access rights are reduced compensation 'at the going market value of water' should be paid.<sup>13</sup> At the Committee's hearing in Deniliquin, Mr Bill Hetherington, Chairman of Murray Irrigation Limited, stated, that water rights were 'the No. 1 priority with us', and that 'Structural adjustment and compensation is the No. 2 priority. Just terms compensation needs to be spelt out by the Commonwealth right now'.<sup>14</sup>
- 4.18 Mr Chris Davis, Chief Executive Officer of the Australian Water Association, used moral arguments to make the case for compensation:
- ...in many instances the farmers were there because government encouraged them to be there and they would not have set up independently without that promotion and assistance to do it. From that point of view, morally you would say that the government actually owe them because they were responsible for putting them up.<sup>15</sup>

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13 Submission no. 73, p. 1.

14 Transcript of evidence, p. 479.

15 Transcript of evidence, p. 551.

- 4.19 Mr Ian Thompson of the Department of Agriculture, Fisheries and Forestry (DAFF), put the Federal Government's view when he told the Committee:

The position that our minister and the department have is that, if water is to be obtained for public purposes, those who own the water now should not be worse off after the public has obtained it.<sup>16</sup>

- 4.20 Despite there being no provision for compensation under South Australian legislation, Mr Peter Hoey, Executive Director, Murray Darling Division, of the South Australian Department of Water, Land and Biodiversity Conservation, told the Committee: 'There is no certainty in anything, but if governments consciously make decisions that affect livelihoods I think there is a strong case[for compensation].<sup>17</sup> He went on to emphasise the need for Federal-State cooperation and coordination on this issue. He was 'convinced that there is a key role for the Commonwealth in working with the state or the states over that issue and getting some consistency across the country'.<sup>18</sup>

- 4.21 In its submission, however, the Queensland Conservation Council (QCC) questioned whether compensation is appropriate:

Inherent in calls for compensation is the view that what has traditionally been permitted (and fostered in some cases) by government constitutes a compensable right if no longer permitted. This viewpoint fosters a very static view of society and land use practices. Thus, historical negligence, ignorance or the predominance of certain values about the environment have generated expectations about the future which farming organisations want to turn into rights. But frustrated expectations are *not* equivalent to withdrawn compensable rights. Rather, one could argue that many landholders have benefited at the expense of the environment and society through damaging farming practices. We don't argue that these landholders should compensate the environment and society (although it is logically sound); we argue, rather, for the adoption of reasonable practices with community sharing of the costs of transition in some cases.<sup>19</sup>

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16 Transcript of evidence, p. 536.

17 Transcript of evidence, p. 341.

18 Transcript of evidence, p. 341.

19 Submission no. 126, p. 11.

- 4.22 The QCC thought it a dubious argument that the public pay individuals to resist degrading what exists. The public benefited from the continued existence of native vegetation and environmental flows, but should not pay individuals in order for that benefit to be retained. However, there was an argument for paying land managers to manage the environment for public benefit—payment for positive actions.<sup>20</sup>
- 4.23 The Committee believes that those who hold water licences now should not be worse off if that water is obtained for other purposes. The question is what form that compensation should take.
- 4.24 Amongst farmers there was some scepticism as to the value of structural adjustment payments, and what they would achieve. In evidence before the Committee, Mr Leigh Chappell, Secretary/Treasurer of the Murray Valley Groundwater Users Association, said:
- The compensation that they talk about is just a one-off payment or they talk about structural adjustment. With the rules that they have in place for structural adjustment, you might as well try to get blood out of a stone as get the money for that. It is so unsuitable, because the structural adjustment they give you is for water saving efficiencies ... You cannot make some farms around here any more efficient under present technology. The decision makers are trying to solve our problems with a complete lack of understanding and with misinformation.<sup>21</sup>
- 4.25 Mr George Warne, General Manager of Murray Irrigation Ltd, argued for 'just terms acquisition', with water rights being given the same treatment as land title.<sup>22</sup>
- 4.26 Mr Lawrence Arthur, Chairman of Irrigators Inc., told the Committee:
- ...we have often said to New South Wales, 'If you want our water, don't come and take it off us. You buy our water.' So I think sometimes we are guilty of giving a mixed message. We would prefer to keep the water in our districts. But if it comes to a point of across-the-board cuts where, as proposed by the Wentworth Group, the government says, 'We are going to knock one per cent a year off for 10 years without any compensation,' I think you will hear that every irrigator prefers the situation whereby

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20 Submission no. 126, pp. 10-12.

21 Transcript of evidence, pp. 495-6.

22 Transcript of evidence, p. 494.

governments do enter the market. We would prefer them to go through a regime of looking at systems savings first and other ranges and actually entering the market as a last resort. But if it comes to that compared with across-the-board cuts, you will find that irrigators are looking for that compensation component.<sup>23</sup>

4.27 According to the NSW Irrigators' Council, legislation should compel governments to first explore more innovative investment solutions before resorting to just terms acquisition, including, in order of priority:

- System savings—investment in system and on-farm savings and efficiencies;
- Market schemes—voluntary market-based buyback where government either “stands” in the market or initiates reverse tender schemes;
- Just terms acquisition.<sup>24</sup>

4.28 The Committee agrees with the desire of farmers to retain their current entitlements, where possible, and to obtain just terms compensation where this is not possible. While it is clear that where over-use of water has reached unsustainable levels then water use must be reduced, it is also clear that dramatic changes to levels of water use will have significant social and economic ramifications. Required water ‘savings’ are best generated firstly, through greater water use efficiency; secondly, through voluntary acquisition using market mechanisms; and finally, through compulsory acquisition with just terms compensation.

4.29 The Committee is particularly aware that the Commonwealth has a constitutional obligation to provide just terms compensation and that States do not have the same obligation. The Committee strongly believes that changes in water availability due to changes in public policy which have a direct and punitive impact on water users should result in financial compensation. It believes that all States should adopt a just terms compensation approach in respect to water issues.

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23 Transcript of evidence, p. 486.

24 NSWIC, Submission no. 105, p. 759.

## A uniform system of water access rights

- 4.30 The Inquiry received a considerable amount of evidence recommending a greater degree of uniformity or harmonisation of water access rights across jurisdictions.<sup>25</sup>
- 4.31 According to Mr Theo Hooy of the Department of Environment and Heritage, there were some 20-plus different water products, all with fundamentally different characteristics, across the Murray-Darling Basin, making a fully functioning, free and transparent trading market very difficult. A measure of compatibility between the states is required for trade to occur.<sup>26</sup>
- 4.32 The need to harmonise entitlements across jurisdictions was stressed by Dr Blackmore of the MDBC. He also gave an example of how the present diverse system could be manipulated :

There needs to be a sense of harmony about the access provisions in the states so we do not have distortions. New South Wales have a 15-year licence, but with a 10-year review, and a set of rules on how that will be operated. Victoria have no such review provisions. In South Australia the minister can call a review at any time that suits him and make an adjustment without compensation. To give you an example, let's say I am a New South Wales irrigator and I have set up interstate trade. I am at year 9 in the New South Wales cycle and I say, 'Hang on, I do not know what New South Wales are going to do.' So I trade 100 per cent of my water to somebody in Victoria, into a holding company ... I wait to see what New South Wales do: they will either increase or decrease the allocations ... I wait until that dust settles and then I trade 100 per cent of my water back and I have kept it.<sup>27</sup>

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25 Groups which supported uniform water entitlements included the Australian Water Association (transcript p. 542); Twynam Group (transcript p. 608); Irrigators Inc. (submission no. 109); and Environment Business Australia (submission no. 173).

26 Transcript of evidence, p. 445.

27 Transcript of evidence, p. 401.



- 4.33 In its evidence before the Committee, the South Australian Farmers Federation (SAFF) urged the Commonwealth to push for ‘uniform property rights’, although a precise model was not defined. Moreover, the difficulties in creating a uniform system were fully recognised, SAFF noting that the different states all have slightly different views of what uniform rights would mean, particularly their implications for compensation.<sup>28</sup>
- 4.34 The views of the Victorian Farmers Federation (VFF) with regard to uniform property rights illustrates that uniformity is not seen as a positive step by all concerned. Victorian farmers see the push for uniformity as a threat to their security of tenure. Mr Manners told the Committee:
- In general terms the VFF support the system of water rights and allocations that has been in operation in Victoria for 100 years ... We are a little concerned ... that there is pressure for a national system of water rights. I guess there is apprehension within Victoria that a national system will in some way water down what we have developed and enjoyed in Victoria.<sup>29</sup>
- 4.35 In the Committee’s view, part of the problem of introducing a system of uniform water rights is that different industries have grown out of the different systems of water rights—imposing a uniform system upon these industries could necessitate considerable structural adjustment. On the other hand, a failure to bring some degree of commonality will prevent trade reaching its full potential and increase the pain of structural adjustment.
- 4.36 The essential difference revolves around different degrees of security which should be a surmountable issue. Entitlements do not have to be identical in order to be traded, but they do require a common framework upon which trading in entitlements with different levels of security can be based.
- 4.37 Professor Mike Young, Director of the Policy Economic Research Unit, Land and Water Division, CSIRO, told the Committee that there were considerable potential dangers with attempting to create a water market under the existing plethora of different entitlements.<sup>30</sup> His solution was to return to first principles and rebuild the system of entitlements:

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28 Transcript of evidence, p. 326.

29 Transcript of evidence, p. 247.

30 Transcript of evidence, p. 465.

What we clearly need is an entitlement system that steps out of all the mess we have got ourselves into—one that is designed for trading and also includes water quality in the whole process. Setting up a market that does that could ease the costs of adjustment.<sup>31</sup>

- 4.38 In their paper *Robust Separation: A search for a generic framework to simplify registration and trading of interests in natural resources*, Professor Mike Young and J. C. McColl, of CSIRO Land and Water, outline a template for water entitlements that is both simple in conception and robust in construction, having been built on longstanding precedents in property and company law.<sup>32</sup>
- 4.39 At the heart of the proposed system is the separation of the different components of a water property right:
- The entitlement—the long-term interest (share) in a varying stream of periodic allocations;
  - Allocations—a unit of opportunity (usually a volume) as distributed periodically; and
  - The use licence—permission to use allocations with pre-specified use conditions and obligations to third parties.<sup>33</sup>
- 4.40 A key component of the entitlement process would be registration of interests under the Torrens Title system, which would provide a high degree of specificity and protection to entitlement holders and third parties, such as banks and water traders, with a financial interest in an entitlement. The Torrens Title system is in the process of being implemented in New South Wales and South Australia.<sup>34</sup>
- 4.41 It is the view of the Committee that the Robust Separation model would provide the necessary framework for a system of tradeable entitlements that could operate efficiently and effectively across State borders.

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31 Transcript of evidence, p. 465.

32 M. D. Young & J. C. McColl, *Robust Separation: A search for a generic framework to simplify registration and trading of interests in natural resources*, CSIRO Land & Water, September 2002. This was presented as an attachment to Submission no. 59.

33 Young & McColl, *Robust Separation*, p. 27.

34 Young & McColl, *Robust Separation*, pp. 35–6; Productivity Commission 2003, *Water Rights Arrangements in Australia and Overseas*, Commission Research Paper, Productivity Commission, Melbourne, p. 115.

- 4.42 In its detailed submission to the Inquiry, the New South Wales Irrigators' Council (NSWIC) described a system of water rights and the principles underlying it, which appeared similar in nature to the Robust Separation model.<sup>35</sup>
- 4.43 The Committee believes that the National Water Initiative should aim for a system of tradeable entitlements that can operate efficiently and effectively across State borders. The Robust Separation model, in conjunction with other Committee recommendations, appears to meet the expectations set out by the NSWIC, and others such as the Southern Riverina Irrigation District Council<sup>36</sup> providing both security and flexibility while establishing a common basis for the current array of entitlements. The Committee recommends that this model be carefully assessed by the National Water Initiative.

### Recommendation 10

- 4.44 **The Committee recommends that the Commonwealth urge the Council of Australian Governments to give top priority to the establishment of a clearly defined and robust system of perpetual water access rights under the National Water Initiative, and that the Robust Separation model proposed by the CSIRO be evaluated as a possible system for establishing such water access rights.**

## Water trading

- 4.45 Professor Cullen identified trade as another vital aspect of the COAG water reform process that had not come fully to fruition. He told the Committee:

We frankly do not have a trading system at the moment that lets water move from low value use to high value. We do not have a transparent market that lets water move around—for example, the Murray–Darling Basin—and facilitates interstate trade ... The trading needs a bit more work to get an operating market, in my view.<sup>37</sup>

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35 Submission no. 105, p. 10.

36 Submission no. 106.

37 Transcript of evidence, p. 2.

- 4.46 Although most of the evidence received by the Committee supported the concept of water trading, some opposed it. For example, in its submission to the Inquiry, Burdekin Shire Council announced itself 'strongly opposed' to the transferability of water allocations, stating that 'Council considers that there may be detrimental environmental impacts if water allocations are transferred'.<sup>38</sup>
- 4.47 On the other hand, Hydro Tasmania was an ardent advocate of trade:
- It is now necessary to refine the existing policies, processes and infrastructure to encourage water to be transferred via commercial trades between competing water users. Any such transfer should be between willing parties. A water market is the only viable means of reallocating water between conflicting uses, both existing and future, as it allows and encourages the transfer of water from less efficient or productive uses to other higher value uses ...
- A functioning water market allows new irrigators to obtain water for high value initiatives and encourages movement away from inefficient water use practices. This can be achieved without the need for new regulation and external intervention.<sup>39</sup>
- 4.48 Ms Deborah Cope of the NCC outlined the principal benefits to be derived from water trading. She suggested that from an economic gain point of view, water would go to those particular crops where you got the biggest return from the water, which, she noted, 'is particularly important when we are talking about a very scarce resource. We want to make sure that we use it in a way that maximises the gains from it for Australia'. Water trading would mean that the people who got high returns from the use of water would tend to be the people who bought and used water.<sup>40</sup>
- 4.49 Mr Thompson (DAFF) also emphasised the benefits of trade as a mechanism for allowing industries to evolve without the need to pick winners. He did not think governments should say, 'We don't have this industry; we do have that one. Water will move from here to there from on top'.<sup>41</sup>

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38 Submission no. 15, p. 1.

39 Submission no. 40, pp. 1-8.

40 Transcript of evidence, p. 237.

41 Transcript of evidence, p. 537.

- 4.50 In its submission, the National Farmers Federation argued that it ‘is vital that a competitive and efficient market for water is achieved’.<sup>42</sup> Likewise, the South Australian Farmers Federation supported the pricing and trading of water according to market principles.<sup>43</sup>
- 4.51 The Victorian Farmers Federation endorsed water markets, but with caveats as to transparency of operation and price:
- The VFF is supportive of the application of market mechanisms for the efficient allocation of the nation’s limited water resources. But, water trading must occur through clearly defined water markets that are open and transparent.<sup>44</sup>
- 4.52 Mr Manners of the VFF spoke of the growing sophistication of the water market in Victoria, and emphasised the positive benefits of water trading for water use efficiency:
- There is a financial incentive for a farmer to improve his water use efficiency in a tradeable market with water. This year it was worth \$500 a megalitre at the peak, which is a very strong financial incentive to farmers to improve their water use efficiency, to sell what they save or whatever. The dollar is a very strong driver.<sup>45</sup>
- 4.53 Mr Ian Johnson (QFF) also gave his support to water trading, while emphasising the physical limits to trading in Queensland.<sup>46</sup>
- 4.54 Even as there are considerable benefits to be derived from water trading, the Committee acknowledges there are also potential risks which need to be properly assessed. While supporting water trade in principle the NSWIC was concerned that trade not be viewed as the ‘solution to all our problems’, or ‘as a substitute (a poor one) for necessary structural adjustment processes’.<sup>47</sup>
- 4.55 Mr Doug Miell, Executive Director of the NSWIC, emphasised that the water market, like any other market, required appropriate rules for its successful operation.<sup>48</sup> Professor Cullen also identified the need to establish rules to prevent undue economic and social impacts arising from
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42 Submission no. 168, p. 3.

43 Transcript of evidence, pp. 328–9.

44 Submission no. 73, p. 1.

45 Transcript of evidence, p. 251.

46 Transcript of evidence, pp. 164–5.

47 Submission no. 105, p. 20.

48 Transcript of evidence, pp. 576.

trade. The market would not be 'a free-for-all'. It would have to be 'a highly managed market' to minimise any negative impact on regional communities.<sup>49</sup>

4.56 Strong reservations about open-ended water trading were expressed by irrigator representatives the Committee met at its public hearing in Deniliquin.

4.57 Mr Warne of Murray Irrigation<sup>50</sup> told the Committee that his company 'had been actively involved in water trade for almost a decade, and operated Australia's only internet exchange that is live and accessible 24 hours a day during the irrigation season'.<sup>51</sup> He explained that his shareholders are 1,600 irrigators and they had decided early on to prohibit the sale of water out of the district. He said:

So communities and farmers alike have realised that bringing water into your farm business or into your community increases the potential wealth of the community and there is enormous enthusiasm for trading water in, but there are barriers in almost every irrigation community, district and river system to trading water out. A lot of those barriers are not physical; they are simply the community recognising that they want the water retained in that community for its future prosperity.<sup>52</sup>

4.58 Mr Warne mentioned the negative socio-economic impacts on the Kerang region due to the permanent sale of eight or nine percent of its water out of its region.<sup>53</sup> Mr Michael Barlow representing Moira Private Irrigation District endorsed Mr Warne's comments. He confirmed that trading of water out of his group was prohibited on the basis that water was essential for the future well-being of the farms which made up Moira Private Irrigation. He explained:

Once we start getting rid of water out of our system, it would become uneconomical because the costs would become prohibitive, and the whole system would slowly collapse.<sup>54</sup>

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49 Transcript of evidence, pp. 6, 13.

50 Murray Irrigation Limited is the largest privatised irrigation company in NSW. MIL is now owned by 1,600 family farm businesses and provides irrigation and drainage services to 2,400 farms in an area covering nearly 800,000 hectares.

51 Transcript of evidence, p. 482.

52 Transcript of evidence, p. 482.

53 Transcript of evidence, p. 482.

54 Transcript of evidence, p. 484.

4.59 Mrs Deborah Kerr, representing Irrigators Inc., downplayed the perceived benefits of trade, both as a mechanism for moving water to higher value production and as a mechanism for structural change. Moreover, irrigators understood the intrinsic value of their water to their businesses and livelihood. They would not sell water, unless forced to do so, for short term gain:

Irrigators believe that their licence is intrinsic to their property, to their livelihood, to the profitability of their enterprise and they are not going to willy-nilly sell their licence just because somebody is offering them a higher price, because they know long term their farm is going to suffer. Irrigated agriculture is the highest value agriculture in Australia. Most of it is produced off one per cent of the arable land. A lot of those factors are not taken into consideration in any of these arguments.<sup>55</sup>

4.60 Mrs Kerr, Mr Hetherington and Mr Arthur all highlighted the profitability of the rice industry as an example of the success of a crop which is commonly perceived as 'low value'.

4.61 Mr Warne observed that permanent water trade had been dominated by desperate sellers and opportunistic buyers, and that the prices realised were a poor reflection of the real value of water to farm enterprises.<sup>56</sup> Mr Hetherington and Mrs Kerr, told the committee that the real value of water to their farm enterprises was in the vicinity of \$3500 per megalitre (at least)—'we are not going to bail out for \$200, head off somewhere and think we are going to live a life of luxury after that and leave a district in ruin—no way'.<sup>57</sup>

4.62 The Committee acknowledges these concerns about the assumed benefits of trade. Obviously, both as a mechanism promoting economic growth and structural change, water trading has still some way to evolve, and the ramifications will not be all positive. Nonetheless, the potential benefits from trade remain, and the Committee endorses the aims of the National Water Initiative in encouraging 'the expansion of water markets' with clear trading rules and robust water accounting, and a clear eye to identifying and dealing with any negative consequences which may arise.

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55 Transcript of evidence, p. 489.

56 Transcript of evidence, p. 496.

57 Transcript of evidence, p. 495.

## Other potential problems with water trading

- 4.63 The Committee received other evidence on potential problems which could arise as a result of the development of water trading. These included: the likely problems arising from any failure to standardise entitlements; the issue of ‘sleepers and dozers’; possible social costs; the potential for ‘water barons’ to emerge; trading in environmental allocations; and the potential problem of ‘stranded assets’.

## Adjusting the system of entitlements

- 4.64 In his evidence before the Committee, Professor Mike Young, the Director of the Policy Economic Research Unit, Land and Water Division, CSIRO, told the Committee that there were considerable problems with attempting trade under the current system of entitlements:

If you specify trading arrangements and entitlements in a flawed way, the market will deliver you a flawed outcome. That is guaranteed. Markets reveal what you have specified, rather than your intention. If you look at the way we have designed water entitlements, you see that we just bolted on trading arrangements without going back and designing a system that had a thorough understanding of several key things. This includes the way water flows through a system and what determines water yield; the connections between ground water and surface water; and the fact that, when people irrigate inefficiently, a large proportion of the water flows back into the river and is available downstream. If you do not build all of these things in, you can trade into trouble.<sup>58</sup>

- 4.65 Professor Young’s solution was to return to first principles and rebuild the system of entitlements (i.e. using the robust separation model):

What we clearly need is an entitlement system that steps out of all the mess we have got ourselves into—one that is designed for trading and also includes water quality in the whole process. Setting up a market that does that could ease the costs of adjustment.<sup>59</sup>

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58 *Transcript of Evidence*, p. 465.

59 *Transcript of Evidence*, p. 465.



- 4.66 The Committee concurs with the view that an effective water market requires defined, secure and readily transferable and tradable water access entitlements.

### **Recommendation 11**

- 4.67 **The Committee recommends that the Commonwealth Government, working through the Council of Australian Governments, ensures that the system of uniform water access entitlements adopted under the National Water Initiative are fully transferable and tradable, where practical.**

### **Sleepers and dozers**

- 4.68 A drawback of water trading is that it has activated previously little used or unused entitlements. In its submission, Environment Business Australia highlighted the problem:

The move to market-based resource allocation through water markets, with separation of water rights from land, has been successful in lifting the value of the water and redirecting it to higher value uses. However, a consequence of the higher value and greater mobility provided by the markets has been to expose the level of over allocation of water resources. Previously unused or under-used licenses have been ‘awakened’ and traded, the ‘sleepers’ and ‘dozers’, who now find their previously unused licences of significant value. The impact of the activation of these licences has been to increase demand on an already capped water supply at the expense of the existing regular users, whose allocations have been reduced to provide water for these newly activated licences.<sup>60</sup>

- 4.69 Mr Warne explained how water trading had activated previously unused water:

...the MDBC pilot study looked at the trading permanently of water interstate downstream of Nyah on the Murray system. I think the study analysed 51 trades that had occurred, and 49 of those trades were people selling water that had never been used.

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60 Submission no. 173, p. 5.

So when you are talking about water going from low value to high value, it was going from never being used as a windfall gain to someone who was obviously going to use it because they were paying quite a lot of money for it, and that water just came out of the pool that was generally available for all other irrigators in the three states.<sup>61</sup>

- 4.70 The Committee believes that it would be beneficial if any remaining unused entitlements were removed from the system—if nothing else, this would diminish perceptions of over-allocation. Sleeper and dozer entitlements however are now realisable assets with a market value. They cannot simply be confiscated. The process of identifying and removing such entitlements should be a joint Commonwealth–State responsibility carried out under the auspices of COAG.

### Recommendation 12

- 4.71 **The Committee recommends that the Commonwealth ask the Council of Australian Governments, as part of the National Water Initiative, to develop a strategy in consultation with stakeholders, which deals with ‘sleeper’ and ‘dozer’ entitlements.**

### Social impacts of trade

- 4.72 In its submission, the Public Interest Advocacy Centre (PIAC) highlighted the potential impact of water trading upon rural residents. While trading might create economic efficiency, the movement of water away from current activities could not be presumed to give equal benefit to all members of the community:

The CoAG agreement on water policy stipulates that the primary consideration in water trading should be the ‘highest economic value use’ ... this approach entrusts to the dynamics of the new market the protection of the interests of smaller and vulnerable water users. However, positive social outcomes clearly are assigned a lower priority than the operation of the market itself. As a result there is nothing in the current water trading framework

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61 Transcript of evidence, p. 487.

which promises that water will continue to be available and affordable for rural households.<sup>62</sup>

4.73 Indeed, the PIAC believed that given the dominance of economic power within markets it was highly likely that the social costs and benefits of trade would accrue to different sections of the community. It suggested that trading needs to be undertaken within a framework which allows each stakeholder to identify their costs and benefits in each transfer.<sup>63</sup>

4.74 Concerns about possible social impacts on rural communities were also raised at the public hearing at Deniliquin. Mr Clark (SRIDC) described the social impact the Cap had on his community in the Murray Darling Basin.<sup>64</sup> Furthermore, Mr Hetherington told the Committee:

We [Murray Irrigation Ltd] have been the biggest traders in Australia, so trade is going to stay there. But I would remind the Parliamentary committee to have a hard look and start coming down to the areas where the trade is going to take place. Most of these trading rules have been set up by AFFA and company and bureaucrats in Canberra that really do not have a feel for the social implications that are going to follow—the social disillusionment of a lot of the communities in shires, drying out areas and breaking up various productive areas. People such as those might lose in trade, but it is a big debate that has to take place in a proper consultative way. At the moment, we are really afraid.<sup>65</sup>

4.75 It is the Committee's belief that if trade is to succeed as an instrument of economic development and environmental protection, then those engaged in affected industries and communities must have a say in the way that markets are established and trading rules operate. Markets must be established in consultation with rural communities and industries, and the progress of change tempered to the needs of community consultation and adjustment.

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62 Submission no. 100, p. 8.

63 Submission no. 100, pp.8-9.

64 Transcript of evidence, p. 496.

65 Transcript of evidence, p. 483.

## Water barons

4.76 A significant concern about separating water entitlements from land title is the possible entry into the water market of ‘water barons’—rich speculators who buy and sell on the market for profit rather than use.

4.77 This is regarded as a difficult issue and, in some eyes, a real risk.<sup>66</sup> Mr Theo Hooy (Department of Environment and Heritage), however, downplayed the risk, suggesting that speculators would be ‘fairly brave investors’ to risk the vagaries of the water market:

If you buy water, to take a small example, in a jurisdiction where there are no carryover provisions and you are a water speculator, you have to make sure that that water is off your books. By the end of every irrigation season you will have to have sold it. If you have a wet year and you are a water trader—a person who derives income purely from trading—you will be in a pretty difficult position. I am not sure at all that there are windfall profits to be made by water traders.<sup>67</sup>

4.78 On the other hand, according to Mr Hooy, there are definite risks in restricting ownership to water users:

The property valuers have found it extremely difficult to value a product where tenure, ownership and longevity are uncertain. The banking industry has a legitimate concern. If you introduce fairly bland restrictions on ownership of water by parties other than farmers, for example, it would be very difficult for banks to loan against the water licence, because the normal procedure is that, if a bank loans against property and if there is failure to repay the debt, the bank recalls the land. If the bank cannot claim ownership of the water, it cannot loan against the water right.<sup>68</sup>

4.79 Professor Young (CSIRO) also warned of the difficulties inherent in the proposition that only farmers should own water.<sup>69</sup>

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66 Transcript of evidence, pp. 7, 487.

