

Submission to Murray Darling Basin Plan Amendments

24 February 2017 (Mailed February 27, 2017 as a thumbdrive due to huge size of documents-with permission from MDBA-see email included)

“A large plumbing exercise” Jessica K Weir ‘Murray River Country: an ecological dialogue with traditional owners’ 2009.

“The Object of the Act is to enable the Commonwealth and States to manage the water resources of the MDB in the **national interest**” Eds Michael Kidd, Loretta Feris, Tumai Murombo and Alejandro Iza ‘Water and the Law: Towards Sustainability’ 2014.



The degraded and over-allocated Murray River at Nangiloc, Victoria in April 2008.

Maria I E Riedl□

[Redacted]□Mildura, Victoria 3502□

[Redacted]



The empty Darling River at Lelma Station in February 2008



NOT a river but an irrigation channel between Finley and Denilequin, the Mulwala Channel 2011



The Murrumbidgee River at Hay 2008 (at same position from the bridge)



The Murrumbidgee River at Hay April 2012 (same position from the bridge)



Photo of the same position at Hay on the Murrumbidgee River Bridge April 2012

Proof of granting of extension to mail thumbdrive as documents were too large-see following.

24 February 2017

Hi Maria,

Following our conversation on the phone, given that your submission is quite large, we will accept your submission on a usb via post. Our mailing address is:

**GPO Box 1801
Canberra ACT 2601**

**All the best,
[Redacted]**

**Engagement team Partnerships and Community Engagement, Chief
Executive Office**



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INTRODUCTION

1. My name is Maria Riedl. I have had a great interest in the Water Act 2007 as well as the Murray Darling Plan. Having a great interest in environmental matters and I have completed a Master of Environmental Law thru ANU and started a Master degree in International Law as well as at present a Master of Environmental Governance through UTAS. Laws interest me, especially in what they do, and specifically those that have an environmental or human rights focus. Looking after our silent and long-suffering environment is a duty-of-care laid upon all of our shoulders. This is because of the very vocal protestations and intent of vested interests that are interested in power, money and shareholder profits no matter the degradation of our 'silent' environment. It is an imperative that I stand up for the MDB Plan and against those interests that would weaken it even a 'little' bit.

I am including information in my submission that I have previously included in other submissions to the MDB Plan. I have also sent the Authority about 32 Attachments with more information, that I would ask that you attach to my submission, as I strongly believe that people are forgetting the reason for this Plan. They need a reminder. Its survival simply cannot be left to chance. The Basin States have agreed on measures to address the substantial over-allocations

that have occurred because of the degradation and threat of collapse of the entire MDB system; including surface and groundwater from its sources to the very end; the mouth of the river. It is time that this message is delivered again. Misinformation is no longer acceptable. We need the MDBA to really correct information and not just react to those who are vocally blaming the MDB Plan for all their woes!!!! This is terribly serious, as your actions right now will either ensure the survival of the MDB or its dismal sinking into a salty, dead system. For Mr Joyce and others to blame our requirement for a healthy MDB onto “greenies, or environmentalists” is simply wrong and a furphy set to mislead. It is a lie. How about these negative people plan for an MDB Plan that is in fact “in the National interest” and not their own short terms gains????

2. The following is a clear summary, which I support, as it sets the scene and what and why the *Water Act 2007* and the MDB Plan were urgently enacted. I found this applicable and relevant information in the textbook: **‘Water and the Law: Towards Sustainability’** Eds Michael Kidd, Loretta Feris, Tumai Murombo and Alejandro Iza 2014.

“The MDB is made up of the catchments of the River Murray, the Darling River and all the rivers and creeks that flow into them. In total there are 21 NRM regions in the Basin. 15 NRM regions are fully contained in the Basin, while 6 others overlap MDB boundaries. Of the 6 regions that are partially in the Basin, 4 have more than 70% of their area within the MDB and remaining 2 have only very small proportion of their total area in the MDB. The wetlands in the Basin support and maintain the productivity and health of the river systems and a number of them are recognized under the Convention on Wetlands of International Importance.