67 Transcript of evidence, p. 447.

68 Transcript of evidence, p. 446.

69 Transcript of evidence, p. 468.

- 4.80 Mr Thompson (Department of Agriculture, Fisheries and Forestry) noted that the key to preventing unhealthy concentration of ownership or speculative trade was establishing a well regulated water market:

In establishing a market for water—an operating market like any other market—it has got to have some regulatory underpinnings to make sure it operates effectively. There are roles in there for bodies like the NCC or the ACCC on how people are behaving in a market so that there is not undue market influence or concentration. They are some of the issues that have got to be worked through in developing an effective market.<sup>70</sup>

- 4.81 Mr Andrew Campbell, Executive Director of Land and Water Australia, acknowledged the risk of concentration of ownership in a free market situation, but did not necessarily see this as a negative as big business has certain strengths:

Certainly it is a particular policy challenge because of the issue of potential concentration of resources, but I do not think it necessarily bad for water management on the whole. The degree of professionalism and the degree of investment in long-term sustainability that those sorts of enterprises can afford puts them in a better position in the long run. The policy framework needs to be cognisant of them but I do not think it should see them as necessarily any better or worse than other water users.<sup>71</sup>

- 4.82 The Committee believes that the risks of excessive concentration of ownership in the water market are small, and do not outweigh the problems involved in restricting ownership. Nonetheless, the possible consequences of ‘water barons’ (both private and public sector) dominating the market are serious enough to require effective oversight and regulation of any water market.

### Recommendation 13

- 4.83 **The Committee recommends that the Commonwealth, as part of the National Water Initiative, ask the Council of Australian Governments to assess the need to develop policies and measures to prevent undue concentration of ownership of water entitlements in the marketplace.**

70 Transcript of evidence, p. 534.

71 Transcript of evidence, p. 24.

## Asset stranding

4.84 Another concern raised by witnesses was the problem of asset stranding, where water was traded out of a district leaving infrastructure underutilised and, therefore, unremunerative. Mr John Palmer, Manager of the Pioneer Valley Water Board, expressed concern that his organisation was vulnerable to such a scenario under current trading rules, but had little power to do anything about it.<sup>72</sup> Similar concerns were expressed by Mr Michael Barlow, Chairman of the Moira Private Irrigation District, on the River Murray in New South Wales. He told the Committee that ‘once we start getting rid of water out of our system, it would become uneconomical because the costs would become prohibitive, and the whole system would slowly collapse’.<sup>73</sup>

4.85 One possible solution to the problem is the use of excision fees to cover infrastructure costs when water users opt out of irrigation networks. However, this option was rejected by Mr Mark Bramston, Chief Executive Officer, Coleambally Irrigation Cooperative Ltd. He told the Committee:

We have done some modelling of those sorts of numbers and we cannot get them to add up in the long term.

Just by way of background, irrigation corporations plan for 50 to 100 years and then sometimes 200 years when we run our infrastructure annuity funds. If you run a discounted cash flow analysis, you can only make it work over 20 years. People put some money into the infrastructure fund and they fund it on a 20-year basis. They do not tend to look at the ongoing operational maintenance costs over the long term. We cannot make excision fees pay the disbenefit it has for the community, and it is tough to make it pay for the infrastructure. I do not see excision fees as a viable model to overcome the disbenefits caused for communities.<sup>74</sup>

4.86 Dr Beare (ABARE) suggested two-part tariffs as a solution to the problem of asset stranding:

That is fixable. One has to recognise that water rights are not just things in dams. Water rights are rights to infrastructure, and water rights are the way you are being charged for your infrastructure and access. That is bundled up in your rights. If you do not do two-part charging on infrastructure charges, you will get stranded

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72 Transcript of evidence, p. 110.

73 Transcript of evidence, p. 484.

74 Transcript of evidence, p. 485.

assets. That will happen. If I am in your irrigation area and I sell my water out, the balance of the fixed charges are now levied on a reduced population and the charges go up...The correct water right says that if you are in an irrigation area and you have a fixed set of charges—those charges that are not volumetric sensitive, such as channels et cetera—you cannot escape those charges by selling your water out.<sup>75</sup>

- 4.87 The Committee supports the introduction of two-part tariffs as a remedy to the problem of asset stranding. However, while the Committee is anxious to avoid unnecessary restrictions on trade, there is no doubt that even with two-part tariffs, asset stranding could still be a potential problem. Even where infrastructure is maintained, particularly in gravity fed systems, it is conceivable that once a certain amount of water is traded out of a system it will become unviable. Where this occurs as a result of water trading, there may be a case for structural adjustment assistance for remaining water users.

## Conclusion

- 4.88 Having considered all the evidence, in the Committee's view water trading is a key mechanism in ensuring that water is used more efficiently. Water markets allow industries to make better and more flexible use of limited water resources and provide the opportunity for new investment in high value-added agriculture. Trade helps individual irrigators to adjust to changing circumstances and to manage risk. A well-developed water market can stimulate the movement of water to higher value, more sustainable use.
- 4.89 The Committee believes that the Commonwealth could have some powers under the corporations trading powers of Section 51 (xx) of the Constitution, which could allow the Commonwealth to play a leading role in the establishment of a national water market. However, the Committee acknowledges that there is some doubt how this would align with Section 100 of the Constitution. Whilst there is clearly a need for a national approach to establishing a national water trading regime, this is probably best achieved through established COAG processes.

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75 Transcript of evidence, p. 391.

**Recommendation 14**

**4.90 The Committee recommends that the Commonwealth ask the Council of Australian Governments, as part of the National Water Initiative, to:**

- **facilitate the expansion of water markets and water trading to the greatest extent possible;**
- **establish appropriate trading rules and administrative systems in full consultation with market participants and rural communities; and**
- **establish trading in water free from constraints, other than in accordance with the prescribed trading rules.**



## **Water use efficiency and related issues**

### **Introduction**

- 5.1 A critical issue raised during the course of this Inquiry was the urgent need for Australians to use their water resources more efficiently. While the focus of this chapter is on rural water use, some of its recommendations are also relevant to urban water use.
- 5.2 This chapter looks at key issues of water use efficiency in rural Australia both off-farm and on-farm, financing options, prospects for turning rivers inland, and other innovations such as recycling, desalination, and enhancing household water efficiency. The chapter also reviews the need for public awareness and information programs, and tax incentives to encourage investment in technology and improved infrastructure.

### **Rural Water Use Efficiency**

- 5.3 'Off-farm water use efficiency' refers to the savings made in the transmission of water to the farm. If transmission is made more efficient and water losses are reduced, that generates savings which can be used for other purposes. 'On-farm water use efficiency' refers to the savings made through better water management practices and improved technology on the farm itself.

- 5.4 Increasing water use efficiency on-farm and off-farm involves better management practices and improved technology. Efficiency in storage and delivery systems can involve replacing open channels with pipes, thereby reducing both evaporation and seepage; lining channels; lining and/or covering storages; and automating delivery systems to reduce response times to orders for water. Piping also opens the way for pressurisation, thereby further reducing response times and maximising benefits of water use efficiency on-farm.
- 5.5 Storages can be better organised. Mid-stream storages place water closer to its destination, allowing better response times to orders and more efficient management of releases from main storages. Use of natural storage sites, such as wetlands, can provide a low-cost, environmentally beneficial, option for mid-stream storage.
- 5.6 On-farm efficiencies can involve replacing flood irrigation with overhead sprinklers or subsurface drips; the use of soil moisture probes to monitor and control watering; identification of soil types to establish best practice watering regimes; and the automation of irrigation systems providing faster response times to plant and soil needs. It can also involve better management of flood irrigation through laser levelling of land to ensure more efficient and even watering, and the storage and reuse of run-off.
- 5.7 During the course of this Inquiry, the Committee has been impressed by both the economic and environmental benefits that can accrue from better water use efficiency. Inspections conducted in Mildura in Victoria, Renmark in South Australia, and Dareton in New South Wales, clearly identified the benefits of investment in water use efficiency. The Committee is convinced that investment in water use efficiency is vital to the future of Australian agriculture.

### **On-farm water use efficiency**

- 5.8 During its inspections of orchards and vineyards at Yandilla in South Australia, Deakin Estate in Victoria and Coomealla in New South Wales, the Committee was impressed by the impact of improved technology—such as soil moisture monitoring, drip irrigation, and automated irrigation controls—and improved management practices upon productivity and water use efficiency. However, new technology and irrigation practices come at a price. The principal barrier to the wider uptake of water efficient irrigation technology appears to be cost.

5.9 In his evidence, Mr Burnett explained the difficulties of increasing on-farm water use efficiency:

First and foremost, as with all small to medium sized businesses, the driver for the implementation of new technology is improved profitability. But there are many other aspects that confuse that particular driver. Access to capital is probably first and foremost, but there is also the intellectual capacity and knowledge to implement that new technology. The point has been made to me—and it may be overstating the case somewhat—that asking a grower to move from, for example, flood irrigation to subsurface drip irrigation would be like asking an office to move from writing left to right to writing right to left. It would be a profound change in the way they managed their business and, from some strategic decisions at the highest level down to very mundane day-to-day operations, things would have to change. So it is often no easy task to ask a farmer to implement new technology, even though from an outside perspective the technology is there, it may clearly work and it may clearly lead to water savings and even cost savings and improved profitability. If they do not believe they can implement that new technology without a severe disruption to their business, then all those other things do not matter.<sup>1</sup>

5.10 Along similar lines, Mr Andrew McMillan, Director of Policy for the Western Australian Farmers Federation, told the committee:

On an individual farmer basis, subject to the cost price squeeze that our members face on a day-to-day basis, there is a continuing need for improving the way they use any resource on their farms. The capital cost of extensive improvements to irrigation is prohibitive and we have been indicating for some time that there is a need for some type of incentive to assist farmers to adopt more efficient irrigation practices.<sup>2</sup>

5.11 Direct evidence of these problems was presented in the submission of Mr Matthew Arkinstall, a farmer from Rathdowney, Queensland, who wrote:

Technology exists today that would enable me to reduce my water usage 50% or so and grow the same amount of crop, and run the same amount of cattle. However, at around \$5000 per acre to install, and with a lifespan of perhaps only 5–7 years and increased maintenance costs, the costs are too prohibitive. In areas with

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1 Transcript of evidence, p. 597.

2 Transcript of evidence, p. 656.

flood irrigation there are significant water savings possible by capping flowing bores and piping flood irrigation channels. In both these instances as well, the costs are often too much to be borne by the individual.<sup>3</sup>

- 5.12 In his evidence before the Committee, Mr Paul Emmerson, Chairman of the Upper Lockyer Water Users Association, discussing the economics of installing drip irrigation said:

We call it trickle irrigation rather than drip irrigation. It is being used increasingly and there are issues with its use. A lot of irrigation is for one-off use and the economics of using it on a lot of crops are very limited. On our particular place with dairying, we are looking at over \$2,000 an acre to put trickle irrigation under our pasture. If we did not have deregulation, we might think about it but with the current price of milk, you just cannot do it. And there are the current problems with water access, so the whole question makes it all very marginal.<sup>4</sup>

- 5.13 In her evidence, Ms Jacqueline Knowles of the NSW Irrigators Council argued:

... the investor in the process that delivers savings should be able to use those savings, whether it is to be able to grow more crop or to trade excess water, but that is not to say that governments might not have an opportunity to invest in those sorts of things as well ... there are opportunities there for governments to be partners in those sorts of projects to use water. If they invest 20 per cent then 20 per cent of those savings should be reverted to the government to use for whatever purpose they might find for it.<sup>5</sup>

- 5.14 Mr Ralph Leutton, a member of the National Farmers' Federation Water Task Force, endorsed government investment in water use efficiency:

Say government were to invest in efficiency. We think that is a far better way to go than buying back licences, because then you get a much more pragmatic and proactive approach to looking after the environment. If that were to be the case then we would get better outcomes.<sup>6</sup>

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3 Submission no. 24, p. 99.

4 Transcript of evidence, p. 119.

5 Transcript of evidence, p. 575.

6 Transcript of evidence, p. 699.

- 5.15 It is the Committee's view that a national public investment scheme would greatly enhance the adoption of on-farm water use efficiency measures. The caveat is that where public money is invested, the savings generated should be the property of the government in proportion to the level of public investment (for example, where government contributes half the cost, it gets half the water savings).
- 5.16 Furthermore, any investment should be determined by recognised on-farm planning processes, such as Land and Water Management Plans, which set out costs, savings and external impacts of any water efficiency investment. Any on-farm improvements in water use efficiency must be agreed to voluntarily by the owner.

### Recommendation 15

- 5.17 **The Committee recommends that the Commonwealth Government, working through the Council of Australian Governments, seek to establish a national scheme for investment in on-farm water use efficiency, utilising established on-farm planning processes, with water savings becoming the property of government in direct proportion to the level of public investment.**

### Off-farm water use efficiency

- 5.18 Of equal importance as improving on-farm water use efficiency, in the Committee's view, is the development and improvement of the nation's water infrastructure. Significant decisions about the redevelopment of our water infrastructure currently face the nation. Indeed, in his evidence before the Committee, Dr Don Blackmore of the Murray-Darling Basin Commission argued that the decisions we make now about how we develop our rural water infrastructure would define us as a nation:

You invest in infrastructure—so you make a choice on what is of net benefit. This is whether it is in pipelines, in flush channel technology. Australian products are now leading the world in relation to channel technologies—and, quite frankly, we will need to put those in to modernise our channels ... That [\$300 million] would modernise our systems, set them apart as world's best practice and get most of our gravity irrigation systems operating at about 85 per cent efficiency, accurate measurement, two- to three-hour watering, so you can order water within two to three hours.

It has cracked all the problems we have had. It is solar energy driven. It is pretty flash stuff. Those sorts of technologies should sit there. These things that we should roll out define us.<sup>7</sup>

### Water storage

5.19 The Committee received a number of submissions calling for an increase in water storage capacity, principally the building of more dams.<sup>8</sup> In evidence before the Committee, Mr Stephen Struss, a member of the Beaudesert Community Advisory Panel and chair of the water subgroup of the Community Reference Panel, argued strongly for the creation of more storage capacity:

My big push at this point is for more water storage, as I feel very strongly about it. I feel that we have been pushed into a corner and that in years to come we are not going to have enough water. For all the talk about conserving water, which I appreciate is very important, through the re-use of grey water, I think the big push should be for more water storage.<sup>9</sup>

5.20 Mr Chris Lawson, Director, Civil Operations, Beaudesert Shire Council, told the Committee:

There are ... two more dams that could reside within our area—one within this [Boonah] shire and one within Beaudesert shire. I guess it is a question of whether they ever get built. Sooner or later, they will be built, we will use an enormous amount less water or, I suppose, we will go to desalination. Those decisions are up for grabs in a study we are hoping to kick off in south-east Queensland some time next month.<sup>10</sup>

5.21 In its submission, the Tasmanian Government identified increased storage capacity as a major factor in future economic development. Tasmania's Water Development Plan provides for further water storage development to meet the target for doubling the value of primary production by 2008.<sup>11</sup>

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7 Transcript of evidence, p. 414.

8 Citizens Electoral Council of Australia, Submission no. 30; R. K. McDonald, Submission no. 89; Local Government Border Rivers Project Group, Submission no. 107; Mr David Downie, Submission no. 120; Mr Max de Mestre–Allen, Submission no. 143.

9 Transcript of evidence, p. 60.

10 Transcript of evidence, p. 69.

11 Submission no. 157, p. 2.

The Western Australian State Water Strategy also identifies two new dam developments.<sup>12</sup>

- 5.22 The Committee notes, however, that the simple construction of water storage is no guarantee of water security. In many parts of Australia, storage capacity exceeds diversions, and yet shortages still occur. In the Murray-Darling Basin, for example, storage capacity exceeds annual flow by 50 percent, and annual diversions by 350 percent.<sup>13</sup> The critical factor in water security is rainfall, and very few dams have been full in recent years due to low rainfall, posing the question why build more dams when we can't fill the ones we have now?
- 5.23 Under the COAG water reform framework, investments in water infrastructure schemes or extensions to existing schemes are only to be undertaken if economically viable and ecologically sustainable. This policy aims to avoid subsidies for uneconomic projects so that future generations do not have to pay for poor investment decisions, and environmental impacts are fully investigated before major projects proceed.<sup>14</sup>
- 5.24 Professor Peter Cullen endorsed the position taken by COAG in his evidence before the Committee, stating:
- I would not build any more dams until we are using the water we have more efficiently than we are. To think that we are not going to have to implement that COAG requirement for full economic and environmental appraisal of a dam is silly. That will come back to us some time, with our urban communities and with others, and we are going to have to go through those tests. They are appropriate tests and they should stay there.<sup>15</sup>
- 5.25 It is the Committee's view that the development of major water storage infrastructure should only take place in accordance with the requirements of the COAG water reforms, i.e. that major infrastructure developments should be economically viable and ecologically sustainable. The critical factor in Australia's water future is greater water use efficiency.

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12 Government of Western Australia, *Securing Our Water Future: A State Water Strategy for Western Australia—Summary Document*, February 2003.

13 Transcript of evidence, p. 395.

14 Submission no. 160, p. 17.

15 Transcript of evidence, p. 15.

## Technical innovation

- 5.26 The opportunity to use existing storages more efficiently or open new avenues for water storage has great potential.
- 5.27 One such innovation is the lining and covering of existing storages to prevent losses from seepage and evaporation. In its submission to the Inquiry, Evaporation Control Systems Pty Ltd, indicated that progress had been made in making light weight, cost effective, covers for water storages.<sup>16</sup> On its tour of inspection of the Tod Reservoir, the committee saw the covers used on one of the secondary storages above the main reservoir.
- 5.28 While in Port Lincoln, the Committee heard from Councillor Peter Davis, Mayor of Port Lincoln, on the success he had enjoyed using plastic sheeting to capture rainfall on his property on Boston Island.<sup>17</sup>
- 5.29 It is the Committee's view that such technological innovation offers considerable scope for creating cost effective water savings, and that the development and use of such systems should be encouraged by governments.
- 5.30 Another means of managing water better is the use of mid-system storages (i.e. between the main storages and use on-farm). Mr Hetherington of Murray Irrigation regarded mid-system storage as one option with great possibilities in terms of water conservation and environmental management that till now had been largely neglected:

I am going to suggest one [option] that gets recorded for your committee; that is, if river managers looked at en route storage along some of the irrigation systems to avoid excessive flooding in forests and other environmentally sensitive areas when you cannot avoid it through nature—spring thunderstorms and things—it would be far more efficient and beneficial if some of that funding that is available up there were allocated to a project such as this or at least be investigated as a priority. A lot of savings can be found in river management that have been totally neglected in my view.<sup>18</sup>

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16 Submission no. 145, pp. 1-3.

17 Transcript of evidence, p. 368.

18 Transcript of evidence, p. 512.



- 5.31 At the same hearing, Mr John Howe, Water Policy Manager for Murrumbidgee Irrigation, highlighted the work that was being done in his area to improve the storage efficiency of natural wetlands:

The way that we are currently looking at reduced evaporation losses is in our mid-system storages. Those storages are necessary for the management of water within the system, but your evaporation losses fall with the depth and lower surface area of those storages. So we investigated a project to take a mid-system storage and effectively halve the area of it. That is, covert one-half back to the original wetland and use the other half. In fact, active storage would be only one-third, with a bit in addition to that for very high flow periods that would be a spill to more often 'inundated' wetland than the other 'returned to its natural state' wetland. That is the project that will reduce evaporation losses by up to 30,000 megalitres per year. Currently, we lose from that mid-system storage about 60,000 megalitres a year. With the new approach, it would be just 30,000.<sup>19</sup>

- 5.32 The importance of water storage to economic development was emphasised by Councillor William McCutcheon, Mayor of Chinchilla Shire Council, who advocated off-stream storages for capturing the intermittent high flows of the Condamine River.<sup>20</sup>

- 5.33 Mr Stephen Struss of the Beaudesert Community Advisory Panel also identified water harvesting of floods and high flows as a potential source of supply:

I see the potential for water harvesting as a big issue, although it is not suitable for all properties, particularly those in the Logan basin. But with those properties that meet the geographical requirements needed for water harvesting, the carrot approach is needed to get people to spend money on water harvesting. I know that with my operation my water harvesting system effectively doubles the amount of water which I take from the Logan. Half of it would be otherwise just wasted water going past. The potential is huge, even if you just get 20 or 30 per cent of farmers to harvest water.<sup>21</sup>

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19 Transcript of evidence, p. 512.

20 Transcript of evidence, pp. 100-1.

21 Transcript of evidence, p. 60.

- 5.34 The Committee sees potential in the use of mid-stream storages and wetlands, and believes these options should be further investigated. However, it is important that the environmental impacts of such practices should be taken into account, and that the harvesting of flood waters not cost downstream users their entitlements. Just because water flows past one farmer's land does not mean the water is wasted.
- 5.35 During its tour of inspection in South Australia, the Committee was impressed with work of the City of Salisbury in using artificial wetlands to harvest, clean and reuse stormwater, creating both natural habitat and a valuable economic resource. As part of this scheme, the City of Salisbury has established a system of aquifer recharge, storage and recovery—to store high winter flows and then utilise them for summer watering.
- 5.36 The Committee is also aware that some inland cities (such as Canberra and Albury) return significant stormwater and treated effluent to inland water systems. This suggests that coastal cities should also be able to return at least some stormwater to inland rivers systems or storage dams.
- 5.37 In evidence to the Committee, Dr John Radcliffe, a former Director-General of Agriculture in South Australia and former Deputy Chief Executive of CSIRO, and currently a member of the South Australian Arid Areas Water Catchment Management Board, supported aquifer storage and recovery (ASR), but emphasised the need for good research and management practices:
- You need to have a good knowledge of the aquifer structures beneath the area where you might put your ASR, and you also have to manage the water so that it does not clog up, say, sand strata through which it might need to go ... You also need to be careful that you do not have fractured aquifers, because you might put it into one aquifer and then suddenly, if there is a fractured rock structure, it might disappear into another aquifer and you will not be quite sure where it finishes up. So you do need to have a good knowledge of the local geology.<sup>22</sup>
- 5.38 Professor Don Bursill, Chief Executive Officer of the CRC for Water Quality and Treatment, described to the Committee another successful example of aquifer storage and recovery operated by SA Water at Clayton Bay.<sup>23</sup>
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22 Transcript of evidence, pp. 317–18.

23 Transcript of evidence, p. 297.

- 5.39 The Committee believes that aquifer storage and recharge is now proven technology and that it has great potential for wider use. The necessary research should be undertaken to determine where and how the best use could be made of aquifer storage and recharge for domestic, industrial and agricultural purposes. Aerial magnetic surveys could be used to map aquifers. Much more research needs to be done on the whole issue of Australia's groundwater supplies and potential.

### **Recommendation 16**

- 5.40 **The Committee recommends that the Commonwealth Government facilitate the establishment of a Cooperative Research Centre for Groundwater Management which would:**

- **Map Australia's groundwater resources;**
- **Investigate the current and potential use of Australia's groundwater resources; and**
- **Research the use of aquifers for water storage purposes.**

### **Piping open channels**

- 5.41 In the evidence presented to the Committee, the system of open earth channels used to transmit water from the headworks to the farm was identified as one of the major sources of inefficiency in Australia's irrigation systems. Mr Richard Pratt, Chairman of Visy Industries, stated in his submission:

It is well known that open irrigation channels are a highly inefficient method of transporting water—especially over long distances. Losses through evaporation and leakage can account for up to 80% of water volume from the time water leaves its source until it reaches its destination.<sup>24</sup>

- 5.42 Mr Pratt's solution was to replace open irrigation channels with pipes, helping to eliminate evaporation and leakage, and making more water available for rural, urban and environmental uses. His submission concluded:

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24 Submission no. 4, p. 14.

A scheme to pipe Australia's open irrigation channels would be one of the most effective, far reaching and imaginative steps the Government could undertake to address the water management challenges facing Australia. It would capture the nation's imagination and send a clear message that water management is one of the greatest issues facing this country. The financing, planning, administration and implementation of such a scheme requires considerable analysis. However it has the potential to have a major positive environmental and economic impact for the future of Australia.<sup>25</sup>

- 5.43 The benefits of replacing open channels with pipes are clearly illustrated in the Wimmera Mallee region of north-west Victoria. The Northern Mallee pipeline project replaced open channels across 650 000 hectares of the Mallee, resulting in water savings of 50 GL per year, of which 35 GL is available for environmental flows. A feasibility study was undertaken, and the preparation of a detailed business case is currently underway for the completion of the entire project, representing potential total water savings of around 83 GL per annum.
- 5.44 Western Murray Irrigation, which the Committee inspected in late July, is another example of a successful pipeline investment. There, a joint government-irrigator investment has resulted in the replacement of open channels with a low pressure piped system. Savings of up to one-third have been achieved through piping, and water use has declined a further one-third with the uptake of new technology. Piping and pressurisation has meant that water is available on demand, allowing growers to adopt sophisticated growing techniques. It has also cut drainage outflows by two-thirds.<sup>26</sup>
- 5.45 Piping is not, however, a universal panacea. Some channel systems are more efficient than others, and the level of investment required to pipe some systems may not match the efficiencies gained. Professor Cullen told the Committee that the feasibility to pipe an open-channel system depended on cost-benefit analysis being undertaken. He thought that 'a lot of the real savings and benefits from investment through piping will be at the on-farm level rather than at the system level'.<sup>27</sup>

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25 Submission no. 4, p. 15.

26 <http://www.agric.nsw.gov.au/reader/16146>

27 Transcript of evidence, p. 7.

- 5.46 In its submission, the Department of Agriculture, Fisheries and Forestry noted that where investment costs were over \$3000 per megalitre, which is often the case, the necessary investment was generally considered unviable. Piping is best targeted at areas where channels have very poor water efficiency due to high losses through seepage in sandy soils.<sup>28</sup>
- 5.47 Mr Mark Bramston, Chief Executive Officer of Coleambally Irrigation Cooperative Ltd, told the Committee that his company had investigated replacing open channels with pipes, but had found pipes ‘significantly not cost-effective’ because of the high sediment loads in the Murrumbidgee and the consequent energy requirements for operating and cleaning the pipes.<sup>29</sup>
- 5.48 Mr Ian Wisken, Assistant Project Director, Pratt Water, a company which has invested heavily in testing the feasibility of piping and other water saving technology, agreed that piping everything was not necessary or feasible. He told the Committee of low cost piping options Pratt Water was investigating, using material that was cheaper and less durable than traditional piping materials, making it easier to repair and replace, and less costly to abandon as land uses change.<sup>30</sup>
- 5.49 Despite the difficulties associated with replacing open channels with pipes, the Committee is convinced by the evidence it has received that piping water is the way of the future. Cost-benefit analysis may rule piping out as a short-to-medium-term option in some areas, but the benefits associated with piping combined with the increasing value of a scarce resource—water—will make this option increasingly attractive in the future. The key objective now is to develop research and investment strategies to facilitate piping of those areas urgently in need of upgraded irrigation infrastructure, such as north western Victoria.

### **Recommendation 17**

- 5.50 **The Committee recommends that the Commonwealth Government, working through the Council of Australian Governments, seek to establish a national scheme for investment in water infrastructure, giving priority to the development of more efficient water storage and the piping of open channels.**

28 AFFA, Submission no. 160, Attachment A, p. 19.

29 Transcript of evidence, p. 512.

30 Transcript of evidence, p. 713.

- 5.51 The Committee believes that income accruing to governments from the sale of ‘saved’ water, either on-farm or off-farm, should be used to upgrade other water-related infrastructure, rather than go into consolidated revenue.

### **Recommendation 18**

- 5.52 **The Committee recommends that the Commonwealth ask the Council of Australian Governments, as part of the National Water Initiative, to ensure that income accruing to governments from the sale of ‘saved’ water, either on-farm or off-farm, should be used to upgrade other water-related infrastructure, rather than go into consolidated revenue.**

## **Water Use Efficiency and the Environment**

- 5.53 In its submission, the New South Wales Irrigators’ Council insisted that if more water was to be provided to the environment then it should be obtained first and foremost from ‘savings’ generated by improved water use efficiency.<sup>31</sup>
- 5.54 Mr John Howe, Water Policy Manager for Murrumbidgee Irrigation, expressed the same view in his evidence before the Committee at the round-table discussion in Deniliquin, stating:
- Finally, what we would argue is that improving water use efficiency and generating additional flows are the only way that water savings can be made for redistribution to the environment without reducing the income and welfare of user communities. As we have heard today, that is the primary goal at least of the people around this table.<sup>32</sup>
- 5.55 In its submission, Murrumbidgee Irrigation estimated that one set of projects in the Murrumbidgee Irrigation Area (MIA) and Districts ‘may be able to save 100 GL of water at a cost of about \$200 million’ and speculated that similar savings could be made in other regions.<sup>33</sup>

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31 Submission no. 105, pp. 759, 764.

32 Transcript of evidence, p. 509.

33 Submission no. 127, p. 7.

- 5.56 In its submission, Murray Irrigation was much less sanguine about the prospect of using water use efficiency savings to generate environmental flows, arguing that ‘water efficiency savings that are currently economic have either been implemented or are being implemented’.<sup>34</sup>
- 5.57 The MDBC commissioned two companies to investigate the potential for savings from increased water use efficiency.
- 5.58 A study by consultants CapitalAg identified savings of up to 3000 GL in the Murray–Darling Basin from increased water use efficiency.<sup>35</sup> This report noted that capital requirements and investment risk to upgrade irrigation practices are often large and beyond the scope of individuals.<sup>36</sup> From a farm enterprise perspective, investment in water use efficiency was not necessarily profitable:
- Increasing water prices and additional revenue from water sales means that investment in water saving practices is increasingly becoming feasible for some growers. However, for most growers, the main incentive to upgrade irrigation practices (installing new irrigation systems, improving management and changing enterprise mix) appears to be to save labour and increase yield/quality of production.
  - Costs of installing new irrigation systems ranged from \$2,500–5,000/ha depending on technologies used and associated farm structures. Changes in enterprise structure can cost much more. For example, the cost of replacing existing citrus crops with wine grapes would cost over \$10,000/ha.
  - A switch to more efficient technologies (eg from flood and overhead sprinkler to drip and microjet) could lead to annual savings ... of the order of 3ML/ha for changes in enterprise mix. Simulations show the efficiency of overall irrigation systems could be improved by around 10–15 per cent.
  - In all regions, revenue from permanently selling any water saved appeared to only cover around 70 per cent of the costs of installing new irrigation systems, indicating such investments may not be profitable for many farmers.<sup>37</sup>

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34 Submission no. 161, p. 1308.

35 CapitalAg, *The Potential for Improving Water Use Efficiency: a scoping study of opportunities for change and possible policy approaches for the Murray Darling Basin*, MDBC, August 2002.

36 CapitalAg, *The Potential for Improving Water Use Efficiency*, p. 41.

37 CapitalAg, *The Potential for Improving Water Use Efficiency*, p. 36.

- 5.59 While the CapitalAg report identified water savings that were technically feasible, it did not cost them. Another report, by ACIL Tasman, drawing upon a number of earlier studies, did cost potential savings. It was less optimistic in its evaluation of what was economically feasible.<sup>38</sup>
- 5.60 The ACIL Tasman report argued that economic efficiency as well as technical efficiency was the key to greater water use efficiency. It found that there was limited scope for savings at a marginal cost of less than \$1000/ML, and that where viable on-farm savings had been identified they had been or were being implemented already.<sup>39</sup> It also found the ability of growers to improve application efficiency is often limited by off-farm irrigation systems that cannot provide continuous and preferably pressurised supplies.<sup>40</sup> On the other hand, the piping of open channels was only considered cost effective where there was demand for pressurised supplies, as with drip irrigation.<sup>41</sup>
- 5.61 In terms of off-farm savings, the report found ‘there could be up to 365 GL of potential savings at a marginal cost of around \$1000 -1500/ML. Costs then rise reaching \$4500/ML at around 420 GL. Above 488 GL marginal costs rise sharply’.<sup>42</sup>
- 5.62 The report identified on-farm savings of some 123 GL in the Murrumbidgee Irrigation Area at a cost of around \$1000 - 1500/ML, and total savings of about 200 GL at a cost of between \$1000 - 3000/ML. The list of savings identified was not exhaustive, but the report also noted that:
- ...it cannot be assumed that one particular irrigation application method is universally more efficient than another, given that soil type, climate and land-form will have a significant influence on the performance of a given technology or management technique. For example, only marginal gains may be made by switching irrigation technology on the heavy clay soils of Victorian dairy farms that are believed to be well suited to traditional flood/furrow techniques ... It would be unwise to attempt to form generalised judgements about the most economic water saving measures.<sup>43</sup>

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38 ACIL Tasman, *Scope for Water Use Efficiency Savings as a Source of Water to meet increased Environmental Flows—Independent Review*, MDBC March 2003.

39 ACIL Tasman, *Scope for Water Use Efficiency Savings*, p. i.

40 ACIL Tasman, *Scope for Water Use Efficiency Savings*, p. v.

41 ACIL Tasman, *Scope for Water Use Efficiency Savings*, p. 34.

42 ACIL Tasman, *Scope for Water Use Efficiency Savings*, p. 52.

43 ACIL Tasman, *Scope for Water Use Efficiency Savings*, pp. 52–4.



- 5.63 This conclusion was supported by the evidence of Mr Bruce Finney, Central Region Manager of Twynam Agricultural Group, who, in evidence before the Committee, pointed out that new technology was not necessarily appropriate to all situations:

That is why in our heavy soils in the north-west we have focused on managing the slopes of the fields by levelling ... and the run length, and making that system as efficient as possible. It is quite feasible to have irrigation farms on that soil type, with flood irrigation being 80 per cent efficient. The economic benefit of taking that from 80 per cent to 95 per cent with drip is questionable. It is cost prohibitive.<sup>44</sup>

- 5.64 Mr Leon Ashby, a South Australian farmer, and convenor and founder of Landholders for the Environment, concurred. He told the Committee:

I have been involved with drip irrigation and I have centre pivots. I have done a bit of open flood and I have done a bit of water spreading. So I have played around with the water in different parts of Australia ... I know of some flood irrigation set-ups where they flood very large amounts in very quick amounts of time in the evening. Those set-ups are very efficient for minimal evaporation.

In regard to set-up cost, if you are going to do drip irrigation or pipes or whatever else, they are going to have less evaporation, but they are going to have a lot more infrastructure costs. So there is this sort of play-off there. It is not quite as straightforward now. It depends also on your soil holding capacities. Some soils are just right for flood irrigation. They allow the right amount in for the plants. Others drain too quickly and they use too much water. It goes straight into the subsoil, away from the plant roots, and so on and so forth.<sup>45</sup>

- 5.65 This picture has been further complicated by research suggesting that water 'saved' through improved water use efficiency would probably be used to increase irrigation rather than for additional environmental flow. In an article entitled '*Robust Reform: The Case for a New Water Entitlement System for Australia*', Professor Mike Young and J. C. McColl explored the potential environmental implications arising from greater water use efficiency and land use change in the Murray–Darling Basin. Their

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44 Transcript of evidence, p. 614.

45 Transcript of evidence, p. 190.

research indicated a estimated loss from all sources of 2065 GL in net flows in the River Murray over time, made up of:

- Water use efficiency savings would be used to increase irrigation rather than environmental flow, reducing net flows by 723 GL.
- Sleeper and dozer entitlements would continue to be activated, reducing net flows by 373 GL.
- Land use changes, such as increased forestry, would reduce net flows by some 600 GL.
- Salinity interception schemes were outside the Cap, reducing net flows by 20 GL.
- The failure to cap groundwater extraction would impact on river flow, reducing net flows by 349 GL.<sup>46</sup>

5.66 In his evidence to the Committee, Dr Stephen Beare, Research Director of ABARE, made a similar point about the impact of greater water use efficiency upon the environment. He said:

I have heard people say that in the Goulburn–Broken area it is a really good thing that they are going to be moving a lot of irrigation from furrow to either drip or sprinkler, and they will be saving virtually half their losses. That is not necessarily a good thing, because if the farmers retain that water right and they use it and they expand their activities it will actually work the river harder, and they will transpire more and there will be water that is not coming downstream for other users—and that is clean and potentially quite fresh water.<sup>47</sup>

5.67 Dr Beare suggested that ‘in some cases there is an argument to be made that potentially if you save water in this particular location, you should have to share it with the environment or the other downstream irrigators’. On the other hand, increasing water use efficiency in environmentally problematic areas would produce ‘a net environmental benefit. In fact, irrigators need more incentives than they would naturally see, for that to happen. So it is where it is happening that matters.’<sup>48</sup>

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46 M. D. Young & J. C. McColl, ‘Robust Reform: The Case for a New Water Entitlement System for Australia’, *Australian Economic Review*, vol.36, no. 2, pp. 225–34. Suggested solutions: groundwater allocations should be capped and linked to surface water allocations; land use changes such as increased forestry should require separate allocations within the Cap; sleeper and dozer licenses should be removed from the system; and salinity interception schemes should be brought within the Cap.

47 Transcript of evidence, p. 386.

48 Transcript of evidence, p. 387.

5.68 These findings were disputed by Mr Howe of Murrumbidgee Irrigation who argued that Young and McColl were using a very narrow definition of water use efficiency:

At least in our system, that is not a very good representation of the circumstances. Reduced evaporation losses are an extremely important part of in-system and on-farm flows—they are not actually a flow; it is a loss of water in-system and on-farm that, if retained, becomes a flow—and by reducing evaporation you have no impact on basin flows; you create more water without impacting on the discharge of the basin. Neither does a reduction in drainage to waste, and in our system sometimes we have drainage to environmental damage. So actually stopping those drainages is both good for irrigation and good for the environment.<sup>49</sup>

5.69 Traditionally, any savings created through investment in water use efficiency have remained the property of the water entitlement holder. Young and McColl have suggested two remedies to this issue:

- Either any interest in a stream of periodic allocations should be defined as a ‘net’ interest reflecting the quantity consumed not the volume pumped, i.e. where 50 percent water use efficiency is achieved and 50 percent of water pumped returns to the river, farmers are entitled to 50 percent of their allocation.
- Or as water use efficiency increases there is an across the board reduction in the quantity of water per unit periodically allocated.<sup>50</sup>

5.70 Both these solutions conflict with current notions of water property rights. Ms Michelle Ward, a consultant for the New South Wales Irrigators’ Council, told the Committee:

We would like to clarify that the principle of receiving assistance to do water efficiency savings is that if an irrigator is investing in water savings technology, that irrigator should be able to receive the benefit of those savings in terms of using the water that he saves to grow more product—or trade. Savings should be the property of the person who invests in them.<sup>51</sup>

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49 Transcript of evidence, pp. 509–10.

50 Young & McColl, *Robust Separation*, pp. 30–2.

51 Transcript of evidence, p. 571.

- 5.71 This was a position supported by Mr Jolyon Burnett, Chief Executive Officer of the Irrigation Association of Australia, who agreed that where irrigators made the investment, they should be the beneficiaries of that investment. He qualified this, however, by saying that where government had also invested in those savings, it was not unrealistic to expect it to have a say in how those savings were distributed.<sup>52</sup>
- 5.72 An ABARE report found that the direct purchase of water entitlements for environmental purposes is often more cost-effective than generating additional water through improvements in water use efficiency, although that cost-effectiveness will diminish as the price of water increases.<sup>53</sup>
- 5.73 The Committee opposes any form of water saving measure that involves the confiscation of water entitlements or their diminution by increment. Governments should acquire water savings through direct investment, either by purchasing entitlements or through investment in water saving technology.

## **Financing investment in water use efficiency**

- 5.74 In his submission, Mr Richard Pratt, Chairman of Visy Industries and Pratt Water, proposed a system of water bonds to finance the development of major water infrastructure projects in Australia. He believed that such bonds would provide a highly sought after investment while providing economic opportunities in regional Australia. While Mr Pratt thought the Commonwealth Government was justifiably proud of its record in reducing public debt, water bonds 'would have the advantage of helping keep more of Australia's superannuation fund money onshore as well as providing considerable economic stimulus and job creation in rural areas through a major environmental infrastructure project'.<sup>54</sup>
- 5.75 Pratt Water envisages water bonds being the primary funding mechanism for significant national water infrastructure investment:

Governance of the financing mechanism could be through a Water Bond Vehicle (WBV), which would need to be established to control and manage proceeds from the sale of Water Bonds to investors. The WBV would award and supervise contracts for

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52 Transcript of evidence, p. 603.

53 T. Goesch & A. Heaney, *Government Purchase of Water for Environmental Outcomes*, ABARE, Canberra, 2003, pp. 10–11.

54 Submission no. 4, p. 15.

appropriate infrastructure developments (including new pipelines), and could also provide long-term finance to farm and regional organisations for approved projects. Bond finance may also be allocated to qualifying urban water infrastructure projects, if that accords with government policy and demonstrated need.<sup>55</sup>

- 5.76 The new and redeveloped water infrastructure would be owned by the Water Bond Vehicle, as would water savings created through the investment. Water savings could then be reallocated via agreed market mechanisms to the government for environmental purposes or to other primary producers for regional development. In the case of long term finance provided to farmers and regional organisations, the assets acquired would remain the property of the financed body, but any surplus water savings would be allocated to the Water Bonds Vehicle according to agreed rules.<sup>56</sup>
- 5.77 The Committee believes the water bonds concept has considerable potential to arrest underinvestment in rural water infrastructure without placing a significant burden on public finances. The savings, both in terms of agricultural productivity and environmental sustainability, are potentially huge. This is a proposal worthy of further investigation by both state and federal governments.
- 5.78 Priority areas for investment include on-farm irrigation systems; piping open channels; desalination plants; and reducing evaporation in storages.

### **Recommendation 19**

- 5.79 **The Committee recommends that the Commonwealth Government investigate the introduction of a scheme of investment in National Water Bonds, with a view to implementing said scheme in 2005, as part of the National Water Initiative, and seek to encourage fund managers to invest in water infrastructure.**

55 Submission no. 178, p. 1.

56 Submission no. 178, pp 2 – 3.

## Turning rivers inland

- 5.80 The Committee received evidence both for and against turning rivers inland. Most of the evidence for turning rivers inland compared the vast quantities of unutilised water in northern Australia with the over-allocated systems of the south. Several submissions identified the opportunity to divert the massive flows of Australia's northern monsoonal rivers to the agricultural regions of the south.<sup>57</sup> Another identified the suitability for diversion inland of the Clarence River in northern New South Wales.<sup>58</sup>
- 5.81 A submission from engineering firm T. Bowring & Associates Pty Ltd, advocated the construction of canals from the mouths of the Burdekin and Burnett Rivers in north Queensland to the Darling River at Bourke. The use of concrete lined canals would reduce transmission losses, while aquifer storage enroute would allow for management of the water. The company estimated the cost of the canal and pumping infrastructure for a 2000 GL per annum flow at \$2 million per kilometre, with a canal between Rockhampton and Bourke costing around \$1.5 billion.<sup>59</sup>
- 5.82 On the other hand, Professor Cullen thought that the dangers associated with turning rivers inland were great, and neither the benefits nor the risks had been properly quantified. He believed the existing waters of the Murray-Darling Basin should be used more efficiently before looking for new water sources.<sup>60</sup>
- 5.83 Dr Wayne Meyer, Business Director of CSIRO Land and Water, regarded the turning of rivers inland as an enterprise fraught with danger:

Diverting high volume coastal rivers into inland river systems has many challenging and attractive engineering prospects. What are the likely biological consequences and social responses? Significant decreases in flow and seasonality of the diverted river and increases in the receiving river will affect the ecosystems of both rivers. Major changes in either system are not likely to be acceptable in today's more environmentally sensitive political environment. Increasing flow in the inland rivers and subsequent use for irrigation especially in arid areas will increase salt loading, and in the absence of excellent water control, will almost certainly

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57 Hon. Bob Katter MP, Submission no. 49; Mr. A. S. Davey, Submission, no. 61, p. 309; Mr Jack Pearson, Submission no. 172.

58 Submission no. 107, p. 803.

59 Submission no. 146.

60 Transcript of evidence, pp. 7–8.

increase accessions to groundwaters. Extraction in the upper reaches of the river will negate any advantages for increased supply downstream and the real risk of increased drainage returns will adversely effect water quality. If supplies of quality water are required downstream it is certainly not very efficient to transport water through long, open inland rivers.<sup>61</sup>

- 5.84 The submission from the Department of Agriculture, Fisheries and Forestry noted that such schemes are generally not economically viable or environmentally sustainable, two key COAG criteria. The submission provided estimates of delivery costs of diverted water: for example, the proposed pipeline from the Fitzroy River to Perth – estimated at \$4,000/ML; and the Bradfield Scheme to divert the northern coastal rivers of Queensland – estimated at \$1,500/ML.<sup>62</sup>
- 5.85 While the Committee is impressed with the technical possibilities for diverting rivers from the northern and eastern coasts to the inland, it is concerned that the economic and environmental hazards of such schemes have not been properly addressed by their proponents. Crucially, the Committee received no evidence during the Inquiry that potential users would be willing to pay the huge costs per megalitre which diverted water is estimated to cost.
- 5.86 The Committee believes that investment in more efficient use of existing resources should be the priority of government. Furthermore, the Committee is of the view that governments should investigate the potential to establish new industries in the north, at the source of the water, rather than moving the water south. The Ord River scheme is indicative of the agricultural potential of northern Australia, and of the problems associated with its development. The potential is there. The key is to develop it in an economically responsible and environmentally sustainable way.<sup>63</sup>

## Recommendation 20

- 5.87 **The Committee recommends that the Commonwealth Government urge the Council of Australian Governments to establish programs to investigate the development of irrigated agriculture in northern Australia as part of the National Water Initiative.**

61 Wayne S. Meyer, 'Water in Australia', attachment to CSIRO, Submission no. 59.

62 Submission no. 160, Attachment A, p. 19.

63 Submission no. 160, Attachment A, pp. 21-22.

## Other Water Saving Measures

- 5.88 During the course of its Inquiry the Committee received a considerable amount of evidence relating to other potential water saving measures mainly associated with urban water management, particularly water recycling, desalination, and household efficiency measures including the adoption of rainwater tanks. About twenty percent of water in Australia is used in urban areas—for both household and industrial/commercial use.
- 5.89 The Committee notes that a Senate committee conducted a recent inquiry into Australia's urban water management and tabled its report in December 2002.<sup>64</sup> This is a comprehensive report with several sound recommendations. The discussion of urban-related water issues in this report (which is focused on rural water) will, therefore, be kept short. Nevertheless, it is evident that particularly the recycling of stormwater and treated effluent has the potential to make significant quantities of additional water available for rural use.

## Recycling water

- 5.90 The opportunities to improve overall water use efficiency through the recycling and reuse of water was raised throughout the Inquiry. Mr John Lawson, an urban planning consultant, told the Committee that '50 per cent of the potable water supply in most ... cities could actually be recycled, because 31 to 35 per cent of water in Melbourne goes on gardens and 14 to 19 per cent is on toilet flushing'.<sup>65</sup>
- 5.91 Governments are cognisant of the need to make better use of available water resources. For example, the Victorian Government has set a 20 per cent reuse target for Melbourne's sewage water by 2010. The Western Australian Government has set the same target for 2012.<sup>66</sup>

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64 Report of the Senate Environment, Communications, Information Technology and the Arts Reference Committee, *The Value of Water*, tabled December 2002.

65 Transcript of evidence, p. 228.

66 Government of Victoria, *Melbourne 2030: Planning for sustainable growth*, policy 7.1; Government of Western Australia, *Securing Our Water Future: A State Water Strategy for Western Australia—Summary Document*, February 2003.



- 5.92 The submission from Barwon Water, the regional water authority based at Geelong, identified the recycling of treated wastewater as an integral element in the water cycle and urged the Commonwealth to facilitate the adoption of national standards for recycling to strengthen community acceptance of recycled wastewater as a valuable resource.<sup>67</sup>
- 5.93 In its submission, the Lower Hawkesbury Nepean Water Users Association highlighted the impact upon river health of the fact that 90 percent of the flow of the Hawkesbury River was diverted to Sydney for urban and industrial use, leaving 10 percent for agricultural use and the environment. The Association argued that water quality in the Hawkesbury would improve dramatically if a large proportion of this water was cleaned and returned to the river system, increasing the water available for both the environment and agriculture. The Association called for the adoption by the Commonwealth of a strategic objective to return 50 percent of water diverted to the Hawkesbury–Nepean system.<sup>68</sup>
- 5.94 There appears to be considerable potential for increased urban water recycling and reuse. In its submission, the Victorian Government noted that over the next five years a number of projects will be completed which will increase the use of recycled water in metropolitan Melbourne by between 17 and 35 gigalitres per annum. The submission cited the Aurora development, a new housing estate which will process and reuse all its own waste water using a third pipe system; the Werribee Plains scheme, which will divert up to 35 gigalitres per annum of treated waste water from Melbourne’s Western Treatment Plant; and the Sunbury–Melton pipeline, which pumps 2.2 gigalitres of tertiary treated water to properties between Sunbury and Melton, to irrigate vineyards, olive groves, plant nurseries, golf courses and council reserves.<sup>69</sup>
- 5.95 There are costs associated with recycling and reuse. Third pipe schemes, while readily installed in new developments, are difficult and expensive to retrofit. Supplying water for agricultural use requires transmission and storage facilities for the recycled water. Water still has to be treated to minimum standards to remove salt, metals and pathogens to make it fit even for non-potable uses. Mr Lawson told the Committee that only selected agricultural industries could afford to pay the costs involved in treated water:

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67 Submission no. 2, p. 1.

68 Submission no. 6, pp. 1-4.

69 Victorian Government, Submission no. 175, pp. 6-7.

The gross margins for selected crops with regard to the ability to pay for water are a major issue in relation to treated water. By and large, we believe we can treat the water for about \$300 per megalitre ... So you do have a problem with what you can pay. Generally speaking, it is wine grapes, apples and other intensive agriculture [that can afford recycled water].<sup>70</sup>

- 5.96 Nonetheless, Mr Lawson believed that much greater levels of reuse than those targeted were possible:

The government in Victoria has a target to reuse 20 per cent of Melbourne's sewage water by the year 2010. I am saying that you could have a much higher target and that our overall objective should be to try and reuse all of the water. I believe that, over time, that may be practical and possible.<sup>71</sup>

- 5.97 Dr Radcliffe cited examples in South Australia where wastewater had been diverted to agricultural use, 'at Bolivar and Virginia ... and in the southern vales', thereby saving investment in waste water treatment.<sup>72</sup>

- 5.98 A number of witnesses from Queensland spoke in support of a proposal to pipe waste water from Brisbane to the farming districts west of the Great Dividing Range. Mayor of Boonah Shire, Councillor Brent told the Committee:

We have a particular project here in south-east Queensland ... It is about collecting effluent from Brisbane city and adjoining local governments and turning that water inland to the west of Brisbane, into the lower end of Boonah shire, into Laidley shire and Gatton shire and extending further westward to Toowoomba and out onto the Darling Downs. There currently is a draft report that is in the final stages of titivation prior to public release. I believe I can say that it is around an \$800 million project.<sup>73</sup>

- 5.99 Representatives of Chinchilla Shire Council were enthusiastic about the proposed pipeline, not because they would benefit directly from it but because the water saved upstream as a result of this scheme—around 130 GL per annum—would mean more water availability in their region.<sup>74</sup>

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70 Transcript of evidence, p. 228; see also Submission no. 160, Attachment A, p. 20.

71 Transcript of evidence, p. 19.

72 Transcript of evidence, p. 315.

73 Transcript of evidence, p. 42; see also Transcript of evidence, p. 72.

74 Transcript of evidence, pp. 97, 103.

- 5.100 The media reported that the feasibility study estimated that the price of water from the scheme would be around \$1000 per megalitre<sup>75</sup>. As there was no indication that farmers would be willing to pay such prices for this water, the Queensland Government decided not to proceed with the project citing economic costs and environmental concerns, two key COAG criteria.
- 5.101 Professor Bursill voiced caution because of the potential health risks involved. He did 'not believe this country needs to have effluent reused for potable purposes, broadly speaking',<sup>76</sup> and was concerned at the implications of the push to greatly increase the use of recycled water:
- You hear, in public consultations and workshops within various sectors of Australia, people say, 'This is too restrictive; we ought to loosen up on guidelines so that other options are more readily available and we can be more innovative.' What that translates to, in reality, is: 'We want to take more risk with public health to enable these water sources to be used.' I am against that; I do not think that is being more innovative at all. Surely one should be challenging this system where we can use this water. Here in South Australia, there are very good programs in aquifer storage and recovery with effluents and stormwaters. We are reusing our waste waters here at a fairly high level for various horticulture endeavours, but with a very clear view about what the health risks are and how to manage them, and that is what needs to be done.<sup>77</sup>
- 5.102 During the public hearing in Adelaide in April 2003 Dr Radcliffe mentioned that he had been asked by the Australian Academy of Technological Sciences and Engineering (AATSE) to undertake a detailed review of water recycling in Australia, under a project funded by the Australian Research Council.
- 5.103 The AATSE's very timely report, titled '*Water Recycling in Australia*', was published in April 2004. This is the first time a comprehensive review of all facets of water recycling in Australia has been undertaken. The Committee congratulates the AATSE for taking the initiative in compiling this report which will be an essential reference document for policy makers. Findings indicate that nationally about 9 percent of treated

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75 *Courier Mail* (Brisbane), 13 August 2003, p. 2, 16 August 2003, p. 12.