The Commonwealth enacted the Water Act 2007 directly in managing Australia’s water resources. It was designed to specifically address the threats to the water resources of the MDB. The threats arose as a result of over-allocation and overuse of the MDB water resources. The Act sets a standard for the allocation of water resources, focusing on addressing over-allocation and achieving sustainable limits on water extraction. One of the objects of the Act is to enable the Commonwealth and the States to manage the water resources of the Basin in the ‘national interest’. Another object is to promote the use and management of the Basin’s water resources in a way that optimizes economic, social and environmental outcomes.

More direct outcomes:

- a. ensure the return to environmental sustainable levels of extraction for water resources that are over-allocated or overused.*
 - b. to protect, restore and provide for the ecological values and ecosystem services of the MDB.*
 - c. subject to theses two, to maximize the net economic returns to the Australian community from the use and management of the water resources of the Basin.*
- These are to be achieved by the implementation and enforcement of the MDB Plan.*

The purpose of the Plan is to provide for the integrated management of the Basin’s water resources in a way that promotes the objects of the Act. Promotion of the objects is thus impliedly an obligation of performance indicating how integrated

management is to take place. The Plan is to provide for the establishment and enforcement of environmentally sustainable limits to the quantities of surface and groundwater that may be taken from the Basin. It is to be developed as prescribed by a number of specific obligations: must promote sustainable use of the Basin's water resources to protect and restore the ecosystems, natural habitats and species that are reliant on the water resources and to conserve biodiversity. It must also promote the wise use of all Basin water resources and an obligation to take account of the principles of ecologically sustainable development. This includes the maximum long-term average quantities of water that can be taken on a sustainable basis, from the Basin water resources as a whole, and those of each water resource plan area.

There is an obligation to include environmentally sustainable diversion limits for the Basin. Section 23(1) states: 'A long-term average sustainable diversion limit for the Basin water resources, for the water resources of a particular water resource plan area or for a particular part of those water resources must reflect an environmentally sustainable level of take.' That is, environmentally sustainable diversion limits (SDLs) must be included for the water resources of the Basin. An environmentally sustainable level of take is defined as the level at which water can be taken from a water resource which, if exceeded, would compromise key environmental assets of the water resource; key ecosystem functions; productive base; or key environmental outcomes. This is a strong environmental standard, unprecedented in Australian water law. This obligation has effect within the context of the statement of the objects, which refers to the optimization of economic, social and environmental outcomes. The relationship between economic and social outcomes on the one hand and environmental outcomes on the other hand is government in the context of long-term average sustainable diversion limits for the Basin's water resources by the standard of the environmentally sustainable level of take.

The ESD strategy enunciates that the challenge is to 'develop and manage in an integrated way, the quality and quantity of surface and groundwater resources, and develop mechanisms for water resource management which aim to maintain ecological systems while meeting economic, social and community needs' thus the development of statutory water plans to provide secure ecological outcomes and resource security for users. These water allocation plans determine how we share valuable water resources between competing uses and plan for the allocation and sustainable management of these resources to meet future water requirements by State/Territories in Australia.

Australia now has a single, national Plan for managing water in the MDB. However, concerns still exist about the health of Australia's river systems and their capacity to provide enough water for all user groups, including the environment. This is largely because the Basin States continue to fight each other and the Commonwealth, to promote their goals or block those of others. Developments, such as slashing the funding of the MDBA, demonstrate the challenge of balancing the interests of inter-jurisdictional river systems with local, vested interests of the States. The general perception is that intergovernmental water reform processes are characterized by confusion, lack of clarity and 'state government bickering,

arguing, delaying, being parochial-even litigating'. Even though the institutional framework for water resource management has improved, there is still scope to expand the capacity of regional natural resource management bodies to manage river health, and to assure minimum environmental flows.

Australia has a highly variable climate; a land of climactic extremes-prolonged droughts and flooding rains. Climate change modelling for south-eastern Australia suggest significant reductions in rainfall; temperature increases leading to increased evaporation rates; and a potential increase in the frequency and severity of extreme events such as drought, flood and bushfire in native forests in key water catchments, all with potentially adverse impacts on water availability and quality. Climate change will also have devastating direct impacts on many species and ecosystems, while simultaneously increasing pressure on natural resources for human use.