76 Transcript of evidence, p. 295.

77 Transcript of evidence, pp. 294-5.

effluent is being recycled at present (166GL out of a total of 1824GL), although this proportion is often much higher in rural areas.<sup>78</sup>

- 5.104 A key observation in the AATSE report is that ‘Governments and water agencies must come to recognise that in a dry country, wastewater effluent, stormwater and rainwater are complementary additional water resources rather than disposal problems.’<sup>79</sup>
- 5.105 The Committee is of the firm belief that recycling of treated effluent and stormwater is an important part of Australia’s water future. While the difficulties and costs associated with recycling are considerable, smart-thinking and technology will overcome most problems. The AATSE report provides the ideal foundation on which to quickly build a workable national water recycling policy. The best way to ensure that water recycling receives the priority and attention it deserves, is to make it an integral part of the National Water Initiative.

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### **Recommendation 21**

- 5.106 **The Committee recommends that the National Water Initiative incorporate a national policy on the recycling and reuse of stormwater and treated effluent around Australia.**

### **Desalination**

- 5.107 During the course of its Inquiry, the Committee received evidence concerning desalination as a potential source of future water supplies.
- 5.108 In its submission to the Inquiry, URS Australia advised that it was recently contracted by the Department of Agriculture, Fisheries and Forestry and the Department of the Environment and Heritage to examine the technical and economic issues surrounding desalination in rural regions of Australia, particularly the priority regions identified under the NAP. Various desalination technologies were examined for their technical and economic feasibility, and several were identified as having potential for commercial application in the not-too-distant future.

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78 ‘*Water Recycling in Australia*’, a report published by the Australian Academy of Technological Sciences and Engineering, April 2004, p. 7 of the Introduction.

79 ‘*Water Recycling in Australia*’, a report published by the Australian Academy of Technological Sciences and Engineering, April 2004, p. 2 of the Summary.

- 5.109 The main conclusion of the study was ‘that desalination is currently only cost competitive with traditional forms of water supply (i.e. mains) in certain limited scenarios’. These were where water was not otherwise available or the cost of accessing other sources of water was very high.<sup>80</sup>
- 5.110 One example cited in the URS study was the reverse osmosis desalination plant at Penneshaw, on Kangaroo Island in South Australia. The capital cost of establishing a desalination plant at Penneshaw was significantly less than the cost of linking the town to a water supply. On the other hand, the operating costs of the plant are higher than the unit costs of providing water through the mains.<sup>81</sup>
- 5.111 URS noted that the costs of operating desalination plants, particularly reverse osmosis, had been declining and desalination was becoming increasingly cost-competitive in many regions. Pricing water to reflect its true value would accelerate this process.<sup>82</sup>
- 5.112 Moreover, desalination had distinct environmental benefits. The URS study cited the case of Merredin, in Western Australia, where groundwater was desalinated. This lowered the watertable, thus reducing the salinity risk to the town while providing another source of drinking water which reduced dependency on piped supplies.<sup>83</sup> The URS study stressed, however, that desalination was not cost effective as a salinity management tool.<sup>84</sup>
- 5.113 The Western Australian Government has also investigated the possibility of using desalination to enhance Perth’s water supply. A feasibility study had been undertaken into seawater desalination, but the Government had decided not to pursue the development at this time.<sup>85</sup> Mr Ed Hauck, Manager of the Hydrology and Water Resources Branch, Resource Science Division of Western Australia’s Department of Environment, informed the Committee:

I think it is well recognised that the scale of development for desalination does bring down the cost somewhat. But, considering energy inputs, the efficiencies may not go too much further than what we see today. The costings that have been provided on desalination are associated with a 45 gegalitre unit, which is a large

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80 Submission no. 80, p. 551.

81 URS Australia, ‘*Introduction to Desalination Technologies in Australia*’, 2 September 2002, p. 7.

82 Submission no. 80, p. 1.

83 URS Australia, ‘*Introduction to Desalination Technologies in Australia*’, p. 4.

84 URS Australia, ‘*Introduction to Desalination Technologies in Australia*’, p. 33.

85 Government of Western Australia, *Securing Our Water Future: A State Water Strategy for Western Australia—Summary Document*, February 2003.

unit. By far the most cost efficient water source development in WA is related to catchment management and water conservation measures.<sup>86</sup>

5.114 Nonetheless, desalination is being increasingly seen as a viable water supply option. Professor Bursill noted that ‘even desalination of sea water has got within the realms of affordability of major communities—Adelaide, for example’.<sup>87</sup>

5.115 Dr Radcliffe cited the example of the Luggage Point Wastewater Treatment Plant in Brisbane as an example of water being successfully treated and reused for industrial purposes:

There is a contract between Brisbane Water, which is owned by the Brisbane City Council, and BP Australia to provide something like 10 megalitres of water per day to the oil refinery. It has gone through a microfiltration process, a reverse osmosis process, so the water is very low in salt and can be used in boilers with no ill effect. It proved to be a more satisfactory solution than bringing a large water pipeline to a fairly distant location which happened to be close to a waste water treatment plant.<sup>88</sup>

5.116 Desalination is also being attempted on the Eyre Peninsula in South Australia, where the Tod reservoir now contains saline water. It is planned to have a 2.3 gigalitre desalination plant operational at the Tod reservoir by the end of 2004. A pilot project processing some 40 kilolitres a day is already under way. The plant is expected to produce 85 percent fresh water, substantially enhancing the region’s supplies, although the region will remain dependent on already stressed groundwater resources. The desalination process is also expected to be highly energy intensive.<sup>89</sup>

5.117 In evidence to the Committee, Mr Vance Thomas, Executive Officer of the Eyre Peninsula Local Government Association, emphasised that desalination was becoming increasingly cost competitive:

I got very interested in desalination back in the mid-1990s. At that time Israel was leading the field with a different process—boiling it and cooling it, basically. The cost of our water right now is 97c a kilolitre. Back in the mid-nineties, in 1993–94, Israel was producing water by desalination at a time when our water was at the higher end of the 80–90c range for a kilolitre. The cost of producing

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86 Transcript of evidence, p. 649.

87 Transcript of evidence, p. 294.

88 Transcript of evidence, p. 320.

89 Submission no. 97, p. 2; Transcript of evidence, pp. 362–3.

desalinated water by that process at that time was 700 per cent more than the current asking price for state provided water. Now you are talking about—and I know we can get into arguments about real and actual costs—a gap, particularly with reverse osmosis technology, where that is down to somewhere between \$1.50 or \$2 a kilolitre. You have a factor of 50 to 80 per cent added onto it, rather than 700 per cent. That gap is getting smaller. At the same time, the technology of how efficient these things are becoming is improving exponentially as, in the reverse direction, the cost is coming down. So it is looking promising.<sup>90</sup>

- 5.118 The Committee believes that, as the technology becomes more affordable, there is huge potential in the future to enhance water supplies in rural and urban Australia through desalination. It also believes that there is considerable scope for finding other uses for saline water, such as aquaculture.
- 5.119 What is required are targeted desalination research and development programs followed by investment at the appropriate time. Given Australia's huge coastline, solar energy sources, and resources of saline groundwater, the development of solar-powered desalination should be a top priority. To ensure that solar-powered desalination receives the attention it warrants, it should be recognised as a priority area under the National Water Initiative. The proposed national scheme for water infrastructure investment should make special provision for solar desalination projects.

## **Recommendation 22**

- 5.120 **The Committee recommends that the proposed national scheme for water infrastructure investment includes solar desalination programs, based particularly on solar energy, but also based on wind and other energy sources. Farm-scale desalination units should also be included in such a scheme.**

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90 Transcript of evidence, p. 364.

## Household Water Use Efficiency

- 5.121 While household water use is a relatively small proportion of total water use<sup>91</sup>, the Committee believes that opportunities for greater water use efficiency in towns and cities should not be overlooked.
- 5.122 Household water restrictions are current in most towns and cities as a result of drought in Australia's south east. The Committee believes that these restrictions represent sound water conservation measures and that they should become permanent.
- 5.123 As part of its submission, Melbourne Water Corporation provided the Committee with a copy of the Victorian Government's *21<sup>st</sup> Century Melbourne: a WaterSmart City Strategy Directions Report*. The report identified average patterns of residential water use as:
- Garden 35%
  - Bathroom 26%
  - Toilet 19%
  - Laundry 15%
  - Kitchen 5%<sup>92</sup>
- 5.124 Numerous measures have been identified to reduce the dependency of households on potable supplies, including water tanks and the use of recycled water for non-potable purposes. Other measures include the use of water efficient appliances such as low volume shower roses and AAAA washing machines.
- 5.125 As part of its State Water Strategy the Western Australian Government has established a \$7 million financial incentive package to encourage the uptake of water efficiency measures, including rebates for the installation of garden bores, rainwater tanks, water efficient shower heads and washing machines rated AAAA or better. It has also implemented a tiered pricing structure designed to encourage household water conservation, with steep price rises above basic levels of consumption.<sup>93</sup>

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91 The National Land and Water Resources Audit estimated that urban water use represented 20 percent of total water use (*Australian Water Resources Assessment 2000*, p. 57, Table 14). This is divided roughly equally between household and industrial/commercial use.

92 Government of Victoria, *21<sup>st</sup> Century Melbourne: a WaterSmart City Strategy Directions Report*, May 2002, p. 40.

93 Government of Western Australia, *Securing Our Water Future: A State Water Strategy for Western Australia—Summary Document*, February 2003.



- 5.126 The Victorian Government has, or is in the process of, implementing a range of similar measures. Rebates are available for connection of rainwater tanks to toilets, retrofitting of dual flush toilets, AAA shower roses, AAAA washing machines, AAA dishwashers and home water conservation audits. Permanent watering bans are proposed, as are mandatory water conservation measures for new housing developments, and mandatory minimum standards for household appliances.
- 5.127 The Victorian Government is also participating in the development of a National Mandatory Water Efficiency Labelling Scheme for appliance, fixtures and fittings, expected to be in place by the end of 2004.<sup>94</sup>
- 5.128 The Committee strongly supports such measures and believes they should be implemented nationwide. For example, all new major sub-divisions across Australia should be based on principles of water sensitive urban design.
- 5.129 Just as important as introducing tough new standards in urban design and household appliances, however, is raising public awareness. Many household water conservation measures are about smarter water use—better garden design, watering at night, washing cars with buckets, capturing cold flow from hot water systems. The Committee believes that first and foremost household water use efficiency is about public education.

### Rainwater Tanks

- 5.130 During the course of the Inquiry the Committee received a considerable amount of evidence on the efficacy of rainwater tanks. A visit to the Bushman Tanks factory in Adelaide revealed both the quality and variety of the products available, ranging from 500 litre slimline models that will sit at the side of a house to 48 000 litre water tanks for agricultural or industrial use. From the perspective of product availability and quality there is little reason why any landholder could not have a rainwater tank attached to their house or business.
- 5.131 Several submissions to the Inquiry urged the uptake of rainwater tanks as a matter of policy. The Toowoomba & Region Environment Council suggested 'mandatory standards for water conservation and efficiency in local building codes', including 'compulsory rainwater tanks and

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94 Victorian Government, *Securing Our Water Future*, Green paper for discussion, Melbourne, August 2003.

compulsory dry toilet systems'.<sup>95</sup> In its submission, Beaudesert Shire Community Advisory Panel stated:

A Federal Government incentive for the installation of rainwater tanks in domestic premises would assist to make better use of the available water resources across Australia. It is acknowledged that there may be some negative impact from such a policy, but these would only occur in the event of an overwhelming participation in a single catchment.<sup>96</sup>

5.132 There was some concern expressed about using rainwater tanks as a source of potable water. In its submission, Derwent Valley Council identified rainwater tanks as the lowest cost option for providing domestic water supply to rural communities, but, given recent dry conditions, also the least reliable. The Council also identified health risks from direct contamination and atmospheric contamination. It preferred the extension of reticulated supplies to outlying communities for, while this option was expensive, it carried the least health risks and was the most reliable.<sup>97</sup>

5.133 Two other submissions highlighted the dangers of lead poisoning and other forms of contamination. The Lead Advisory Service Australia has found that tank owners were generally unaware of their responsibility to manage and maintain the quality of their tank water, and that building codes to prevent lead contamination were either inadequate or not properly enforced. The result was that lead poisoning remained a real threat to those dependent on rainwater for drinking water in rural and regional Australia.<sup>98</sup> Associate Professor N. A. Gibson, an expert in inorganic chemistry, also stressed the dangers of lead in roof catchments.<sup>99</sup>

5.134 In evidence before the Committee, Professor Bursill said:

Rainwater very rarely meets the microbiological requirements of the Australian drinking water guidelines and sometimes does not meet some of the chemical requirements. What do we do about that? If it is circulated, for example, through the hot water system for a certain time, does this eliminate microbiological risk? This has not been studied properly and is not known. We have to watch out for having the temperature too high because then there is a scalding risk. If you have it too low, there is a Legionella

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95 Submission no. 35, p. 1.

96 Submission no. 25, p. 2.

97 Submission no. 46, pp. 10-11.

98 Submission no. 1, pp. 1-8.

99 Submission no. 26, pp. 3-5.

problem. There are some serious issues that need to be resolved there, and it is not known what we can do about utilising even rainwater in those situations and maintaining public health.<sup>100</sup>

- 5.135 Professor Bursill reiterated the risk of lead and cadmium poisoning, and highlighted the cost of treating rainwater to potable standards and installing such systems on a large scale:

As I said, on my rainwater tank I spent \$700 and I have very good water for drinking and cooking in the holiday house. But if you multiply that, if you include the cost of the tank, you could spend in excess of a billion dollars making adequate rainwater collection and supply available for a community the size of Adelaide. That amount of money could go a lot further in a major public system. The costs of treating water are only of the order of 10 per cent to 15 per cent of the total supply costs in a public system.<sup>101</sup>

- 5.136 In its submission, Urban Rainwater Systems advised that the technology is now available to ensure that rainwater tanks are a safe and reliable source of potable water which can be connected to the normal mains supply without risk of cross contamination. It noted that the key barrier to utilising rainwater as a new and secure source of water was State government regulations, and urged the Commonwealth, through COAG to ensure that State governments:

- acknowledged the right of property owners to the unrestricted use of water from rainwater tanks; and
- confirmed the right of property owners to distribute both mains water and rainwater in household plumbing systems, provided backflow into the mains was prevented.<sup>102</sup>

- 5.137 Cost effectiveness, however, remained a consideration. Mr Brian Foster, a member of the Eyre Peninsula Catchment Water Management Board, while supportive of the use of rainwater tanks, emphasised that in low rainfall areas tanks could not make households self-sufficient in potable water.<sup>103</sup> Mr Geoff Rayson, General Manager of the Eyre Peninsula Catchment Water Management Board, did not believe, given the current low price of water, that rainwater tanks were cost effective.<sup>104</sup>

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100 Transcript of evidence, p. 289.

101 Transcript of evidence, p. 299.

102 Submission no. 158.

103 Transcript of evidence, p. 350.

104 Transcript of evidence, pp. 354–5.

- 5.138 Councillor Patrick Brassil, of Wagga Wagga, Chair of the Water Management Committee of the Local Government Association of New South Wales, acknowledged that many local Councils were now actively encouraging the use of rainwater tanks, and some had made them mandatory in new housing developments. He, nonetheless, questioned the effectiveness of rainwater tanks as a water saving measure—‘you could do a lot better by simply restricting the water supply for gardens’.<sup>105</sup>
- 5.139 It is the Committee’s opinion that rainwater tanks should become a mandatory water saving measure throughout Australia. Strict codes should be enforced to provide for the maintenance of rainwater tanks and associated appliances to prevent the chemical or biological contamination of the tank water or the reticulated water supply.

### **Recommendation 23**

- 5.140 **The Committee recommends that the Commonwealth Government, working through the Council of Australian Governments, encourages the adoption of rainwater tanks as a mandatory water saving measure throughout Australia, subject to appropriate health codes being in place.**

## **Education and training**

- 5.141 The Committee believes that an important aspect of water use efficiency is access to information, extension services and incentives for better water management.

### **Education**

- 5.142 In evidence before the Committee, Professor Cullen said, ‘we really do not have a water literate society where people think ‘water’ and take appropriate actions. We must use this drought to try to lift the general level of water literacy amongst Australians’.<sup>106</sup>

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105 Transcript of evidence, pp. 586–7.

106 Transcript of evidence, p. 16.

- 5.143 The Committee heartily agrees with these sentiments. Indeed, creating a 'water literate society' may be the most important task governments can undertake.
- 5.144 It is a big challenge. Mr Campbell of Land and Water Australia, cited the rice and cotton industries as examples of industries committed to improved water use performance, but noted that the dairy industry was less interested in new water-saving techniques.<sup>107</sup>
- 5.145 Mr Colin Nicholl, President of the Western Australian Farmers Federation, highlighted the absence of adequate extension services as a serious obstacle to educating farmers on the latest water use efficiency methods and technology.<sup>108</sup>
- 5.146 The Committee believes that public information and extension services are vital to the propagation of water use efficiency ideas and technology. It is a vital part of Australia's water future. The Committee therefore expects that such services will be an integral part of COAG's National Water Initiative.

#### **Recommendation 24**

- 5.147 **The Committee recommends that the Commonwealth Government propose that the Council of Australian Governments, as part of the National Water Initiative, develop strategies for establishing a water literate society through**
- **public awareness campaigns;**
  - **public information services; and**
  - **the provision of extension services throughout rural and regional Australia to promote water use efficiency techniques and technology.**
- 5.148 Cooperative Research Centres (CRCs) play an important part in the process of finding solutions and disseminating knowledge of water use efficiency. Rice and cotton are two industries where research and development have contributed to impressive savings in water use. Both have established CRCs.

107 Transcript of evidence, pp. 31-2.

108 Transcript of evidence, pp. 661-2.

- 5.149 A more recent development was the launch of the CRC for Irrigation Futures on 1 July 2003. The CRC for Irrigation Futures has the goal of doubling profitability while halving water use in Australian irrigation. It will define and promote sustainable irrigation areas and practices. It will also examine issues of urban, industrial and rural communities sharing and reusing water.<sup>109</sup>
- 5.150 The Committee endorses the establishment of the CRC for Irrigation Futures, and supports its aims and the thrust of its programs.

### Training

- 5.151 Another important part of water use technology is training. In evidence before the Committee, Mr Burnett of the Irrigation Association of Australia stated:

The participation and levels of training and qualification in the irrigation industry are some of the lowest throughout primary industry and yet it is increasingly one of the most technologically sophisticated areas of farming. Just recently, the Australian National Training Authority has endorsed for the very first time ever national qualifications in irrigation, independent of agriculture or horticulture. We see it as vital that support and encouragement is given to get the industry participating in those new qualifications.<sup>110</sup>

- 5.152 Mr Burnett argued that training was an essential element to the successful implementation of new irrigation technology, a system of nationally recognised qualifications was important, and that ‘perhaps some link between demonstrated competence or training and continued licence access is worth investigating’.<sup>111</sup>

- 5.153 Mr Ian Wisken, Assistant Project Director, Pratt Water, told the Committee:

We have seen examples of a pressurised system being used on a horticultural operation and the farmer knows it is working because he can see the water flooding down the drain. That is not what is meant to happen. So, as part of this package we are putting together, there has to be some accreditation process, some training and some after-market support. We have met with representatives of the irrigation supply industry with a view to supplying better

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109 <http://www.agric.nsw.gov.au/reader/crc/irrigationcrc.htm>

110 Transcript of evidence, p. 596.

111 Transcript of evidence, p. 599.

after-market support. It is no good just selling the equipment and leaving it there. There has to be an ongoing program to ensure that farmers are using it correctly; otherwise it just defeats the purpose.<sup>112</sup>

5.154 To address some of these issues, the Irrigation Association of Australia has:

- initiated and funded the development of a National Irrigation Training Plan;
- contracted a national education officer to coordinate training and education for the association and the industry;
- established the School of Irrigation, which provides practical training and skills development at a regional level;
- established an internationally recognised certification program for irrigation installers and designers that now underpins access to adjustment and development assistance in a number of States; and
- holds the largest irrigation related trade exhibition and conference in the southern hemisphere every second year.<sup>113</sup>

5.155 The Committee agrees that the development of a national system of training and accreditation of irrigators should be developed in conjunction with industry in order to maximise the benefits of new irrigation technology and techniques. The effective implementation of innovation is the best solution to the supply constraints now facing irrigators.

### **Recommendation 25**

5.156 **The Committee recommends that the Commonwealth Government pursue through the Council of Australian Governments, as part of the National Water Initiative, the development of:**

- **a national training and education strategy for the irrigation sector; and**
- **a national system of accreditation for irrigators.**

112 Transcript of evidence, p. 710.

113 Submission no. 28, p. 109.

## Taxation incentives

5.157 Incentives, either directly through subsidies, or indirectly through tax measures, form an important part in shaping public perceptions and facilitating investment. In his evidence, Dr Beare of ABARE told the Committee:

First of all, what we want to do, to the maximum degree possible, is set up the right investment incentives; to get people investing in the right activities and to provide an incentive, whether it be a subsidy or a tax, so that it makes up the differences between what is right from a private investment point of view and what is going to get the right investment from what we think is a public investment point of view.<sup>114</sup>

5.158 A number of specific issues related to taxation were raised in the evidence presented to the Committee. Some concerns related to tax arrangements for investment in water use efficiency applied to primary producers, and the different rules applying to others. In its submission, Murrumbidgee Irrigation noted:

At present accelerated depreciation allowances are available to primary producers (individuals and companies) for investment in water efficiency and savings. However, this does not extend to water suppliers. That is, Murrumbidgee Irrigation shareholders are eligible but the Company is not. This acts as a disincentive to larger scale investment in water efficiency and savings. But such investments may have very high social returns.<sup>115</sup>

5.159 Dr Hurditch representing Pratt Water raised the same issue, proposing tax equivalent status for water investment on-farm and off-farm:

One small but not insignificant issue involves the tax treatment of near-farm infrastructure. At the moment a farmer who invests in water-saving infrastructure can obtain a deduction for that expenditure as a primary producer. However, with certain cooperatives, quangos or quasi public or private water companies or incorporated bodies who have to supply, as Ian said earlier, the near-farm infrastructure to allow that pressurised irrigation, there is a major gap in the tax treatment of that investment which I think

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114 *Transcript of Evidence*, p. 390.

115 Submission no. 127, p. 971.



has been kicked back and forward for five years between various portfolios and Treasury. I believe there would be a very strong case for recommending an equivalent tax treatment for that type of infrastructure; it may need a public ruling or something of that nature.<sup>116</sup>

- 5.160 Murrumbidgee Irrigation also suggested that the Commonwealth consider tax and other incentives for private investment in projects that directly deliver better river health and increase water use efficiency, including a 150 per cent tax deduction for investment in water savings.<sup>117</sup>
- 5.161 Councillor Davis, the Mayor of Port Lincoln, made a similar point in his testimony to the Inquiry, urging that any individual or company should have access to the same tax deductions as are available to primary producers for investment in water catchment, storage and delivery. He also argued for an immediate 100 per cent write off of water efficiency investment and the abolition of the GST on water storage and service delivery for domestic users—tanks, pumps, plumbing and fire-fighting facilities.<sup>118</sup>
- 5.162 An issue facing recently privatised irrigation entities in NSW was raised by Pratt Water in a supplementary submission to the Inquiry. These entities have often inherited from government infrastructure in need of new capital investment. The funds raised by the irrigation entities through shareholder subscription or government grants have, however, been treated as income by the Australian Taxation Office. This poses a dual problem:
- (a) Much of the inherited water infrastructure was/is in need of restoration, and had a low capital value that could be depreciated for tax purposes, over a very long period of time. Hence, little or no annual tax deduction would be available, and
  - (b) The much -needed funds raised by the irrigation entities for specific works designed to enhance water-use efficiency are depleted to the extent of the tax charge on the funds raised.

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116 Transcript of evidence, p. 718; see also Pratt Water, Submission no. 178.

117 Submission no. 127, p. 8.

118 Submission no. 149, p. 2; Transcript of evidence, p. 370.

5.163 Pratt Water believes there is a strong case for government intervention to rectify this problem which compounds the lack of access to deductions for off-farm investment. Suggested solutions are:

- (a) Deeming by the Tax Office the collective irrigation entities to be primary producers for the purpose of asset depreciation. This measure could be prescribed further to deal specifically with water supply infrastructure assets, and/or
- (b) Establishment of rural water infrastructure investment funds, which would enjoy tax-free status with respect to fund receipts (with appropriate prescriptions).<sup>119</sup>

5.164 The Committee notes with approval an announcement in relation to the 2004 Budget which removes the previous discrepancy between on-farm and off-farm investment in water infrastructure.<sup>120</sup> The two forms of investment are, after all, organically linked. The Committee also believes that funds provided by governments, or raised by levy, by irrigation entities for the sole purpose of infrastructure spending should be tax deductible.

5.165 Professor Mike Young proposed a system of levies and rebates as a way of promoting water savings in homes and businesses, and providing money for environmental management. He wrote:

Imagine what would happen if we valued ecosystems as if they mattered? Imagine what would happen if good environmental managers had the advantage and bad environmental managers got penalised? All we need to do is reverse the onus of responsibility and create opportunity. One simple way of doing this is to raise everyone's income tax by 1 per cent and give this increase back as a rebate to all those who are looking after the environment.

Earn \$50,000, pay your \$11,380 plus \$114, live responsibly and get the \$114 back. To get the \$114 back, you would need to live in a "five-frog" rated house. A house with a five-frog certificate would have, among other things, smaller roof areas and less paving to avoid excessive run off of rainwater, a rainwater tank, low volume showers, a front-loading washing machine and so on. The choice would be yours.

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119 Submission no. 178.

120 Joint media release by the Minister for Revenue and the Minister for Agriculture, Fisheries and Forestry dated 11 May 2004, titled '*Taxation concessions for irrigation water providers*'.

The same five-frog system could apply to every business. A five-frog small business would need to show that it is water and environmentally efficient. Big firms would need to maintain a full spectrum of leading-edge water and environmental management practices.<sup>121</sup>

- 5.166 While the Committee is loath to recommend any form of additional taxation, it sees merit in Professor Young's proposal to link water use efficiency in households and businesses to tax rebates. Such rebates would provide a simple and effective incentive to encourage smarter water use.

### Recommendation 26

- 5.167 **The Committee recommends that Commonwealth taxation laws be amended to provide:**

- **that water sold to meet specified environmental objectives, or to an environmental trust, has tax deductible status in the same manner as a charitable donation; and**
- **the establishment of a system of tax rebates to encourage the uptake of water use efficient technology and practices in households and businesses.**

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121 Mike Young, '*Imagine if we valued ecosystems as if they mattered—Towards Opportunity and Prosperity*', reprinted from *The Australian*, 25 March 2002, p. 10, attachment to CSIRO, Submission no. 59.



## **Other issues — urban creep; potable water for rural communities; and competing uses of water facilities**

6.1 This chapter reviews three particular issues which were raised with the Committee during the Inquiry — the impact of ‘urban creep’ on good agricultural land; potable water supplies for rural communities; and competing uses of publicly-funded water facilities for tourism and recreation.

### **The impact of ‘urban creep’ on agricultural land**

6.2 The expression ‘urban creep’ describes the spread of cities and towns into what was previously good agricultural land. Agricultural land is subdivided into either hobby farms or into residential blocks, but either way the primary use changes from agricultural production.

6.3 Most of the interior of Australia receives very little rainfall and land use is restricted to low-intensity grazing. The areas which receive the best and consistent rain are along the coast, and that is where most of the productive land is also located.

6.4 It is not surprising that the main population centres started up along the coastal fringe, where comparatively reliable water supplies were available. As these urban concentrations have grown and developed, they have naturally spread inland and up and down the coastline.

6.5 In this process, some of Australia’s best agricultural land has been taken over for residential and industrial purposes.

6.6 When farmers sell their land for urban sub-division the rating valuation of other farming properties in the region tends to increase. This often means that the remaining farmers who want to continue to farm in that region cannot afford to do so. They will usually have to purchase a new farm further inland and farm less productive land with less reliable water resources. Their productivity decreases because they have relocated to less productive agricultural areas and other costs, such as transport, increase as they are now further from end-users.

6.7 The Committee is concerned at this trend and questioned several witnesses as to possible solutions. Mr Chris Davis, Chief Executive Officer of the Australian Water Association, commented:

I believe what has happened with urban encroachment on previously agricultural land is a tragedy. Diversity is lost and we get these very homogeneous, boring cities that just spread out eternally, and the rich fabric of market gardens and close-in farms disappears.<sup>1</sup>

6.8 Mr Davis indicated that this issue had been considered at a conference in 2002 which recommended:

...there should be a mosaic of land use that is coherently planned so that you get the best use, you protect good agricultural land and you have it close to the city. You would get a more interesting fabric, retain fresh produce close to the city and the farmers can be cost effective.

6.9 In response to a question by the Committee as to the way forward, Mr Davis said:

The ideal would be a GIS system which has a model that says, 'Given the slope, the location, the climate, the soil—what is the optimum use of this land?' and then planners actually take that into account. It seems to me that quite often development is very bottom-line driven and that the developers carry a lot of clout.

6.10 In evidence to the Committee on the issue of 'urban creep', Councillor Patrick Brassil, AM, Chairperson of the Water Management Committee of the Local Government Association of NSW said that in his experience the rate of financial return will, in the end, determine the use to which land is put. He said:

Various schemes have been tried over the years, like the green belts around Sydney which apparently slowed development in

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1 Transcript of evidence, p. 553.

some areas for a little while. Towns expand into prime agricultural land only because the prime agricultural land does not give the return that it will as residential land. It is a terrible thing but those are the facts of the matter. So the land will tend to its most valuable use. People say this should not occur, and in planning you try to avoid it. But at the end of the day, if the town is growing and somebody wants to subdivide land for residential use, the Council is going to say that it can be done and by whom.<sup>2</sup>

- 6.11 Local councils are normally in a situation where they would like to increase their income base, and the reality is that denser development is often attractive because it gives them that possibility.
- 6.12 The Committee asked Cr Brassil if more rigid or better planning might be an answer. In reply he made the point that farmers, although they might love their calling, prefer to have control over their own land rather than be restricted by government regulation. On the subject of planning he commented:
- I believe that Australia generally should be adopting a plan which is more of a population distribution plan than anything else. There are lots of economic circumstances that come into play to decide where people are going to live, and governments affect them.<sup>3</sup>
- 6.13 The Committee recognises that urban creep and the resultant loss of prime agricultural land is a difficult issue, and as with most water-related issues, no simple solution is evident.
- 6.14 The Committee is concerned, however, that unless there is more focus on this issue, the problem will continue to grow. Planners should take more account of the most productive land uses and a scheme should be devised whereby rateable values reflect usage rather than potential. As this is an issue affecting most parts of Australia the Committee believes that the Commonwealth should establish a Commonwealth/State task force to study this issue, review international experience, and to identify possible solutions.

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2 Transcript of evidence, p. 591.

3 Transcript of evidence, p. 591.

**Recommendation 27**

- 6.15 The Committee recommends that the Commonwealth Government, through the Council of Australian Governments, establishes a special Task Force to identify solutions to the issue of loss of prime agricultural land through ‘urban creep’.**

**Potable water for rural communities**

- 6.16 The Committee received evidence in a number of submissions regarding the provision of potable water supplies for domestic use in rural and regional areas.
- 6.17 Many small communities would like to provide reticulated water systems for their residents, but cannot afford to build and maintain such systems. At the public hearing on 15 August 2003 Mr Rod Lehmann, President of the Australian Water Association highlighted this as an important issue for Australia. He said:

We believe a lot of small communities do not have adequate supplies of water...there needs to be some investment in developing systems which can be adequately installed in small communities in a cost effective way.<sup>4</sup>

- 6.18 The Tasmanian Government made a similar point in its submission. It commented:

Tasmania's low population base and small, decentralised, and sometimes isolated, communities means that water development projects are often restricted by cost and the standards of water service accepted by the majority of Australians living in big cities is not possible.<sup>5</sup>

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4 Transcript of evidence, p. 542.

5 Submission no. 157, p. 2.



6.19 The submission from the South Australian Government made the following comment on this issue:

The cost of providing water services to rural areas is generally much higher than metropolitan areas due to diseconomies of scale, remoteness and poor quality of local water resources. The lack of trained staff required to operate and maintain water services in remote communities is perceived by some as an issue that may limit the use of relatively complex water systems. As a result, many rural towns suffer from a deficiency in reticulated water and waste water services that impede regional economic development.<sup>6</sup>

6.20 The experience of Esk Shire Council, north-west of Brisbane, is probably fairly typical of many regional areas. Esk shire made a submission<sup>7</sup> which focussed on the difficulty of supplying potable water to small communities. Representatives of the Shire also gave evidence during a public hearing in Boonah on 17 February 2003.

6.21 Esk Shire covers an area about 125 kilometres long by 70 kms wide (about 4,000 square kilometres) north-west of Brisbane. The Shire serves a population of 14,500 spread across the region. There are five townships with populations of around 1,000, two more with populations of around 500, and a number of villages with populations between 50 and 200.

6.22 The Council currently operates five urban water supply schemes, but the submission admitted that the Council 'struggles to operate the current town water supply schemes let alone provide town water to those communities with no town water'.<sup>8</sup>

6.23 To try to cover operating costs the Council charges 1.53 per kilolitre, which it estimates is about 30 percent higher than water charges in the outer suburbs of Brisbane. Even so, the income generated does not cover operating costs and the water fund has to be subsidised from other income.

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6 Submission no. 104, p. 16.

7 Submission no. 32 and Supplementary Submission no. 133.

8 Submission no. 133, p. 2.

- 6.24 The Council would like to provide reticulated water to the smaller communities, but the cost is excessive. Coominya is a town of about 550, only 12 kms from Wivenhoe Dam, but to install a water supply scheme would involve the following costs:

For example to install a water supply scheme in Coominya the cost would be about \$5 million for 330 lots and even with State Government subsidy the cost is still more than \$11,000 per lot.<sup>9</sup>

- 6.25 At the public hearing Mr Ralph Ash, Utilities Engineer of Esk Shire Council, explained:

The trouble we face is being able to put these little schemes in every town up and down our shire and then continue to operate them. Other Shires near us have at least one very large centre and they are able to cross-subsidise within their Shire to service their small towns. Because we do not have one big centre anywhere in our Shire we do not have the ability to function in that way.<sup>10</sup>

- 6.26 The lack of reticulated water supplies was seen by the Council as a major deterrent to growth in the area. As Mr Ash said:

One of the reasons we are looking at trying to get some water supplies to our communities is because, without that, they cannot grow...We are close to Brisbane...and we have the potential... But while we cannot even supply people with town water, why would anyone think about subdividing in Esk when they can do it next door, in Ipswich, which has all the facilities.

- 6.27 Esk Shire submission recommended that the Commonwealth provide funding for the installation of water supply schemes for small scattered communities, supported by annual grants to assist with operating costs. The Council's experience is that water supply schemes with less than 1,000 connections can not cover their operating costs.

- 6.28 Households in rural areas not situated within precincts of a town normally rely on rainwater, and groundwater where that is available, for their potable water requirements.

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9 Submission no. 133, p. 2.

10 Transcript of evidence, p. 79.

- 6.29 The submission from the Tamborine Mountain Progress Association Inc<sup>11</sup> indicated that the 6,000 residents on the 2,000 hectares which make up the Tamborine Mountain region in south-east Queensland have enjoyed the self-sufficiency provided by rainwater tanks topped up, as required, by groundwater. However, the Progress Association expressed concern at the sustainability of the groundwater resource as the demands on the water supply grow due to increased agricultural, industrial and tourism activities.
- 6.30 There is currently no regulation or monitoring of groundwater usage on Tamborine Mountain, as the resource is not considered 'significant' under State legislation.
- 6.31 The submission from the Tamborine Mountain Progress Association made a number of practical suggestions, including that the criteria for assessment of ground water supplies as 'significant' by the State take into account the importance to the local community of that resource, and that a scientific assessment of the sustainability of the resource be undertaken by the State authorities.
- 6.32 The submission suggests that first priority for use of the resource should be for consumption by local residents, followed by local use for agriculture and gardens. Commercial use for sale off Tamborine Mountain should be allowed only if it can be demonstrated that this will not deplete supplies for residents.
- 6.33 The Progress Association believes that similar issues are faced by regional communities all over Australia where ground water is a significant part of their water supply. It recommends that the Commonwealth develop national guidelines for the sustainable use of water resources by rural communities and suggests that the Tamborine Mountain experience be taken as a case study for the development of such guidelines.<sup>12</sup>
- 6.34 The submission from the Victorian Division of the Planning Institute of Australia commented on the age and inefficiency of much of the public water infrastructure in small towns. It said:

But what of the water use in rural townships? How many times have you visited Council public toilets on that long haul trip, to find ancient single flush toilets, consuming vast quantities of water and taps which do not turn off? In some rural Victorian towns,

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11 Submission no. 23.

12 Submission no. 23, p. 5.

outdated sewerage and stormwater systems, some based on technology and infrastructure of two centuries ago, now need to be replaced following the EPA's review of urban discharge licences across the State. Much more needs to be done to reduce water wastage across the country.<sup>13</sup>

- 6.35 The Committee received evidence from the Cooperative Research Centre (CRC) for Water Quality and Treatment, both in the form of a written submission and the Chief Executive Officer (Professor Donald Bursill) and the CRC's Leader of Regional Water Supplies (Mr Darryl Day) appeared at a public hearing in Adelaide on 28 April 2003.
- 6.36 The CRC for Water Quality and Treatment was created in 1995 under the Commonwealth's Cooperative Research Centres Program. Its activities focus on potable water, providing research and knowledge management on water quality and treatment issues "from the catchment to the tap."<sup>14</sup>
- 6.37 Funding for a second period of 7 years commenced on 1 July 2001. Under the new agreement, the Commonwealth will provide \$16.7 million and the other 30 partners from industry, government and the research community will contribute \$65 million.
- 6.38 While the CRC's focus had been on water quality issues in major urban centres, it perceived a need for 'research to provide better, more affordable solutions to water supply problems in regional, remote and rural Australia'<sup>15</sup>.
- 6.39 In late 2001 the CRC established a separate Regional and Rural Water Supplies Program with Mr Day, General Manager Water Services, Northern Territories Power and Water Corporation as program leader. In relation to the establishment of this program the submission notes:
- It is recognised by the CRC that many of the water providers in these communities do not have the resources to effectively initiate and undertake research into water quality issues that may impact on the health of the community.
- 6.40 In commenting on the work of the new program, Mr Day said:
- In Australia the responsibility for water in regional and rural Australia involves Commonwealth, state and local government agencies as well as local communities...the collaboration between the National Health and Medical Research Council, the CRC for
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13 Submission no. 176, p. 8.

14 Submission no. 66, p. 3.

15 Submission no. 66, p. 7.

Water Quality and Treatment and other cross-sectoral interests is absolutely critical in addressing key research issues to provide evidence-based practice and policy for water in regional and rural Australia...include other CRCs, such as the CRC for Aboriginal and Tropical Health and the CRC for Desert Knowledge, which are both due to commence on 1 July this year...these issues in improving public health through good, wholesome, reliable water supplies and sanitation are complex and involve technical, social, administrative and economic considerations.<sup>16</sup>

- 6.41 The Committee questioned Professor Bursill about the general quality of rainwater captured in rainwater tanks, as this is what many households in small and remote communities must rely on for their potable supplies. He replied:

I often get asked to address community groups, to do interviews on radio, in general discussing water, and this question of rainwater tanks always comes up: why doesn't the government support rainwater tanks and subsidise them?

My reply is always that I have never seen a sample of rainwater come to our laboratories over the years that has come within cooe of meeting the microbiological guidelines that are in place.

Often there are other problems, depending on where it comes from; it could contain lead and cadmium and other chemicals or pesticides. I have seen samples with a lot of pesticides in them; crop-dusting aircraft have flown across rooftops with all their gear still going and it has rained not long after and it has a cocktail of contamination.

I always say that it is hard for government to recommend something and perhaps even subsidise something that they know full well does not meet health guidelines for drinking water.<sup>17</sup>

- 6.42 Professor Bursill added that filtration and sterilising technology is available to enhance the quality of water held in rainwater tanks to potable standard. It cost him \$700 to do this at his own holiday house. Some submissions recommended that the Commonwealth fund research into water purification in an endeavour to reduce the cost.

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16 Transcript of evidence, p. 290.

17 Transcript of evidence, p. 298.

- 6.43 The submission from the Department of Agriculture, Fisheries and Forestry indicated that the Bureau of Rural Science (BRS) is undertaking a study of water supplies for remote communities. The submission noted:

The project has assessed water supplies from a number of rural communities across Australia with populations between 50 and 10,000. It is noteworthy that preliminary results from the study indicate that up to about 20% of rural communities use water that exceeds Australian Drinking Water Guidelines (NHMRC/ARMCANZ, 1996) for total dissolved salts.<sup>18</sup>

- 6.44 In commenting on the preliminary results of the BRS study, Mr Day of the CRC for Water Quality noted:

We are using many waters throughout regional and rural Australia without a good understanding of what the health risks are.<sup>19</sup>

- 6.45 The submission from the South Australian Government made the following observation:

Sufficient quantity of water is often not available to readily meet all reasonable needs of remote Aboriginal and non-Aboriginal communities. Water quality is also an issue. Salinity, for example, can be quite high in bore water supplies, and is a problem for many Aboriginal and non-Aboriginal rural communities (in some locations, for example at Yalata, Penneshaw and Roxby Downs, desalination plants have been installed).<sup>20</sup>

- 6.46 The South Australian Government submission recommended that the Commonwealth could consider increasing funding for research into cost-effective, low-technology solutions for improving the quality of water supplies, with a focus on drinking water supplies, and into cost-effective wastewater services to rural and remote communities, with an emphasis on safe reuse for appropriate purposes.<sup>21</sup>

- 6.47 The submission from the Tasmanian Government made the point that the Clean Quality Water Program, a partnership program with the Commonwealth, has improved domestic water services to rural communities in Tasmania in recent years. It went on to say:

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18 Submission no. 160, Attachment A, p. 32.

19 Transcript of evidence, p. 291.

20 Submission no. 104, p. 16.

21 Submission no. 104, p. 17.

There remain a number of small communities that have not benefited from these programs, and which have great difficulty in funding the necessary technology needed to provide potable water supplies that meet modern accepted health and reliability standards. It is important therefore that the Commonwealth continues its role in the States and Territories to redress the inequity affecting small rural communities.<sup>22</sup>

6.48 However, similar to the Mt Tamborine situation in south east Queensland where the residents are generally satisfied with their current water supplies, the submission from the Tasmanian Government cautioned that the final decision should be made by the local community. It said:

...some communities such as Central Highlands, are reported to not want town water and are happy with their current water quality. It is important communities have a right to determine policies on water quality for their areas.<sup>23</sup>

6.49 The submission from the Queensland Government commented on the support provided by the Commonwealth for Aboriginal and Torres Strait Islander (ATSI) water supply and sewerage infrastructure in the Torres Strait area. The submission recommends that the Commonwealth consider expanding the ATSI infrastructure program to include all ATSI communities.<sup>24</sup>

6.50 Having considered the evidence, the Committee believes that the funding of water supplies by Shire Councils for small rural and regional communities should most appropriately remain a matter for local government, supported by State government financial assistance.

6.51 However, it is axiomatic that as many Australians as possible should have access to good quality potable water. The Commonwealth could certainly play a role in funding research and development to ensure that 'world's best technology' for small scale water schemes is available and understood in Australia. The same applies to improved filters for rainwater tanks. The CRC for Water Quality and Treatment may be able to undertake this important research task.

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22 Submission no. 157, p. 4.

23 Submission no. 157, p. 4.

24 Submission no. 129, p. 8.

- 6.52 The Committee commends the initiative of the CRC for Water Quality and Treatment in expanding its work to include issues of water quality in rural and remote areas. It would also appear to be the most appropriate agency to undertake the research and development of small scale water schemes referred to in the previous paragraph.
- 6.53 When finalised, the findings of the BRS study should be widely disseminated and strategies developed to ensure that water quality for regional communities is within guidelines.

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### **Recommendation 28**

- 6.54 **The Committee recommends that the Commonwealth Government provides funding to investigate the development of, and the funding requirements for, small scale water schemes to assist Councils to provide high quality reticulated potable water to small regional communities.**

## **Water facilities used for tourism & recreation**

- 6.55 A submission received from Mr Bob Charles MP, Member for La Trobe, raised the question: ‘to whom does water in public storages belong?’<sup>25</sup>
- 6.56 Mr Charles’ submission specifically referred to Lake Eildon, north-west of Melbourne, but the principle has wider application.
- 6.57 Lake Eildon was built by the Victorian Government to provide irrigation water to farmers but over the years has become a popular recreational and tourist area, based on water sports such as fishing and water skiing. There are many holiday homes around the shore-line, and over 700 houseboats on the Lake itself. The region has many leisure-related small businesses such as caravan parks and motels which generate significant employment.
- 6.58 Water in Lake Eildon had fallen to 19 percent of capacity in August 2002 when the submission was made, and was below 10 percent in March 2003 when the Committee took evidence from Mr Charles in a public hearing. The submission describes the receding lake shore as ‘a mess’. Most houseboats and fuel barges are sitting on mud. Lake-side cabins and boat ramps are now a kilometre or more from water.
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6.59 The Goulburn Murray Water Authority (GMWA), a Rural Water Authority under the Victorian Government, manages the Lake Eildon water resource. The GMWA has stated its belief that in its view the water in Lake Eildon belongs to irrigators, and it regulates the flow of water from the Lake to suit the requirements of the irrigators. On this point the submission responds:

To say “Well, the dam was built originally for irrigation purposes and nobody ever thought about anybody using it for waterskiing, fishing, or other boating or water leisure activity” is certainly disingenuous. Times change. Where we had farms in my electorate we now have houses. Many of us might wish that we still had farms there, but times move on and we need to address the issues as they arise.<sup>26</sup>

6.60 The GMWA levies fees on houseboat owners (\$1,180 pa). Caravan parks and other shore-line facilities also pay levies based on their water frontage. These levies are charged even if the shore-line has receded a long way from the facility and houseboats and boats are no longer actually in water.

6.61 The submission contends that levies should not be charged on tourist facilities, such as houseboats, if their access to water is restricted. The submission noted:

It is certainly crazy that the Authority can hit the property and houseboat owners for all those fees and yet make no guarantee of any water level in the Lake whatsoever.<sup>27</sup>

6.62 The submission suggests that, in view of the economic benefits to the region (estimated at more than 185 direct jobs, and a total contribution of over \$20 million), the GMWA should take leisure activities into account in its management of Lake Eildon.

6.63 To enable the continued use of the Lake for recreational purposes, the submission recommends that water capacity should not be allowed to go below 40 percent of capacity. A public petition was circulated on the subject of a minimum water level in Lake Eildon and generated over 4,000 signatures. The submission states:

I do not deny the rights of Victorian farmers to water. This is an important resource, and it should be used and used properly. But there are competing demands for this resource...<sup>28</sup>

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26 Submission no. 16, p. 4.

27 Submission no. 16, p. 3.

- 6.64 In response to questions by the Committee at the public hearing about the attitude of GMWA, Mr Charles said:

It is a cultural problem, and I suspect this might well be true of other Authorities around Australia. Because the Authority's task has been to maximise return from the water in order to provide irrigation water for the farmers, it has no culture of positively dealing with these other issues. It basically just does not care.<sup>29</sup>

- 6.65 At the public hearing Mr Charles summed up his stance as follows:

What I am saying is that because the Authority allowed the leisure industry to build up, allowed leisure operators to use the lake and charged the leisure operators for that privilege, they should have a responsibility to allow them to use part of the resource.<sup>30</sup>

- 6.66 The submission from the Victorian Government noted that under the State's '*Water for the Future*' policy, water authorities are increasingly required to adopt a triple bottom line accounting approach to improve water management. One of the expected results of that change is that such authorities will no longer be able to 'singularly focus on irrigation supply, but must recognise and value the multiple benefits that water storages provide and the broader impact of operational decisions'.<sup>31</sup>

- 6.67 The Victorian Government has publicly acknowledged that Lake Eildon is a resource with important uses other than irrigation. On 21 October 2003 the State Government announced that it would contribute an additional \$8 million (on top of the original \$3 million committed) towards the \$30 million required to upgrade the Eildon dam wall and spillway. The balance would be funded by Murray Goulburn Water.

- 6.68 In announcing the contribution, the joint statement by the Victorian Minister for Water and the Environment and the Victorian Minister for Agriculture noted:

We are committing these extra funds because we recognise that Lake Eildon is not only a significant piece of irrigation infrastructure, but is also an important site for recreational and tourist use.<sup>32</sup>

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28 Submission no. 16, p. 3.

29 Transcript of evidence, p. 201.

30 Transcript of evidence, p. 201.

31 Submission no. 175, p. 20.

32 Joint media release by the Victorian Minister for Water and the Environment and the Minister for Agriculture, '*Extra Funds for \$30 million Lake Eildon Upgrade*', 21 October 2003.

- 6.69 Media comment on this announcement noted that water levels in Lake Eildon were back to about 40 percent of capacity.
- 6.70 The issue raised by Mr Charles is difficult to resolve. How does one prioritise equitably between competing demands on publicly-funded water facilities? The importance of tourism in economic terms has to be acknowledged. Dr Don Blackmore of the Murray-Darling Basin Commission made this point in relation to the health of the River Murray. He advised the Committee:
- In economic terms in the Basin it [tourism] is a bigger industry than rice, cotton or dairy as individual industries. Those folks are entitled to have a river that provides some amenity.<sup>33</sup>
- 6.71 The Committee considers it possible that the problems at Lake Eildon would not be so severe if there was a means by which some of Melbourne's stormwater discharge could be diverted to the Lake.
- 6.72 The Committee believes that once basic human needs are satisfied, it is up to communities to determine the most appropriate allocation of limited water resources between competing uses. The key requirement is that the overall resource must be managed in a sustainable manner so that it is there for future generations.

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33 Transcript of evidence, p. 409.



## **Research & Development—cloud seeding; climate change; and water resources**

### **Cloud seeding and climate modification**

#### **What is cloud seeding?**

- 7.1 Cloud seeding<sup>1</sup> is a procedure to attempt to artificially generate precipitation from clouds. It may attempt to produce rain or snow when none would fall naturally, or it may attempt to increase the amount of rain or snow which falls over a particular area.
- 7.2 Clouds are made up of millions of water droplets. When these tiny droplets join with particles (also called cloud nuclei) which are present in the atmosphere they become heavy enough to fall to the ground as raindrops, snowflakes or hailstones. These particles may be dust, salt from evaporated sea spray, sand or other material from forest fires, volcanic eruptions and pollution.

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1 This explanation of cloud seeding and the background to cloud seeding in Australia is largely taken from the CSIRO web site [http://www.dar.csiro.au/publications/holper\\_2001c.htm](http://www.dar.csiro.au/publications/holper_2001c.htm) accessed on 16 September 2003. The submissions from Hydro Tasmania (no. 40) and Snowy Hydro (no. 55) contain brief descriptions of cloud seeding and some history of cloud seeding in Australia. A detailed description of the Australian experience with cloud seeding is contained in “*Guidelines for the utilisation of cloud seeding as a tool for water management in Australia*” published by the Agriculture and Resource Management Council of Australia and New Zealand in May 1995.

- 7.3 Under cold conditions in clouds, droplets of water form ice crystals on the surfaces of the particles. Water vapour in the cloud then freezes directly onto the surface of these crystals, which become heavier and eventually fall.
- 7.4 Cloud seeding from a plane uses silver iodide burners, dry ice pellets or hygroscopic flares. Clouds can be seeded from the ground using silver iodide generators.

### History of cloud seeding in Australia

- 7.5 Americans made the discovery in 1946 that pellets of dry ice could induce precipitation from clouds. The following year cloud seeding experiments commenced in Australia with CSIRO scientists using aircraft to drop dry ice into the tops of cumulus clouds.
- 7.6 During the late 1950s and early 1960s, CSIRO performed large-area cloud seeding trials in the Snowy Mountains, on the York Peninsular in South Australia, in the New England district of New South Wales, and in the Warragamba catchment area west of Sydney.
- 7.7 Of these four experiments, only the one conducted in the Snowy Mountains produced statistically significant rainfall increases over the entire experiment.
- 7.8 Between 1965 and 1971, the State Governments of Victoria, New South Wales, Queensland, South Australia and Western Australia all undertook cloud seeding operations. However, in all cases where the analysis of the seeding operations was possible the results were inconclusive.
- 7.9 The CSIRO's trials in Tasmania in the 1960s were more successful, achieving significant rainfall increases. Since that time Hydro Tasmania has regularly undertaken seeding in mountainous parts of the State (see para 7.14 for more details on Tasmania).
- 7.10 In 1972-75 CSIRO conducted cloud seeding experiments in Emerald, Queensland, and in 1979-80 in Western Victoria. The Western Australian Government ran trials in 1980-82 to test the viability of seeding in the northern wheat belt.
- 7.11 None of these activities found that seeding would be an economical, reliable way of increasing rainfall. A major problem in marginal areas was that aircraft costs were rising much more quickly than wheat prices, which impacted on the cost/benefit ratio.

- 7.12 Between 1988 and 1992 CSIRO acted as scientific advisor to Melbourne Water in a cloud seeding assessment conducted over the Baw Baw plateau, a major water catchment area about 120 kms east of Melbourne. The results of analyses of the rain gauge network showed that any increase in rainfall was not statistically significant.<sup>2</sup> Other tests for the buffer area between the target and the control areas showed a statistically significant increase, although the reasons for this are not understood.<sup>3</sup>
- 7.13 In 1994, Hydro Tasmania was retained by the NSW Government to undertake a 12 week cloud seeding program in an area north of Tamworth NSW for drought relief. Although rainfall was consistently recorded throughout the program, this operation was not conducted as a formal scientific trial so there was no conclusive evidence of the actual increases in rainfall due to the cloud seeding.

#### Tasmania

- 7.14 Tasmania has had the most practical experience in Australia with cloud seeding. The submission from Hydro Tasmania provides the following outline of cloud seeding activities in Tasmania from 1964 to the present.<sup>4</sup>

##### **Stage 1 - 1964-1971**

This was an alternate year trial over Tasmania's Central Plateau providing randomisation on a seed / no-seed 1:1 ratio, using silver iodide. This trial was designed and assessed by CSIRO. From this trial it was concluded that there was strong statistical evidence that seeding increased rainfall by estimated values of 30% in Autumn and 12% in Winter. The experiment was concluded in 1971 when the reservoirs were full.

##### **Stage II - 1979 – 1983**

This experiment over the same catchment area used a ratio of suitable seeded / unseeded days at 2:1 to provide randomisation with clouds seeded every year. Silver iodide was used as the seeding agent and the work was done in conjunction with CSIRO. The results of this experiment showed increases in rainfall attributable to cloud seeding in the order of 37%.

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2 Agriculture and Resource Management Council of Australia and New Zealand “*Guidelines for the utilisation of cloud seeding as a tool for water management in Australia*”, May 1995, p. 7.

3 Agriculture and Resource Management Council of Australia and New Zealand “*Guidelines for the utilisation of cloud seeding as a tool for water management in Australia*”, May 1995, p. 10.

4 Submission no. 40, p. 6.

### **Drought Relief Operations - 1988-1991**

During this period all suitable cloud was seeded over Hydro Tasmania's catchments.

### **Stage III - 1992 –1994**

This trial was very similar to Stage II except that dry ice was used as the seeding agent. This experiment found statistically significant increases in rainfall due to seeding but the magnitude and temporal duration of this was less than Stage II.

### **Drought Relief – Spring 1994 and 1995**

Hydro Tasmania conducted drought relief operations over the agricultural areas of Tasmania's midlands and east coast.

### **Operational Seeding – 1998 to present**

Currently cloud seeding is being undertaken in operational mode. All suitable cloud over designated hydro catchments is seeded between April and November each year during both night and day. Silver iodide is used as the seeding agent.

- 7.15 The submission from Mr Ian Searle, who had many years practical experience in cloud seeding with Hydro Tasmania, gave an indication of the costs involved. Mr Searle noted that, as a guide, the Tasmanian cloud seeding operation comprising one aircraft and 3 full time staff operating over an area of 6,000 sq. kms, cost a little over \$1 million per annum.<sup>5</sup>

### **The current situation**

- 7.16 By 1995 the CSIRO appears to have reached the conclusion that, except in a few areas such as Tasmania and possibly the Snowy Mountains, Australia does not have weather conditions suitable for cost-effective cloud seeding.
- 7.17 The CSIRO decided that it would maintain a 'watching brief' on international developments in relation to cloud seeding, but that it would not be a priority area of research until more potential benefits were apparent. The CSIRO expressed its position in the Guidelines, as follows:

Given the current priorities for atmospheric research in CSIRO, the study of weather modification techniques must compete with funds for research into climate change, climate variability and air

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5 Submission no. 31, p. 16.



pollution studies. It is likely that any substantial research into this area in the future will be initiated by the Water Industry and will require substantial support from that body. However CSIRO will retain its expertise in the fundamental cloud physics necessary to evaluate any studies undertaken by the Water Industry.<sup>6</sup>

- 7.18 In May 1995 the Agricultural and Resource Management Council of Australia and New Zealand (ARMCANZ) published the “*Guidelines for the utilisation of cloud seeding as a tool for water management in Australia.*” The guidelines were drawn up by Dr B. Ryan, Principal Research Scientist, CSIRO Division of Atmospheric Research, and Dr B. Sadler, Executive Director Water Resources of the Water Authority of Western Australia. According to the publication:

“The guidelines ... have been developed to aid planning and decision-making for water managers in effective partnership with atmospheric scientists and commercial operators... recommend the disciplines to be followed in the planning and implementation of a cloud seeding experiment that seeks to maximise the opportunities for defining and achieving a successful outcome.<sup>7</sup>

- 7.19 These Guidelines are designed to ensure that at the conclusion of any cloud seeding operations there would be a clear understanding as to the results achieved in terms of increased precipitation. The Guidelines, as issued, are comprehensive and would normally involve a trial period of some years to gather conclusive evidence of increased precipitation.

- 7.20 Many of the submissions to the Inquiry which raised the issue of cloud seeding supported a greater effort by the Commonwealth in that regard. Typical was the comment made by Coleambally Irrigation Cooperative:

Whilst we have listened to both sides of the debate (on cloud seeding) with interest we are concerned that this science has not been given open consideration. I feel Australia would benefit from an open debate on this technology as a real response to drought and climate change.<sup>8</sup>

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6 Agriculture and Resource Management Council of Australia and New Zealand “*Guidelines for the utilisation of cloud seeding as a tool for water management in Australia*”, May 1995, p. 12.

7 Agriculture and Resource Management Council of Australia and New Zealand “*Guidelines for the utilisation of cloud seeding as a tool for water management in Australia*”, May 1995, p. 12.

8 Submission no. 29, p. 1.

7.21 Similarly, the submission from the Coordinating Committee of the Namoi Valley Water Users' Association Inc. called on governments to immediately implement cloud seeding trials.<sup>9</sup>

7.22 Mr Lawrence Arthur, Chairman of Irrigators Inc. told the Committee that about 40 cloud seeding operations in the USA are funded by private capital, (although he gave no indication that private companies were willing to fund such operations in Australia). He continued:

We are all aware that these sorts of groups look very hard at their budgets. So if there were not the benefits in cloud seeding, why would these private organisations want to be funding it?

7.23 On the other hand, a number of submissions advised caution, based Australia's poor experience with cloud seeding. The submission from the Queensland Government made the following comment on the prospects for cloud seeding in Australia:

The low frequency of appropriate meteorological conditions make the prospects for success very limited ... weather modification must compete for research funding with more pressing and perhaps more useful climate variability and climate change research.<sup>10</sup>

7.24 The submission of the Western Australian Government also expressed its reservation, as follows:

Western Australia does not believe the Commonwealth Government should be involved in climate modification programs such as cloud seeding as this approach is at best of marginal value and appears to be treating a symptom rather than addressing the challenge of adaptation and better planning under greater uncertainty.<sup>11</sup>

#### **CSIRO's position on cloud seeding**

7.25 The Committee sought to clarify the CSIRO's current thinking on research into cloud seeding at the public hearing on 25 June 2003. In response to a question, Dr. Brian Ryan, Leader, Earth Systems Modelling Program of the Division of Atmospheric Research commented:

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9 Submission no. 95, p. 1.

10 Submission no. 129, p. 23.

11 Submission no. 117, p. 5.

No, there has been no research effort in Australia ... within CSIRO the priorities have been in developing weather applications and climate in a particular area ... We have kept a watching brief on the state of weather modification. If we were to re-establish it in Australia, it would be a massive effort.<sup>12</sup>

- 7.26 The Committee sought further clarification from Dr Ryan as to what would be involved for the CSIRO to recommence research into cloud seeding. He responded:

If you are asking me to speak honestly in terms of what it would require, CSIRO itself would not actually have the capacity to undertake all the various areas concerned. For example, if you look at what is happening in places like the US, I am sure, if it starts up, there will be a whole lot of technologies—radar and those sorts of things—which currently we would certainly not have the ability to use. It would actually take a wide range of skills to be able to do it.<sup>13</sup>

- 7.27 Following a number of inconclusive trials (except Tasmania) over more than three decades, the CSIRO decided that other areas of research presented greater returns in cost/benefit to Australia.

- 7.28 The Committee received evidence suggesting that the CSIRO is against private investment in cloud seeding. For example, these comments by Mr Arthur of Irrigators Inc:

It is also worth commenting that there is a strong view in the community that the CSIRO see any private investment in cloud seeding to be in direct competition with their access to government funds. That is a commonly put view that I have heard in various groups trying to push the cause for cloud seeding. That does cause me some concern.<sup>14</sup>

- 7.29 The CSIRO advised the Committee that it was definitely not opposed to private cloud seeding initiatives. It explained that, while cloud seeding has not been a priority research area for the CSIRO in recent years, they are very willing to provide advice to any privately-funded cloud seeding operations so that the results of such operations can be scientifically verified.

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12 Transcript of evidence, p. 462.

13 Transcript of evidence, p. 463.

14 Transcript of evidence, p. 519.

## Review of cloud seeding by American National Academy of Sciences

- 7.30 At the public hearing on 25 June 2003, the CSIRO's Dr Ryan advised the Committee that the American National Academy of Sciences was undertaking a comprehensive review of cloud seeding, and that the results of that review would be available in a few months.
- 7.31 The committee established by the Academy to conduct the review published its report titled '*Critical Issues in Weather Modification Research*' in October 2003. The review committee concluded:
- The Committee concludes that there still is no convincing scientific proof of the efficacy of intentional weather modification efforts. In some instances there are strong indications of induced changes, but this evidence has not been subjected to tests of significance and reproducibility.<sup>15</sup>
- 7.32 Media reports noted the review's conclusion that there is no scientific evidence that cloud seeding works, in spite of the millions of dollars spent around the world on cloud seeding operations. The Canberra Times quoted the President of the National Centre for Atmospheric Research, Colorado, as saying "To some extent weather modification is an act of faith with people. In terms of precipitation on the ground, there's no compelling evidence."<sup>16</sup>
- 7.33 The American National Academy of Sciences review noted that funding for research into weather modification in the USA had fallen from US\$20 million per annum in the late 1970s to less than US\$0.5 million p.a. now.
- 7.34 The review called for a coordinated national research program to, once-and-for-all, determine if cloud seeding works. Such a program would "address the fundamental questions that will lead to credible scientific results ... in time, this research will place us in a position to determine whether, how, and to what extent weather and weather systems can be modified."<sup>17</sup>

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15 American National Academy of Sciences website accessed 15 October 2003  
[http://www.nap.edu/catalog/10829.html?onpi\\_topnews\\_101303](http://www.nap.edu/catalog/10829.html?onpi_topnews_101303)

16 The Canberra Times, 15 October 2003, '*Millions spent on rainmakers – no evidence that it works*', p. 15,

17 American National Academy of Sciences website accessed 15 October 2003  
[http://www.nap.edu/catalog/10829.html?onpi\\_topnews\\_101303](http://www.nap.edu/catalog/10829.html?onpi_topnews_101303)

## The Snowy Hydro program

- 7.35 The Snowy Mountains has been regarded as having relatively good potential for cloud seeding operations. In its submission, Snowy Hydro Limited set out the background to past cloud seeding attempts, and argued that a properly conducted cloud seeding trial should be attempted again.<sup>18</sup>
- 7.36 The CSIRO conducted experiments in the Snowy Mountains from 1955-59. Preliminary results looked promising, but later were regarded as inconclusive because of perceived shortcomings in the design of the experiment.
- 7.37 A study in 1986 and field investigations during the winters of 1988 and 1989 indicated positive prospects, and preliminary plans were made for a more detailed trial. However those plans were shelved due to concerns raised by three groups— by environmental groups concerned about possible impact on wilderness areas of the Kosciuszko National Park; by ski resort operators concerned that the increased precipitation could fall as rain rather than as snow; and by downwind farmers concerned that they could be deprived of rainfall.
- 7.38 Snowy Hydro has identified a long term downward trend in precipitation in the Snowy Mountains region. They believe that cloud seeding provides an economic and viable method to counter that trend. Their submission states:
- The estimated increase in runoff from a fully operational program is estimated to be well over 100 gigalitres per year based on a 6% increase. Some of this would flow directly into the River Murray as the snow melted, most would be regulated for release to the River Murray during drier months.<sup>19</sup>
- 7.39 Representatives of Snowy Hydro appeared before the Committee at a public hearing on 20 August 2003. Mr Terry Charlton, Snowy Hydro's Chief Executive Officer, told the Committee that he was confident that cloud seeding would produce positive results:
- We are looking at a six-year experiment. We do not use the word 'experiment' among ourselves because we know it is going to work. We are very confident of that. But the word 'experiment' is there because we do want to gather data. We do want access to the
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18 Submission no. 55, p. 3.

19 Submission no. 55, p. 4.

park in a way that we can validate the conclusions that we are drawing and the confidence that we have. Clearly the board, after a period of time, is going to want to know that the \$5 million or \$6 million a year has been reasonably well spent.<sup>20</sup>

7.40 In response to a question of whether the benefit of the proposed cloud seeding trial outweighs the cost, Mr Charlton said:

Yes, it does. That is why we are prepared to do it without asking for any assistance. The bottom line is that we are looking at a minimum of 12 events a year, up to 20. We are looking at an extra 15 centimetres in snow pack, an extra three to five days in fall—nothing more than that—which is well within natural variation. We are looking at 100 to 150 gigalitres extra water run-off eventually and available for turbinning. That means a revenue of somewhere around \$12 million for the \$5 million that we are prepared to put in.<sup>21</sup>

7.41 Snowy Hydro assured the Committee that the cloud seeding program it proposed addressed the three concerns expressed earlier—wilderness areas will be excluded from the program; cloud seeding will only take place when snow can be guaranteed; and studies have confirmed that cloud seeding has a negligible impact on normal precipitation downwind of seeded areas.

7.42 On 25 February 2004 the NSW Minister for Agriculture and Fisheries announced that the NSW Government had agreed to Snowy Hydro's cloud seeding plans. Legislation to enable the six-year trial to take place was introduced into NSW State Parliament, and approved on 7 April 2004. The Snowy Hydro cloud seeding program is scheduled to commence in the winter of 2004.

7.43 The Committee fully supports the cloud seeding trials by Snowy Hydro. This is potentially a very significant win/win situation—the proposed cloud seeding operations will not be an impost on the taxpayer, and the projected gain of more than 100 GL would be a very significant boost to the River Murray system.

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20 Transcript of evidence, p. 621.

21 Transcript of evidence, p. 621.

- 7.44 Snowy Hydro normally supplies about 550 GL annually to each of the Murray and Murrumbidgee Rivers, so the estimated increase through cloud seeding of 100 – 150 GL represents an overall increase of between 10 percent and 15 percent, which would be of great potential benefit both to environmental flows and to irrigators.<sup>22</sup>
- 7.45 The Committee understands that the CSIRO and the Bureau of Meteorology have both been involved in designing Snowy Hydro's cloud seeding program. These bodies should be closely involved throughout, to ensure that the trial is based on sound scientific principles so that, at the end of the period, the results in changed snowfall can be conclusively proven.

### Future developments

- 7.46 The last 15 years or so have seen significant technical advances in meteorology, in areas such as the use of computers, radar and satellites. The American Academy of Sciences review of cloud seeding described these developments, as follows:

Despite the lack of scientific proof, the Committee concludes that scientific understanding has progressed on many fronts since the last National Academies' report and that there have been many promising developments and advances. For instance, there have been substantial improvements in the ice-nucleating capabilities of new seeding materials.

Recent experiments using hygroscopic seeding particles in water and ice (mixed-phase) clouds have shown encouraging results, with precipitation increases attributed to increasing the lifetime of the rain-producing systems. There are strong suggestions of positive seeding effects in winter orographic glaciogenic systems (i.e., cloud systems occurring over mountainous terrain).

Satellite imagery has underlined the role of high concentrations of aerosols in influencing clouds, rain, and lightning, thus drawing the issues of intentional and inadvertent weather modification closer together.

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22 Transcript of evidence, p. 624.

This and other recent work has highlighted critical questions about the microphysical processes leading to precipitation, the transport and dispersion of seeding material in the cloud volume, the effects of seeding on the dynamical growth of clouds, and the logistics of translating storm-scale effects into an area-wide precipitation effect.<sup>23</sup>

- 7.47 Water is a vital resource in a dry continent such as Australia, and the Committee feels strongly that all aspects of water availability and use should be continuously explored.
- 7.48 The Committee believes that Australia needs to be at the forefront of researching and verifying the prospects for cloud seeding and that, given the willingness of Snowy Hydro to invest in cloud seeding in the Snowy Mountains region, this would be an opportune time for the Commonwealth Government to revisit this subject. The question is how to do so in the most efficient and effective way?
- 7.49 The submission from the Centre of Dynamical Meteorology and Oceanography (CDMO) of Monash University canvasses the possibility of creating a Cooperative Research Centre (CRC) to coordinate research into cloud seeding. The submission states:
- CRCs are designed to have a seven-year lifetime ... partnership between industry, universities and government laboratories allows for the research to respect both commercial interests and scientific integrity ... Such a proposal would also clearly fall under the government's research priority of sustainability.<sup>24</sup>
- 7.50 The CRC Programme was established in 1990 to improve the effectiveness of Australia's research and development effort. It links researchers with industry to focus R&D efforts on progress towards utilisation and commercialisation. The close interaction between researchers and the users of research is a key feature of the programme.<sup>25</sup>
- 7.51 Following completion of the 2002 selection round, there are 71 CRCs operating in 6 sectors: environment, agriculture, information and communications technology, mining, medical science, and technology and manufacturing.
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23 American Academy of Sciences report '*Critical Issues in Weather Modification Research*', October 2003.

24 Submission no. 123, p. 1.

25 CRC web site [www.crc.gov.au](http://www.crc.gov.au) accessed on 17 September 2003



- 7.52 Over the past 12 years, participants have committed more than \$7 billion (cash and in-kind) to CRCs. The major contributions have come from— Australian Government (\$1.8 billion), universities (\$1.8 billion), industry (\$1.3 billion), and almost \$1 billion by CSIRO.<sup>26</sup>
- 7.53 The CDMO submission suggests that a CRC into climate modification could investigate the following areas as part of its research program:
- the feasibility, viability and expense of cloud-seeding programs in the Snowy Mountains and other parts of Australia,
  - the hypothesis that regional pollution has already been affecting precipitation,
  - the potential downwind and secondary effects of cloud seeding,
  - hail suppression and other weather modification techniques,
  - implementation strategies to optimize the operation of the existing program at Hydro Tasmania.<sup>27</sup>
- 7.54 The CSIRO is positively disposed towards the CDMO's suggestion because it would test the real interest in cloud seeding in both the wider scientific community and in the commercial sector. In commenting on the CDMO proposal Dr Ryan said:
- I note that one of the submissions to your committee was from Monash University suggesting ... a CRC. I think the attraction of that would be that it actually would require hard business sense. To create a CRC, you actually are required to get partners...the CSIRO would be prepared to take part in discussions on such a thing.<sup>28</sup>
- 7.55 To obtain Commonwealth approval and funding, all CRCs must include private sector participation to ensure that their outcomes have a solid commercial focus. Snowy Hydro indicated its definite interest in such a proposal during the public hearing on 20 August 2003.<sup>29</sup> The Committee believes that Hydro Tasmania could also be interested in participating in such a CRC and possibly other rural and urban water authorities.

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26 CRC web site [www.crc.gov.au](http://www.crc.gov.au) accessed on 17 September 2003

27 Submission no. 123, p. 2.

28 Transcript of evidence, p. 463.

29 Transcript of evidence, p. 637.

- 7.56 Irrigator groups have expressed strong support for increased research and trials in cloud seeding, although they have stopped short of making firm financial commitments themselves. Mr Arthur, Chairman of Irrigators Inc, told the Committee:

It was brought up in our submission that Irrigators Inc. would strongly support further investigations on current technology into cloud seeding, particularly when we are looking at the poor yields from our alpine regions recently. We strongly support Snowy Hydro's position to investigate some commercial cloud seeding trials.<sup>30</sup>

- 7.57 So there is a reasonable prospect that appropriate private sector interest could be generated to make a CRC into climate modification a viable proposition.
- 7.58 The CRC program comes under the Minister for Education, Science and Training. Applications for new CRC proposals are called every two years, with the next expected in 2004. The Committee urges all interested stakeholders to join together to put forward a case for a new CRC into climate modification to be considered in this next round of applications.
- 7.59 The Committee's strong view is that Australia needs a well coordinated national research effort on climate issues. Climate is of such fundamental importance across the nation that a separate, specialist CRC focussed on climate issues, and with substantial industry funding, is definitely warranted and should be seen as a national priority.

## **The effect of pollution on precipitation**

- 7.60 In the context of cloud seeding as a possible generator of additional precipitation, the Committee received a submission from Australian Management Consolidated Pty Ltd (AMC) which claimed to have scientific evidence that pollution in the air is the cause of reduced rainfall in certain parts of Australia. Mr Aron Gingis, Managing Director of AMC, also gave evidence at a public hearing in June 2003.

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30 Transcript of evidence, p. 518.

- 7.61 AMC's claims are based on methodology developed by Professor D Rosenfeld of the Hebrew University in Israel. Prof. Rosenfeld uses cloud and atmosphere data transmitted by satellites of the joint USA/Japan Tropical Rainfall Measuring Mission.
- 7.62 Prof Rosenfeld's research has found that rain-forming processes in maritime convective clouds and continental convective clouds are sensitive to air pollution, such as urban and industrial pollution, dust, and smoke from fires.<sup>31</sup> AMC believes that pollution reduces precipitation in the Victorian Alps and the Snowy Mountains by 'at least 5,000 GL'.<sup>32</sup>
- 7.63 The AMC submission claims that cloud seeding trials in Israel employing a spray system of concentrated brine have achieved good results, and that similar results could be achieved in Australia. Mr Gingis told the Committee:
- In the Hebrew University they have developed a special model, a cloud physics model ... We can measure the cloud system when it comes along many hours before it hits the catchment ... We can also simulate what cloud seeding material we can apply to these clouds in order to make them of maximum efficiency. We calculate plus or minus 10 per cent how much rainfall they will produce and how much rainfall they will not produce if we do not seed them.<sup>33</sup>
- 7.64 AMC's submission describes the company's approaches since 1999 to the CSIRO, the Bureau of Meteorology, and to various State Governments. None of these agencies have been willing to enter a commercial arrangement with AMC.
- 7.65 Mr Gingis advised the Committee that his company requires a budget allocation to undertake proper research. He mentioned that he had unsuccessfully sought \$400,000 from the Minister for the Environment and Heritage 'to run a specific study over the Snowy Mountains to determine many things, including how much rainfall they are losing'.<sup>34</sup>

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31 Submission no. 113, p. 3.

32 Submission no. 113, p. 10.

33 Transcript of evidence, p. 440.

34 Transcript of evidence, p. 440.

- 7.66 The Committee asked Mr Charlton, Chief Executive Officer of Snowy Hydro, if he would include research into pollution effects in his proposed cloud seeding trial. He replied that such research was outside Snowy Hydro's primary interest. He said:

I do not know that it is our brief to do that. If somebody wants to assist with some data gathering, that is fine, but I am not sure that we are persuaded by those arguments ... What are we going to do about it? We cannot shut down Port Pirie and other places.<sup>35</sup>

- 7.67 In reply to a question whether Snowy Hydro would be prepared to accommodate other groups wishing to use the proposed cloud seeding trials to research the impact of pollution, Mr Charlton said:

The data gathering is satellite based anyway. There is no difficulty in having that running in parallel with something we do. There is no problem there. As I said, we talk to Aron regularly. There is no difficulty there.<sup>36</sup>

- 7.68 The Committee asked the representatives of the Western Australian Department of Environment whether they were aware of the research into the impact of airborne pollution on clouds. Mr Ed Hauck, Manager of Hydrology and Water Resources in the Department of Environment, told the Committee that he was aware of the research taking place, but felt that it was still largely at a theoretical level. He said:

I am aware of Danny Rosenfeld's work and other meteorologists that are respected throughout the world. Basically, cloud physics and the explanations about the influence of pollution can be appreciated, but the context of some of the science to the local impact is where there has not been a lot of work to date. Most of the work is at a theoretical level. There have been some studies, but in terms of WA, we have not had or participated in any work that is looking directly at aerosol impacts to our rate of run-off.<sup>37</sup>

- 7.69 The Committee then asked if the Government of Western Australia sees research into the impact of pollution on their rainfall patterns as a priority. In reply Mr Fred Tromp, a Director of the Department of Environment, questioned the applicability of Prof. Rosenfeld's initial research findings to the situation in Western Australia. He indicated that all of the south-

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35 Transcript of evidence, p. 636.

36 Transcript of evidence, p. 636.

37 Transcript of evidence, p. 653.

western part of Western Australia had suffered from reduced precipitation since the mid-1970s, not just the Perth region which experienced much higher levels of pollution.

- 7.70 Furthermore, Mr Tromp indicated that the WA Water Corporation did not believe that investing in cloud seeding was worthwhile. He told the Committee:

Our initial response would be probably not. I will give one or two reasons for that. One is that the reduction in the rainfall pattern that we see superficially, at least in any case in south-western Australia, does not seem to be associated with, for example, a plume of pollution from our industrial or urban areas. If we look at some of our rainfall records in the more southern parts of our State, which are not impacted at all by pollution sources in Perth, we see similar reductions in rainfall. So it is not a matter of the areas which are, if you might say, in a cloud shadow from Perth where the prevailing weather systems which drop rain on to this part of the state occurs. It is actually right across the southern half of the state. So there does not seem to be an immediate link there.

Secondly, the organisation which would probably benefit most from research into that area ... would be our Water Corporation, because they have a direct financial interest in increasing water gathering ... They do not seem to see the financial rationale in quite the same way as the Snowy Hydro people seem to think that there is a commercial gain to be made there, and they are prepared to put that \$5 million into it.<sup>38</sup>

- 7.71 It is apparent that the CSIRO, the Bureau of Meteorology and various State Governments are not convinced that Prof. Rosenfeld's research warrants financial support from Australian government sources at this stage of its development.
- 7.72 While the Committee was not able to come to a firm conclusion as to the relevance of Prof. Rosenfeld's research to Australia, any high-quality research to do with the possibility of increasing precipitation should be taken seriously. In that sense the Committee urges scientific agencies to monitor future developments in Prof. Rosenfeld's research, and to keep an open mind as to its relevance to circumstances in Australia.

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38 Transcript of evidence, p. 653.

## Climate change and future water availability

- 7.73 In recent years there has been much debate over climate change, and its possible impact on future water supplies.
- 7.74 The impacts of greenhouse gases on global warming and climate change have been subjects of major international attention over the last two decades. The scientific research in this area is coordinated by the Intergovernmental Panel on Climate Change (IPCC)—the recognised international scientific authority on this subject.
- 7.75 The IPCC has concluded that the balance of evidence suggests that human induced effects are contributing to changes in global climate.<sup>39</sup>
- 7.76 The submission from the Department of Agriculture, Fisheries and Forestry summed up global warming as follows:

An international scientific consensus has emerged that our world is getting warmer. Abundant data demonstrate that global climate has warmed during the past 150 years. The increase in temperature was not constant, but rather consisted of warming and cooling cycles at intervals of several decades. Nonetheless, the long term trend is one of net global warming.<sup>40</sup>

- 7.77 Mr Campbell of Land & Water Australia told the Committee that he believed that Australia's experience with climate variability would enable us to adjust more easily to climate change. He said:

... the tools that we are developing to manage climate variability will stand us in very good stead in handling climate change, because the annual variation of our climate is much greater than the projected long-term trends in background change. So other countries are going to have to get used to the degree of climate variability that Australia has been coming to grips with for as long as we have been here.<sup>41</sup>

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39 Transcript of evidence, p. 269.

40 Submission no. 160, Attachment A, p. 4.

41 Transcript of evidence, p. 21.

## Climate change predictions for Australia

- 7.78 In Australia, the CSIRO's Division of Atmospheric Research (CAR) is the leading agency undertaking research into climate change. The section on climate change in the submission from the Department of Environment and Heritage<sup>42</sup> is based largely on a report titled '*Climate change – projections for Australia*' published by CAR in 2001. The following are the key points of that report.<sup>43</sup>
- 7.79 Australian average surface temperature increased by 0.76° C between 1910 and 2000, with average minimas up by 0.96° C and average maximas up by 0.56° C. Most of this increase has occurred since 1950.<sup>44</sup>
- 7.80 Australia's rainfall is highly variable and although there have been regional trends little significant change in the continental-average was observed in the period 1910 – 2000.
- 7.81 Using climate model simulations, CSIRO has estimated future changes in Australian temperature, rainfall and evaporation. The estimates take into account uncertainties associated with the range of future global warming and the range of regional climate model responses. The CSIRO future estimates are:

### *Temperature*

- By 2030, temperatures are estimated to increase 0.4° to 2°C over most of Australia relative to 1990, with slightly less warming in some coastal areas and Tasmania, and slightly more warming in the northwest.
- By 2070, annual average temperatures increase by 1° to 6°C over most of Australia with spatial variations similar to those for 2030. Greatest warming occurs in spring and least in winter. In the north-west, most warming occurs in summer.

### *Rainfall*

- Changes in annual average rainfall tend to decrease in the south-west of Australia (–20% to +5% by 2030 and –60% to +10% by 2070), and in parts of the south-east of Australia and Queensland (–10% to +5% by 2030 and –35% to +10% by 2070). Most other areas show negligible changes.

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42 Submission no. 150, p. 6 - 7.

43 [www.dar.csiro.au/publications/projections2001](http://www.dar.csiro.au/publications/projections2001). Web site accessed 12 September 2003.

44 'State of the Environment 2001' report, p. 25.

### *Evaporation and moisture balance*

- Higher temperatures are likely to increase evaporation. Annually averaged increases in evaporation are estimated to range from 0 to 8% per degree of global warming over most of Australia, and up to 12% over the eastern highlands and Tasmania. The increases tend to be larger where there is a corresponding decrease in rainfall.
- Net atmospheric moisture balance is the difference between potential evaporation and rainfall. The overall pattern shows decreases in moisture balance on a national basis. Average decreases in annual water balance range from about 40 to 120 mm per degree of global warming. This represents decreases of 15 to 160 mm by 2030 and 40 to 500 mm by 2070.

### *El Niño and La Niña*

- El Niño and La Niña events have a strong influence on climate variability in many parts of Australia, and this will continue. Climate models do not give a consistent indication of future changes, but the drying associated with El Niños may be enhanced by global warming.

7.82 The CSIRO's submission made the following observation on the accuracy of climate change predictions:

Climate change projections (or 'scenarios') are not forecasts. Rather, they constitute a set of plausible futures. The levels of confidence that can be ascribed to these scenarios vary from place to place, and with the size of the region(s) of interest. They also vary with time as new knowledge and greenhouse gas emission projections become available, and the performances of global and regional climate models improve... Uncertainties about future human behaviour and thus greenhouse-gas emissions, and shortcomings in climate modelling are included in the ranges quoted in the CSIRO climate projections on water resources.<sup>45</sup>

7.83 According to the submission from the Department of the Environment and Heritage (DEH), Australia is already experiencing climate change as shown by decreased rainfall in the southwest and southeast regions of the continent in recent decades.<sup>46</sup>

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45 Supplementary submission no. 164, p. 7.

46 Submission no. 150, p. 2.



- 7.84 Stream flow in southern Australia will probably decrease because of reductions in rainfall and increased evaporation due to higher temperatures. The IPCC Third Assessment Report (2001) estimated that changes in stream flow in the east-central Murray-Darling Basin will range from 0 to -20% in 2030 and +5 to -45% in 2070.<sup>47</sup>
- 7.85 Dam storages are also likely to be reduced due to climate change. Modelling of the Macquarie River catchment in the Murray-Darling Basin indicates decreases in stream flow into the Burrendong Dam, the main storage in the catchment. The estimated simulated decreases in storage in Burrendong Dam range from about 0 to -15% in 2030 and 0 to -35% in 2070.<sup>48</sup>
- 7.86 The DEH submission argues that future water assessment and management should allow for the likely effects of climate change. It states:

The trends within climate change are irreversible, and this will induce increasing pressure on Australia's water resources ... Climate change, and the increase in climate variability that accompanies climate change, must be taken into account in the development of policies, especially where these policies may relate to the competing demands for the allocation of water between agricultural, environmental, and urban uses.<sup>49</sup>

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47 Submission no. 150, p. 7 quoting IPCC *Climate Change 2001: Third Assessment Report*, and CSIRO Supplementary Submission no. 164, p. 7.

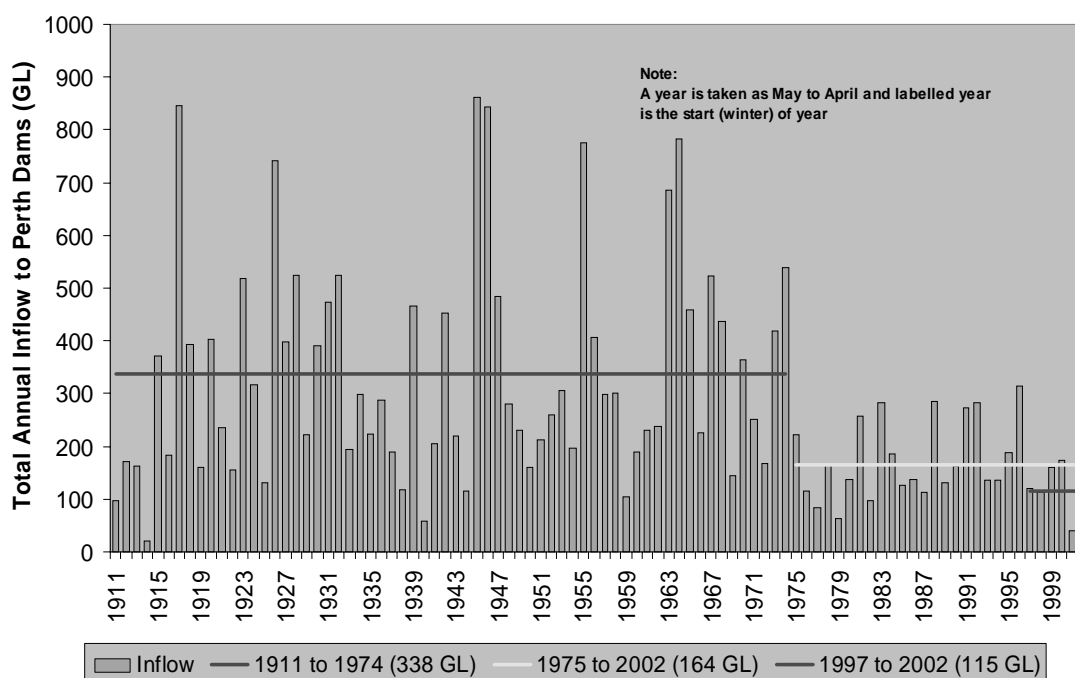
48 Submission no. 150, p. 7 quoting from a report commissioned in 1998 by the Australian Greenhouse Office: *Climate change scenarios and managing the scarce water resources of the Macquarie River*.

49 Submission no. 150, p. 7.

## Recent changes in Western Australia

7.87 The Committee received evidence that Perth's dams have experienced a significant decrease in in-flow since the mid-1970's. The following figure shows the change:

Figure 7.1 Inflow into Perth dams, 1911 – 2002.



Source Provided by the Western Australian Department of Environment, November 2003.

7.88 The figure shows that the average annual inflows for the sixty years before 1975 was 338 GL per annum, which dropped to an average of 164 GL p.a. for the period 1975 to 2001. A third period of low in-flows may have started in 1997, with in-flows since then averaging 115 GL p.a. (1997 – 120.8 GL; 1998 – 112 GL; 1999 – 160.5 GL; 2000 – 174.5 GL; 2001 – 40 GL; 2002 – 88 GL). Notably, no inflows since 1975 have reached even the average of the previous sixty years.

7.89 Ninety five percent of Perth's surface water storage capacity is located within 80 kilometres of the city.

7.90 The Committee asked the representatives of the Western Australian Department of Environment, Mr Tromp and Mr Hauck, what had caused this very significant change since the mid-1970s.

7.91 Mr Tromp said that the definitive cause of the sharp decrease in in-flows since 1975 was still being debated. He said that a new research program, the Indian Ocean Climate Initiative, is investigating the reasons for the change. He also informed the Committee that the trend of decreasing in-flows was continuing. He said:

The figure that I guess concerns us even more is that for the period of 1997 to the year 2002, that average yield figure had in fact dropped to 115 gegalitres, so we are still seeing a declining trend there. We do not see anything kicking up yet to give us an indication that we may be at the end of that cycle.<sup>50</sup>

7.92 Mr Hauck described the changed weather patterns in the following terms:

The change that was observed in the mid-1970s was very much across the globe in terms of observed changes in sea level pressures. The causal factors behind that are still very much debated in the world meteorological community, but various factors have been studied. In the Western Australian context, it can be best thought of in terms of synoptic patterns. The highs from the west tend to stick in the Bight for longer and persist longer throughout the season. So there is a tendency for warmer and drier air to flow across the continent. What we are seeing is a delay or a diminishing of early winter rainfalls, which results in an extension of the dry summer period, versus the previous situation where cold frontal systems were much more prominent.<sup>51</sup>

7.93 Mr Hauck pointed out that dam in-flow is the result not only of rainfall, but also of catchment management practices such as vegetation and mining. The Committee agrees with this observation. It is likely that re-forestation in Perth's catchment area, together with reduced precipitation, have been the major contributors to the reduction in dam in-flow. The figures reported above in paragraph 7.88 seem not to take this into account. The change in inflow must be seen in the context of the re-vegetation of the catchments.

7.94 The Committee is very concerned at the dramatic fall in Perth's dam in-flow since the mid-1970s, and urges that every effort be made to determine the causes for this change.

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50 Transcript of evidence, p. 652.

51 Transcript of evidence, p. 652.

## Research into climate and climate change

- 7.95 Climate research in Australia is undertaken primarily by the Bureau of Meteorology; the CSIRO; some Cooperative Research Centres; the Bureau of Resource Sciences; and the Queensland Centre for Climate Applications. Selected universities, other government agencies, and the private sector also undertake some research.
- 7.96 In the past there was little communication between climatologists, meteorologists and oceanographers. For example, the oceanographers first identified water temperature changes in the Pacific Ocean early in the twentieth century, but it was only in the 1980s that the connection with climate was made, and the El Nino-Southern Oscillation became an important component of climate prediction modelling.
- 7.97 In recent years the Bureau and the CSIRO have made an effort to better coordinate their plans for atmospheric and related research, and to identify joint research activities and areas of collaboration at the project level.
- 7.98 This collaboration occurs within the framework of a formally agreed division of responsibility. The Bureau has primary responsibility for research in support of its own operations and services, and for liaison with the World Meteorological Organization (WMO) in relation to relevant research in Australia. The CSIRO's research focuses on the atmospheric and ocean environments, and on the multidisciplinary interfaces, which link climate variability and change to specific sector and industry-related impacts and responses.<sup>52</sup>
- 7.99 A supplementary submission from the CSIRO explained that their new 'Climate Initiative' integrates climate research across thirteen Divisions. Furthermore, the impact of climate on Australian water resources is a central theme in the Healthy Country Flagship, which has as its overarching objective a 10 fold increase in social, economic and environmental benefits from water use by 2025.<sup>53</sup>

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52 Bureau of Meteorology 2001-02 Annual Report, p. 58.

53 Supplementary submission no. 164, p. 6.

7.100 Regarding the funds involved, the CSIRO submission indicated that:

The current CSIRO investment in climate research ... is estimated to be about \$40 million, while the initial CSIRO investment in the Healthy Country Flagship is of the order of \$16 million in the current financial year.<sup>54</sup>

7.101 Examples of the different types of research undertaken are:

- Pure research: Based on the advances in understanding of the El Niño - Southern Oscillation phenomena over the last two decades, research is being carried out on the development of techniques to predict climate variations on seasonal and longer time scales. To date there is not yet a clear indication of the intrinsic predictability of climate; i.e. the extent to which climate can be predicted at these time scales.
- Strategic research: the development of numerical models and associated software that use the joint Bureau-CSIRO supercomputer to simulate and predict the state of the atmosphere and ocean.
- Applied research: the Australian Air Quality Forecasting System (AAQFS), a collaborative project between the BMRC, CSIRO and the Environment Protection Authorities (EPAs) of Victoria and New South Wales provides detailed forecasts of air quality for the Melbourne and Sydney metropolitan regions.<sup>55</sup>

## Land and Water Australia

7.102 One of the key programs funded by Land and Water Australia (LWA)<sup>56</sup> was the Climate Variability in Agriculture Program (CVAP) which concluded in 2002. The Rainman and Rainman-streamflow software programs were major outcomes of funding provided under the CVAP.

7.103 The submission from the Department of Agriculture, Fisheries and Forestry provides the following background in respect to CVAP:

The major vehicle for collaborative climate research for land management between the Commonwealth and external agencies for the last 10 years has been the Climate Variability in Agriculture Program (CVAP). For much of its history, CVAP has concentrated on developing and communicating better seasonal forecasts and

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54 Supplementary submission no. 164, p. 6.

55 Bureau of Meteorology 2001-02 Annual Report, p. 61 - 63.

56 More background on Land and Water Australia is provided in paras 7.122 – 7.125.

has been instrumental in changing the ‘mental map’ of climate for many Australians. More recently, it has broadened its focus into managing stream flow variability.<sup>57</sup>

- 7.104 LWA’s Board has decided to establish a new climate research program called Managing Climate Variability Program (MCVP). Negotiations with potential partners are taking place, with the expectation that MCVP will be launched in mid-2004.
- 7.105 One of the likely areas of operation of MCVP is to improve the accuracy of seasonal forecasts, which would be of great benefit to farmers.
- 7.106 At this stage the MCVP’s prospective partners have agreed to contribute a total of \$4.5 million over four years. Prospective partners include LWA, the Department of Agriculture, Fisheries and Forestry, the Grains, Sugar, and Dairy Research and Development Corporations, and possibly the Wool and Livestock marketing bodies.
- 7.107 The Committee is concerned at the limited funding which LWA has available under MCVP for applied research into climate issues. These are major areas of interest, which impact on a large portion of the Australian economy. The benefits from solutions are potentially enormous and these matters deserve to be treated seriously. The Committee believes that LWA should be provided with significantly increased funding to devote to applied climate research.

### Scientific gaps

- 7.108 During 2002 the Australian Greenhouse Office commissioned a review of the current research program into climate change. The review identified several gaps—including the science to underpin understanding of climate change impacts, and the detection and attribution of climate change. It also noted that funding for the program, in real terms, had declined significantly over the past decade.<sup>58</sup>
- 7.109 Mr Rod Lehmann, President of the Australian Water Association, made the following observation to the Committee on the paucity of research into climate change in Australia:

Chris Davis and I went to the World Water Forum in Kyoto earlier this year and it was apparent that quite a lot of work has been done internationally on climate change. We have not seen much

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57 Submission no. 160, p. 9.

58 Submission no. 150, p.8.

happening in Australia in that regard ... We think that will particularly affect certain rural areas ... I think the planning has not been done to look at how we are going to manage climate change and I think we should be investing substantial funds to get on top of this problem.<sup>59</sup>

- 7.110 The submission from the Department of Environment and Heritage also advocates increased research into climate change. It made the following comment on this subject:

Current climate change models provide a reasonable understanding of the directions of climate change and, in broad terms, some understanding of the possible impacts of climate change on Australia's water resources. Additional precision in climate models at regional levels across Australia, however, would greatly strengthen our capacity to develop the required policies for the supply and management of water resources for Australia's rural industries and communities.<sup>60</sup>

- 7.111 The Irrigation Association of Australia (IAA), being concerned about future water availability, presented a strong argument that research into climate change should be a priority. It said:

The IAA believes greater investment in R&D on climatic forecasting is required. Funding and coordination of the best information available on climate change projections and the likely impacts of changed rainfall patterns and catchment yields is required urgently.

The potential effects of climate change have the ability to overwhelm all other reforms and initiatives aimed at improving water resource management in Australia. Reductions in allocations for irrigation, or indeed any other use, due to increased environmental flows and increased domestic use have the potential to be insignificant compared to reductions in available water due to climate change.

Similarly, even a 20% reduction in water used for irrigation through achievable improvements in efficiency of irrigation systems and management could be more than offset by reduced or unreliable precipitation due to climate change.<sup>61</sup>

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59 Transcript of evidence, p. 542.

60 Submission no. 150, p. 8.

61 Submission no. 28, p. 8.

7.112 The submission from Hydro Tasmania also supported research into climate change. It noted:

The ability to predict climate change effects will be extremely useful, even if the predictive tools could only provide order of magnitude changes then this would be beneficial. There is a need to undertake more analysis of the climate change effect on all regions in Australia ... a stronger Commonwealth Government initiative is imperative to ensure more knowledge is available on climate change in Australia.<sup>62</sup>

7.113 The submission from the Queensland Farmers' Federation advocated a national 'planning for climate change initiative', of which research would be an integral part.<sup>63</sup>

7.114 The Committee believes that climate change, with its potential to severely impact on the future availability of water, should be a priority area for national research. Better understanding by water managers of the impact of climate change on future water supplies will greatly assist policy making. There is still much to be learnt in this field and increased research funding should be provided so that modelling techniques can continue to be developed.

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## **Recommendation 29**

**7.115 The Committee recommends that the Commonwealth Government:**

- **recognises research into climate issues, including climate change and its potential impact on future water supplies, as a national research priority; and**
- **encourages relevant research, academic and private sector bodies to develop an application to form a Cooperative Research Centre on Climate, with a key focus on climate modification.**

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62 Submission no. 40, p. 14.

63 Submission no. 116, p. 19.



- 7.116 Whilst the Committee supports increased research into climate issues, it notes that the result of such research is likely to have limited impact on greenhouse-induced climate change unless there are also substantial initiatives to enhance the role and contribution of renewable energy sources.

## Research into water resource management

- 7.117 While most of the evidence received by the Committee on future research requirements related to research into climate issues—as specified in the terms of reference—the Committee also received evidence on Australia’s overall research effort into water resource management.

- 7.118 In December 2002 the Prime Minister announced four national research priorities. Water is described as a critical resource under the first priority ‘*An environmentally sustainable Australia*’. The goal set for water research reads:

Ways of using less water in agriculture and other industries, providing increased protection of rivers and groundwater and the re-use of urban and industrial waste waters.<sup>64</sup>

- 7.119 All the evidence received by the Committee supported the Commonwealth’s role as the key funder and provider of research in Australia. Submissions and evidence taken in public hearings all encouraged the Commonwealth to continue to take responsibility for research into all facets of natural resource management, including climate issues.

- 7.120 The submission from the Department of Agriculture, Fisheries and Forestry noted the Commonwealth’s significant contribution to research into water issues. The submission said:

The Commonwealth makes substantial investments in improving the science that supports the management of our water resources. This investment is made directly through the:

- Commonwealth Bureau of Meteorology;
- CSIRO Division of Atmospheric Research;

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64 Department of Education, Science and Training website accessed on September 2003 [http://www.dest.gov.au/priorities/environmentally\\_sustainable.htm#1](http://www.dest.gov.au/priorities/environmentally_sustainable.htm#1)

- Australian Research Council through the Cooperative Research Centres, including the recently announced CRC for Irrigation Futures;
- Natural Heritage Trust;
- Agriculture Forestry and Fisheries – Australia through the Bureau of Rural Science and the Research and Development Corporations; and
- Land and Water Australia.<sup>65</sup>

7.121 Dr Blackmore of the MDBC told the Committee that in the past Australia's research effort has been focussed on commodity research, at the expense of other areas such as river ecology. He said:

This nation has a very thin knowledge base of ecology. We have invested most of our money in commodity research, because that is what was driving us economically, and we still do that. It dominates grains, meat and so on ... the Commonwealth, for example, has 13 R&D corporations. Twelve of them are commodity focused and one of them is on landscapes—Land and Water Australia—the only one that invests solely in how landscapes behave and the ecology you are after. So we are starting a long way back in having universities and institutions with people who think this way and try to understand it.<sup>66</sup>

7.122 Land and Water Australia (LWA, formerly known as the Land and Water Resources Research & Development Corporation), was established in July 1991 as one of 13 rural research and development corporations under the Primary Industries and Energy Research and Development Act 1989.

7.123 LWA relies on budget appropriations for its funding. Its funding has increased only marginally since its establishment—from \$11.1 million in 1991-02 to \$11.9 million in 2002-03. It is the only R&D Corporation which does not receive supplementary funding through industry levies.

7.124 LWA funds research on issues related to land, water and vegetation. For management purposes, its programs are divided into five broad research areas—sustainable primary industries; river landscapes; vegetation; future landscapes; and activities which cut across two or more of the other four areas. The Climate Variability in Agriculture Program was administered under the 'sustainable primary industries' program area.

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65 Submission no. 160, p. 9.

66 Transcript of evidence, p. 409.

7.125 LWA identifies potential research programs, and then approaches other agencies to become partners in the program, either by providing additional funding or contributions ‘in kind’. A key objective for LWA is that the research undertaken is of an applied nature, and that findings are implemented. Mr Campbell of LWA advised the Committee:

I should make clear to the committee that Land and Water Australia does not actually do any research ... We are an R&D corporation that invests in, manages and coordinates research, but we buy it from CSIRO and universities—wherever we find the best science ... We like to work as much as possible in partnership with industry in delivering those programs because we believe that, for research to be any good, it has to be adopted, and that requires good linkages with the end users of the R&D.<sup>67</sup>

7.126 There are six water-related Cooperative Research Centres (CRCs) which deal with complementary aspects of the water cycle. They are:

- CRC for Catchment Hydrology deals with runoff from land to rivers and streams,
- CRC for Freshwater Ecology focuses on the ecological environment of rivers and lakes,
- CRC for Drinking Water Quality looks at water treatment and related public health aspects,
- CRC for Waste Management and Pollution Control considers the return of wastewater to the environment,
- CRC for Coastal Zone, Estuarine and Waterway Management specialises in the effective management and ecological health of coastal areas.
- CRC for Irrigation Futures, whose goals are to double the profitability and halve the water use of Australian irrigation, while defining sustainable irrigation areas and practices.

7.127 Furthermore, water issues are of interest to a large number of the rural-industry focussed CRCs such as the CRCs for Cotton; Sheep Industry; Cattle and Beef Quality; Innovative Dairy Products; Sustainable Production Forestry; Sustainable Rice Production; Sustainable Sugar Production; and Viticulture.

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<sup>67</sup> Transcript of evidence, p. 21.

- 7.128 The Committee received little evidence to show that these various CRCs are coordinating their research in any strategic sense to meet national objectives. There is a danger that the research effort is being fragmented with the creation of so many entities. The Committee believes that it is vital that Australia achieves maximum outcomes from this research activity and urges that formal structures to enhance cooperation and communication be put in place.

## **A national research strategy**

- 7.129 The Committee believes that the many and varied research suggestions put forward in submissions and during public hearings provide a very good starting point for consideration of a well-coordinated and strategic national research effort into water issues. Suggestions included—desalination; impact of irrigation on water quality; the inter-connectivity of surface water and groundwater; total water cycle; and research into new products and possible overseas and domestic markets.
- 7.130 Based on the water surveys the Australian Bureau of Statistics (ABS) has commenced, by 2006-07 Australian water managers and policy makers will have access to much better data on water use in Australia. However, much more needs to be done to gather better information on water availability and water quality. There is no doubt that the National Land and Water Resources Audit completed in 2000-01 was a very good first step. However, the Audit identified many remaining data gaps and the filling of those gaps must be at the very top of the priorities of the National Water Initiative.
- 7.131 The ABS compiles the extensive *Water Account for Australia* report every 4 years<sup>68</sup>. It will also undertake a *Water Survey – Agriculture* report every 2 years (commencing with 2002-03). To complete the water picture, the ABS is intending to compile *Water Surveys* covering urban/industrial (20 percent of total water use<sup>69</sup>) and ‘other rural’ (5 percent of total water use) in 2005.

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68 The first ‘*Water Account for Australia*’ covered the years 1993-94 to 1996-97 and was released in May 2000. The second in the series, covering the years 1997-98 to 2000-01, was released on 19 May 2004.

69 Estimate from the National Land and Water Resources Audit ‘*Australian Water Resources Assessment 2000*’.

- 7.132 If water is to be treated as a key national priority, then much better data must also be made available on water availability and water quality.
- 7.133 Decision makers at all levels need access to the best possible information and the Committee sees this as a necessary and essential step in achieving the nation's future water management goals. The Committee found serious deficiencies in relation to the data underpinning the Living Murray Initiative, which prompted the release of the Committee's interim report in April 2004. This is a fundamental issue, which must be addressed before significant decisions can be made on future allocation of scarce water resources.
- 7.134 The 2002-03 Annual Report of Land and Water Australia noted that over 50 organisations are involved in research into natural resource management (NRM) in Australia. The report said:
- Including cooperative research centres, rural R & D corporations, CSIRO and other Australian Government agencies, more than 50 other organisations at the Australian Government level contribute to national investment (including state, territory and industry funding) in natural resource management research of more than \$300 million annually.<sup>70</sup>
- 7.135 The Committee is concerned at the estimate that there are over 50 different organisations involved in funding or undertaking NRM research. It is most unlikely that this is an efficient or effective structure.
- 7.136 The Committee believes that there should be better coordination of the research effort to ensure that maximum return is obtained. There should be clear national priorities for NRM, and the research effort should be focussed on enabling those objectives to be achieved.
- 7.137 The whole question of how research priorities should be set, funded and coordinated should be reviewed in the context of the new National Water Initiative. The Committee strongly recommends that research be seen as an integral part of the National Water Initiative, and that the opportunity is taken to formulate a well-funded and comprehensive National Research Strategy on Water.

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70 Land and Water Australia, 2002-03 Annual Report, p. 21.

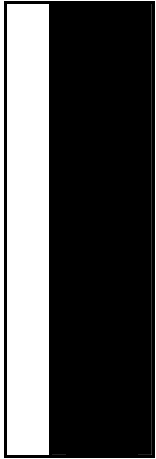
**Recommendation 30**

- 7.138 **The Committee recommends that the Commonwealth Government works through the Council of Australian Governments to develop a national research strategy that prioritises and coordinates all research activities on water, as an integral part of the National Water Initiative.**

Kay Elson MP

Committee Chair

2 June 2004



## **Dissenting Report—Mr Patrick Secker MP**

There has been considerable new data and directions since discussions took place in March over the finalising of the Interim Report.

I believe it is now untenable not to support COAG proposals to commit an additional 500gl of increased river flows to the Murray River and the six 'icon sites' of the Murray Mouth, Coorong, Lower Lakes, Chowilla Floodplain, Gunbower / Perricoota, Barmah-Millewa Forests, the River Murray Channel and the Murray Cod, especially when other submissions clearly show that they can be achieved with minor effects on river communities.

Recent COAG proposals to increase the consultation with river communities and stakeholders are also to be welcomed.

As a result I cannot support the confusing concept arrived at by the Committee in 1.33 and, therefore, recommend deletion of the words in the last sentence:

*“In the Committees view, at this stage the science is not adequate on which to base far reaching decisions, possibly including the reallocation of water from irrigation to the environment.”*

It is confusing to the general public because I believe the science in many areas of the Murray Darling Basin is adequate (such as with the 6 icon sites).

It is also confusing and contradicted by this report in 2.119 which refers to capital works and infrastructure improvements to these six icon sites together with Recommendation 15(5.17) which refers to water savings becoming the property of the government which can then be used for extra environmental flows according to agreed formulas after extensive consultation.

Whilst 1.35 is merely reporting a recommendation from the interim report, I believe that a new recommendation should follow which reads:

*“The Committee recommend that the Australian Government urge the Murray Darling Basin Ministerial Council to commit to an additional 500gl in increased flows to the Murray River and:*

- *A comprehensive program of data collection and monitoring by independent scientists can be continued and extended with a robust, transparent peer review process with particular emphasis on the identified gaps in scientific knowledge particularly in Queensland and New South Wales.*
- *Non flow alternatives for environmental management be considered and reported on more thoroughly, and*
- *Annual comprehensive audits focussed specifically on the Murray-Darling basin water resources, including all new data be conducted.*

Whilst 1.36 again only reports a recommendation from the Interim Report tabled over 2 months ago, I think the Committee should make it clear that the words:

*“prior to proceeding with the proposal to obtain increased river flows”*

should be deleted to coincide with my suggested recommendation to follow 1.35.

I would also recommend the deletion of 1.37 because whilst not disagreeing with the sentiments expressed about adequate research and the possible effects on rural communities, it could confuse the reader over the COAG proposals for 500gl of environmental flows and other less defined proposals for 1500gl and 3000gl environmental flows.

I also believe it is superfluous to other recommendations already stated in this report and the Interim Report.

2.121 of the Report also notes Dr Blackmore’s comments on the 500gl as *“a fantastic start”* and that realistically it is probably as much as the MDBC could handle at this stage.



To coincide with the previous recommendations in this dissenting report and hence recommend that 2.129 be amended to delete the words:

*“The Committee believes that much better data and evidence is required before decisions can be made on the most efficient and effective ways to spend the \$500 million set aside by COAG..*

because it is superfluous to my other recommendation which deals with the additional recommendation inserted after 1.35.

It is my sincerest wish that my dissenting report will not detract from the many other good recommendations in this report dealing with environmental allocations, water policy framework, water rights and water trading, and water use efficiency.

Patrick Secker MP

June 2004





## **Appendix A – List of submissions**

<b>Number</b>	<b>Organisation</b>
44	59 Battalion Hume Regiment Inc
17	Allen, Dr Stephen
108	Arid Areas Catchment Water Management Board
24	Arkininstall, Mr Matthew
60	Ashby, Mr Leon
37	Association of Rural Water Authorities
94	Australian Bureau of Agricultural and Resource Economics (ABARE)
113	Australian Management Consolidated Pty Ltd
159	Australian Management Consolidated Pty Ltd [supplementary submission]
90	Australian Political Ministry Network Ltd (PolMin)
70	Australian Pork Limited
71	Australian Water Association
2	Barwon Water
25	Beautesert Shire Community Advisory Panel
18	Beautesert Shire Council

- 132 Beaudesert Shire Council [supplementary submission]
- 65 Boonah Shire Council
- 112 Break of Day Vegetation, Waterwatch and Rivercare group (Coastal)
- 58 Break of Day Vegetation, Waterwatch and Rivercare group
- 54 Brisbane City Council
- 15 Burdekin Shire Council
- 86 Burnett, Mrs V D
- 147 Caldwell, Mr Robert
- 123 Centre for Dynamical Meteorology and Oceanography, Monash University
- 101 Chambers, Ms Helen
- 142 Chapman, Mr Steven
- 154 Chapman, Professor Bruce and Botterill, Dr Linda
- 16 Charles MP, Mr Bob
- 22 Chinchilla Shire Council, Chinchilla Water Users Association  
Chinchilla Economic and Tourism Development Association
- 30 Citizens Electoral Council of Australia
- 29 Coleambally Irrigation Co-operative Limited
- 181 Cooperative Research Centre for Freshwater Ecology
- 66 Cooperative Research Centre for Water Quality and Treatment (CRC)
- 95 Coordinating committee of the Namoi Valley Water Users' Association Inc.
- 77 Crookwell Shire Council
- 59 CSIRO
- 164 CSIRO [supplementary submission]
- 61 Davey, Mr A S
- 137 Davies, Mr Keith M
- 149 Davis, Councillor Peter

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43	de Burgh-Day, Geraldine
143	de Mestre-Allen JP, Mr Max
160	Department of Agriculture, Fisheries and Forestry - Australia
180	Department of Agriculture, Fisheries and Forestry [supplementary submission]
166	Department of the Treasury
46	Derwent Valley Council
50	District Council of Lower Eyre Peninsula
120	Downie, Mr David
82	Dyke, C R and S P
39	Earth Care Earth Share
148	Energetics Pty Ltd
150	Environment Australia
173	Environment Business Australia
32	Esk Shire Council
133	Esk Shire Council [supplementary submission]
145	Evaporation Control Systems Pty Ltd
97	Eyre Peninsula Catchment Water Management Board
5	Eyre Peninsula Local Government Association
76	Fisher, Mr George
153	Fordyce, Mr Glenn E
88	Friends of Tamborine Mountain Association Inc.
42	Gaskell, Mr Robin F
26	Gibson, Associate Professor N A
57	Golden Plains Shire
121	Golden Plains Shire [supplementary submission]
52	Goodridge, Trevor and Jane
92	Gourlay, Mr Robert

19	Graham, Mr James T
96	Greater Shepparton City Council
21	Grzic, Mr Warren
93	Grzic, Mr Warren [Supplementary submission]
79	Hale, Leonie
47	Hall, Mr Lin M
134	Hall, Mr Lin M [supplementary submission]
34	Hansberry, Mr Beris
83	Hawkesbury City Council
165	Heidecker, Mrs Anna
98	Hindmarsh Shire Council
156	Hyde, Mr John
40	Hydro Tasmania
102	Institution of Engineers, Australia
109	Irrigators Inc
138	Kalfresh Pty Ltd
49	Katter, The Hon Bob, MP
162	Kay Bee Developments Pty Ltd
14	Kealy, Leonce
140	Lain, Mr Peter
36	Land & Water Australia
170	Land & Water Australia [supplementary submission]
41	Launceston City Council
1	Lead Advisory Service Australia
125	Local Government Association of NSW and the Shires Association of NSW
69	Local Government Association of South Australia
107	Local Government Border Rivers Project
72	Logan & Albert Rivers Catchment Association (LARC)

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6	Lower Hawkesbury Nepean Water Users Association
78	Macquarie River Food and Fibre
8	McCaskill, Mr Malcolm
89	McDonald, R K
118	McDonald, R K
3	McGowan, Mr Paul
63	Melbourne Water Corporation
155	Moir Private Irrigation District
115	Mott, Mr Ian
161	Murray Irrigation
135	Murray Valley Groundwater Users Association
144	Murray-Darling Basin Commission
127	Murrumbidgee Irrigation
174	National Association of Forest Industries
12	National Competition Council
168	National Farmers' Federation Limited
139	Nekon Pty Ltd
56	Northern Midlands Council
152	Northern Territory Department of Community Development, Sport & Cultural Affairs
20	NSW Farmers Association [Orange, Molong and Gulgong]
105	NSW Irrigators' Council
91	NSW Rural and Regional Committee of the Liberal Party
48	Outback Areas Community Development Trust
172	Pearson, Mr Jack
85	Pettigrew, J G (Gordon)
9	Pioneer Valley Water Board
176	Planning Institute of Australia

- 171      Plastics Industry Pipe Association of Australia Limited
- 4        Pratt AC, Mr Richard
- 178      Pratt Water (previously Pratt AC, Mr Richard ) [supplementary submission]
- 179      Pratt Water (previously Pratt AC, Mr Richard ) [supplementary submission]
- 100      Public Interest Advocacy Centre
- 110      Pyne MP, Mr Christopher
- 126      Queensland Conservation Council
- 116      Queensland Farmers' Federation
- 129      Queensland Government
- 124      Radcliffe, Dr John C, AM, FTSE
- 27       Ransley, Mr David
- 10       Richmond Shire Council
- 11       Sandell, Mr Arnold
- 62       Sauer-Thompson, Dr Gary
- 75       Saunderson, Mr Bruce
- 31       Searle, Mr Ian L
- 136      Simons, Mr Kostj
- 55       Snowy Hydro
- 33       South Australian Farmers Federation
- 104      South Australian Government
- 13       South West Development Commission
- 106      Southern Riverina Irrigation Districts Council
- 146      T. Bowring & Associates Pty Ltd
- 23       Tamborine Mountain Progress Association Incorporated
- 131      Tamborine Mountain Progress Association Incorporated [supplementary submission]



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81	Tasmanian Conservation Trust
111	Tasmanian Farmers & Graziers Association
119	Tasmanian Fishing Industry Council
157	Tasmanian Government
130	Tenterfield Shire Council
67	The Bureau of Meteorology
28	The Irrigation Association of Australia
84	The Pastoralists and Graziers Association of Western Australia Inc.
7	Tierney, Mrs Sheila
35	Toowoomba & Region Environment Council
74	Tuckey MP, The Hon Minister Wilson
99	Twynam Agricultural Group
114	Twynam Agricultural Group [supplementary submission]
87	Upper Lockyer Water Users Association Inc., Central Lockyer North, Central Lockyer South and Central Lockyer
68	Upper North Coast Water Management Committee
158	Urban Rainwater Systems Pty Ltd
80	URS Sustainable Development
73	Victorian Farmers Federation
175	Victorian Government
38	Victorian Water
51	Water for Australia
141	Water for Australia [supplementary submission]
122	Water for Australia [supplementary submission]
128	Wattle Range Council
163	Wentworth Shire Council
45	Western Australian Farmers Federation
167	Western Australian Farmers Federation [supplementary submission]

- 117 Western Australian Government
- 151 Wilderness Society, Megan Clinton
- 53 Willock, Annie
- 64 Wimmera Malle Water
- 103 World Wide Fund for Nature Australia (WWF)
- 169 World Wide Fund for Nature Australia (WWF) [supplementary submission]
- 177 World Wide Fund for Nature Australia (WWF) [supplementary submission]



## **Appendix B – List of exhibits**

- 1     *Dry conditions impacts in Northern Victoria* – A report to the Victorian Government’s dry seasonal conditions task force. Prepared for the Shires of Campaspe, Moira, Mitchell, Strathbogie, Loddon and Gannawarra, and the Greater Cities of Shepparton and Bendigo by Stuart Brown (Farmanco Pty Ltd). Document received from the Shire of Campaspe.
- 2     *The Australian Water Experience: Some Ways Forward* presented by Professor Peter Cullen at the Public Hearing in Canberra on 13 November 2002.
- 3     Presentation presented by the Glamorgan Spring Bay Council at a private briefing at Triabunna on 19 November 2002.
- 4     *Increasing Rainfall and Runoff by Cloud Seeding*, presentation presented by Mr Ian Searle, Former Tasmanian Hydro Officer and Cloud Seeding expert at a private briefing at Longford, Tasmania on 19 November 2002.
- 5     *Climate Variability, Climate Change, Weather Modification and Future Water Supplies for Australia’s Rural Industries and Communities*, presentation presented by CSIRO Laboratories, Aspendale, Victoria at a private briefing on 21 November 2002.
- 6     ‘*Documents related to water use issues in the Lockyer Valley*’ presented by Gordon Van Der Est at the Public Hearing in Brisbane on 18 February 2003.
- 7     Presentation presented by Pratt Water at a public hearing in Melbourne on Monday, 7 April 2003.

- 8 *'Managing Melbourne's Water Resources - Water Recycling to Protect the Environment and Support Melbourne's Growth'*, a submission outlining strategies to implement Melbourne 2030 – Planning for Sustainable Growth, presented by John Lawson at the Public hearing in Melbourne on Monday, 7 April 2003.
- 9 Document titled *'Adequate and sustainable future water supply for Australia'* faxed to the committee by Mr Peter Jans at the public hearing in Port Lincoln on Tuesday, 29 April 2003.
- 10 Correspondence sent to the committee from Mrs Bette Nourd, Boonah, about the work of Mr K M Davies, Underground Water Surveyor and Diviner taken at the private meeting in Canberra on 4 June 2003.
- 11 Documents titled *'Policy Forum: Water Pricing and Availability, Robust Reform: The Case for a New Water Entitlement System for Australia'*, tabled by CSIRO Land and Water at the public hearing in Canberra on Wednesday, 25 June 2003.
- 12 Copy of correspondence exchanged between the Murray Irrigation and CSIRO, presented by Mr W Hetherington of Murray Irrigation at the public hearing in Deniliquin on 31 July 2003.
- 13 Documents titled *'Received Evidence for Deterioration in Water Quality in the River Murray'*, IPA Water Forum No. 2, Canberra, 25<sup>th</sup> July 2003 by Dr Jennifer Marohasy, Institute of Public Affairs presented Mr George Warne of Murray Irrigation at the public hearing in Deniliquin on 31 July 2003.
- 14 Documents titled *'Outstanding Issues in the Water Reform Process'*, (as at end June 2003) presented Mr George Warne of Murray Irrigation at the public hearing in Deniliquin on 31 July 2003.
- 15 Background papers on the proposed 'Twin Lakes' project regarding the Murray mouth presented by Kellogg Brown & Root Pty Ltd.
- 16 Document titled *'Virtual Water in Food Production and Global Trade Review of Methodological Issues and Preliminary Results'* presented by Australian Water at the public hearing in Sydney on 15 August 2003. Authorised by the committee on Wednesday, 20 August 2003.
- 17 Documents titled *'Global Warming Contributes to Australia's Worst Drought'* presented by World Wide Fund for Nature - Australia at the public hearing in Sydney on 15 August 2003. Authorised by the committee on Wednesday, 20 August 2003.

- 18 Documents titled '*Future Water, Visioning the Role of Water for Inland Australia*', presented by World Wide Fund for Nature - Australia at the public hearing in Sydney on 15 August 2003. Authorised by the committee on Wednesday, 20 August 2003
- 19 Documents presented by the NSW Irrigators' Council Australia at the public hearing in Sydney on 15 August 2003 and authorised by the committee on Wednesday, 20 August 2003:
  - Policy Statement, Principles of Water Access Rights' and
  - 'Water Trading'
- 20 Correspondence from the NSW Irrigators' Council Australia, with the document '*Levels of extraction as % of long term flows*' and '*Integrated Catchment Management and the Community - Discussion Paper, May 2003*', providing additional information and responses to questions taken on notice at the public hearing in Sydney on 15 August 2003. Authorised by the committee on Wednesday, 20 August 2003.
- 21 Fact Sheet on the Murray-Darling Basin Water Resources, Murray- Darling Basin Commission – November 2003 presented by Dr Blackmore at a public hearing in Canberra on 26 November 2003.
- 22 Papers presented by the CSIRO at the Committee's Science Roundtable on Friday, 5 March 2004 and authorised on 24 March 2004:
  - *Is the River Murray Water Quality Deteriorating? A Salinity Perspective*
  - *What is the Status of the River in the Murray-Darling Basin?*
  - *Wealth from water: A national perspective.*
- 23 Paper *Modelling historical seasonal rainfall and river flow patterns in the Murray Darling Basin* by Shahbaz Khan and John Williams, CSIRO Land and Water presented by Dr John Williams CSIRO at the Committee's Science Roundtable on Friday, 5 March 2004 and authorised on 24 March 2004.





## **Appendix C – List of public hearings**

**Wednesday, 13 November 2002 - Canberra**

### **Individuals**

Professor Peter Cullen

**Wednesday, 11 December 2002 - Canberra**

### **Land & Water Australia**

Mr Andrew Campbell, Executive Director

**Monday, 17 February 2003 - Boonah, Qld.**

### **Beaudesert Community Advisory Panel**

Cr. Judy Harvey

Mr Stephen Struss

### **Beaudesert Shire Council**

Mr Chris Lawson, Director Civil Operations

Cr. Ronald Munn, Mayor

### **Boonah Shire Council**

Cr John Brent, Mayor

Mr Patrick Murphy, Director of Works and Technical Services

Mr Cameron Seagrave, Community and Industry Development Officer

Cr. Heather Wehl

**Esk Shire Council**

Mr Ralph Ash, Utilities Engineer

Mr Vimalan Balachandran, Manager, Operations

Mrs Jean Bray, Mayor

**Tamborine Mountain Progress Association Incorporated**

Mr Philip J Giffard, Member

Mrs Jennifer Peat, Honorary Secretary

Mr Jack Ralston, Member of Management Committee

**Tuesday, 18 February 2003 - Brisbane****Chinchilla Shire Council**

Mr Ed Hoffmann, Chief Executive Officer

Cr. Bill McCutcheon, Mayor

**Chinchilla Water Users Association**

Mr Darryl O'Leary, President

**Department of Natural Resources and Mines**

Mr Peter Beavers, Senior Engineer

**Pioneer Valley Water Board**

Mr John Palmer, Manager

**Upper Lockyer Water Users Association Inc., Central Lockyer North, Central Lockyer South, Central Lockyer**

Mr Paul Emmerson

**Water Users Forum (Central Lockyer North)**

Mr Jeffrey Logan, Delegate (Area Representative)

Mr Gordon Van Der Est, Executive

**Wednesday, 19 February 2003 - Brisbane****Individuals**

Mr Lin M Hall



**Land & Water Australia**

Dr Barry White, Coordinator, Climate Variability in Agriculture R&D Program (LWRRDC)

**Logan & Albert Rivers Catchment Association**

Mr Andy Grodecki, Interim President

Miss Brooke Hynch, Catchment Coordinator

**Queensland Department of Primary Industries**

Dr Jeffrey Clewett, Scientist, Leader Landscape Systems Group, Queensland Centre for Climate Applications, Agency for Food and Fibre Sciences

Dr Roger Stone, Director, Qld. Centre for Climate Applications

**Queensland Farmers Federation**

Mr Ian Johnson, Water Advisor

Mr Gary Sansom, President

**Wednesday, 19 March 2003 - Canberra****Landholders for the Environment**

Mr Leon Ashby, Convenor/Founder

**Wednesday, 26 March 2003 - Canberra****Individuals**

Mr Bob Charles, MP, Federal Member for La Trobe

**Monday, 7 April 2003 - Melbourne****Lawson Consultancy Pty. Ltd**

Mr John Lawson, Principal

**Pratt Water Pty Ltd**

Dr William Hurditch, Assistant Project Director

Mr John Nixon-Smith, Financial & Commercial Advisor

**Tuesday, 8 April 2003 - Melbourne****Individuals**

Mrs Jenny Blake

**Commonwealth Bureau of Meteorology**

Dr Mike Manton, Chief of Bureau of Meteorology Research Centre

Mr Bruce Stewart, Assistant Director, Climate, Consultative and Hydrological Services

Dr John Zillman, Director of Meteorology

**National Competition Council**

Mr Ross Campbell, Director, Water Reform Section

Ms Deborah Cope, Acting Executive Director

**Victorian Farmers Federation**

Mr Clay Manners, General Manager, Policy

Mr John O'Brien, Chairman, Water Resource Committee

**Monday, 28 April 2003 - Adelaide****Individuals**

Mr Christopher Pyne MP, Member for Sturt

Dr John C Radcliffe AM, FTSE

**Cooperative Research Centre for Water Quality and Treatment**

Professor Don Bursill, Chief Executive Officer

Mr Darryl Day, Regional Water Supplies Leader

**Department of Water, Land and Biodiversity Conservation**

Mr Peter Hoey, Executive Director, Murray Darling Division

**South Australian Farmers Federation**

Dr Scott Donner, Executive Officer, Natural Resources Committee

Mr Kent Martin, Chair, Natural Resources Committee

**South Australian Government**

Mr Martin Allen, Senior Policy Officer, Department of Water, Land and Biodiversity Conservation

**Tuesday, 29 April 2003 - Port Lincoln****Individuals**

Cr. Peter Davis

**Eyre Peninsula Catchment Water Management Board**

Mr Brian Foster, Board Member

Mr Geoff Rayson, General Manager

**Eyre Peninsula Local Government Association**

Mr Vance Thomas, Executive Officer

**Wednesday, 14 May 2003 - Canberra****Australian Bureau of Agricultural and Resource Economics**

Dr Stephen Beare, Research Director

**Wednesday, 28 May 2003 - Canberra****Murray- Darling Basin Commission**

Dr Don Blackmore, Chief Executive

Mr Kevin Goss, Deputy Chief Executive

**Wednesday, 4 June 2003 - Canberra****Australian Management Consolidated Pty Ltd**

Mr Aron Gingis

**Wednesday, 18 June 2003 - Canberra****Australian Greenhouse Office**

Dr David Ugalde, Manager-Greenhouse Science & Agriculture Team

**Environment Australia**

Mr Theo Hooy, Acting Assistant Secretary, Water Branch

**Wednesday, 25 June 2003 - Canberra****CSIRO**

Dr Wayne S Meyer, Business Director, Land & Water

Dr Brian Ryan, Leader, Earth Systems Modelling Program

Prof. Michael Young, Director, Policy Economic Research Unit

**Thursday, 31 July 2003 - Deniliquin****Coleambally Irrigation Co-operative Limited**

Mr Murray Smith, Acting Chief Executive Officer

**Irrigators Inc**

Mr Lawrence Arthur, Chairman

Mrs Deborah Kerr, Executive

**Moira Private Irrigation District**

Mr Mick Barlow, Chairman

Mr Rodney Barnett, Vice Chairman

**Murray Irrigation Limited**

Mr William Hetherington, Chairman

Mr George Warne, General Manager

**Murray Valley Groundwater Users Association**

Mr Leigh Chappell, Executive Officer, Secretary/Treasurer

**Murrumbidgee Irrigation**

Mr John Howe, Water Policy Manager

**Southern Riverina Irrigation Districts Council**

Mr Trevor Clark, Chairman

Mr Scott Glyde, Chief Executive

**Wednesday, 13 August 2003 - Canberra****Department of Agriculture, Fisheries and Forestry-Australia**

Mr Ross Dalton, General Manager, Water and Murray-Darling Basin

Mr Ian Thompson, Executive Manager, Natural Resource Management

**Friday, 15 August 2003 - Sydney****Australian Water Association**

Mr Chris Davis, Chief Executive Director

Mr Rod Lehmann, President

**Irrigation Association of Australia**

Mr Jolyon Burnett, Chief Executive Officer

**Local Government Association of NSW**

Cr. Patrick Brassil AM, Chairperson, Water Management Committee

**Local Government Association; and Shires Association of NSW**

Ms Stephanie Smith, Senior Policy Officer - Water, Strategic Services

**Nature Conservation Council of NSW**

Ms Rachael Young, Water Policy Officer

**NSW Irrigator's Council**

Ms Jacqueline Knowles, Policy Analyst

Mr Doug Miell, Executive Director

Ms Michelle Ward, Consultant

**Twynam Agricultural Group**

Mrs Christine Campbell, Executive Chairman

Mr Bruce Finney, Central Region Manager

Mr Johnny Kahlbetzer, Operations Director

**World Wide Fund for Nature Australia**

Mr Warwick Moss, Natural Resource Economist, Resource Conservation Programme

**Wednesday, 20 August 2003 - Canberra****Engineers Australia**

Mr Hugh Crawley, Past President Canberra Division, Past Chair Environmental Engineering Society

Mr Malcolm Palmer, Research Officer, Public Policy Unit

**Snowy Hydro Ltd.**

Mr Terry Charlton, Chief Executive Officer

Mr Barry Dunn, Executive Officer-Water

**Wednesday, 10 September 2003 - Canberra****CSIRO**

Dr Christopher Moran, Chief Scientist-Healthy Country Flagship Program

**Land & Water Australia**

Mr Colin Campbell, Executive Director

**Wednesday, 17 September 2003 - Canberra****Western Australian Farmers Federation**

Mr Andy McMillan, Director of Policy

Mr Colin Nicholl, President

**Western Australian Government**

Mr Ed Hauck, Manager, Hydrology & Water Resources Branch, Department of Environment

Mr Fred Tromp, Director, Resource Science Division, Department of Environment

**Wednesday, 8 October 2003 - Canberra****Individuals**

Professor Peter Cullen

**CSIRO Land and Water**

Dr John Williams, Chief

**Wentworth Group**

Mr Peter Cosier, Member

**Wednesday, 15 October 2003 - Canberra****National Farmers' Federation**

Mr Ralph Leutton, Member of the NFF Water Task Force

**National Farmers' Federation Limited**

Mr James Florent, Policy Manager, Environment

**Wednesday, 5 November 2003 - Canberra****Pratt Water Pty Ltd**

Mr Tony Gray, Public Affairs Manager

Dr William Hurditch, Assistant Project Director

Mr Ian Wisken, Assistant Project Director

**Wednesday, 26 November 2003 - Canberra****Murray- Darling Basin Commission**

Dr Don Blackmore, Chief Executive

Mr Andrew Close, Manager Water Resources Group







## **Appendix D - Murray-Darling Basin Water Resources Fact Sheet**

Sourced from the Murray-Darling Basin Commission website on 1 June 2004.  
[See the Fact Sheet at  
[http://www.mdbc.gov.au/publications/factsheets/water\\_resourcesver2.html](http://www.mdbc.gov.au/publications/factsheets/water_resourcesver2.html) ]





**Appendix E - Extracts from *'Talking Water – an Australian Guidebook for the 21<sup>st</sup> Century'*, published by the Farmhand Foundation, May 2004.**