The central feature of the water reform process is the adoption of water resource planning frameworks which introduce legal mechanisms for adjusting water allocations according to variable availability and which protect environmental values in light of long-term water resource degradation. Second pillar of water reform has been the unbundling of water from property in land to facilitate the establishment of water markets, with the objective of achieving more efficient and higher value use of scarce resources.

South-eastern Australia region experienced the Millennium Drought from 1997 to 2009 which led to reductions in water yield as great as 50% in key water catchments, threatening the security of water supply to human populations, industry and the environment. These low stream flows are expected to occur more frequently under climate change, as well as an increase in the intensity of extreme rainfall events. With the increase of more intense fire seasons, these will have adverse long-term impacts on catchment water yield and water quality.

Climate change is also recognized as a key driver of biodiversity loss worldwide. This includes: changes and reductions in climatic and geographic range of species; changes to population dynamics and timing of species lifecycles; and changes in the structure and composition of ecosystems and communities. It will compound many of the existing and ongoing threats to biodiversity, such as habitat loss, fragmentation and degradation; invasive species; unsustainable levels of natural resource harvesting and extraction; and nutrient loading and pollution. Eg water temperature rise; changes to precipitation patterns exaggerating the impacts of unsustainable levels of water extraction and water pollution on aquatic ecosystems. These river systems are already degraded from decades of over-extraction and catchment disturbance.

Has climate change been included in the MDB Plan? I was told at the Mildura/Dareton meeting with the MDBA that it was just mentioned and it was not required to be taken into account in a meaningful way.

In the context of climate change and in the light of the approach to setting the baseline SDL (which arguably falls well short of scientific recommendations for

achieving an environmentally sustainable level of take), the adjustment mechanism should be reconceptualised as a tool to update the SDL on the basis of best available science, including climate change modelling. It remains to be seen whether the multi-scalar arrangements put in place by the Water Act will transcend parochial politics, when there are clearly valuable resources at stake for State governments and their constituents. An added complication is that the federal government was forced to rely on a referral of constitutional law-making powers from State governments to fully legislate the Water Act. Given that such a referral can be withdrawn at any time, there is clearly a pragmatic requirement to achieve political consensus underpinning the planning process.

Commitments have been made to achieve legal recognition of environmental water, and equivalent legal status to consumptive rights to water. State legal regimes for water allocation now recognize two main types of environmental water. 1. Environmental water can be provided on a rules-basis as a fixed volume of flow over a given time period -very secure environmental water which potentially replicates natural flow regime to support environmental objectives. 2. Environmental water managers have access to water allocated against an entitlement, which is of similar nature and status of consumptive water rights. This has forced a recognition that much unallocated water (over and above limits on extraction) that may have remained in the systems and been of environmental benefit during wet times, has disappeared from the system during dry times as it has not been formally specified as environmental water. There is a need for earlier and more strategic contingency planning how different entitlements are to be treated in situations of mounting security; eg Victoria and NSW, during the Millennium drought emergency powers in water legislation to qualify rights to water for critical human needs in effect qualified already insufficient environmental flows to meet human water supply needs, further compounding the stress on aquatic systems.

The effectiveness of reforms to water law and governance depends significantly on full implementation of existing commitments and some fine tuning of objectives and key mechanisms over time. Of paramount importance, as a regulatory precaution in the face of the likely severe impacts of climate change on water resources, is the implementation of an SDL combined with targeted opportunities to review and amend this limit so as to respond to changing adaptation imperatives.

*Some revision of overarching objectives and guiding parameters for related water allocation planning processes to better reflect climate change adaptation imperatives maybe warranted in future. Also critical is the realization of an integrated multi-scalar governance regime for water resources the foundations for which have been laid with the introduction of the Water Act and new environmental water governance arrangements. Water rights and rules regarding their treatment may be refined to better protect **public interest values such as biodiversity conservation in a climate change context.**"*

"The breaking of the Millennium drought in 2010-11 offered a reprieve not to defer the completion of reforms, but to look closely at what has already been

achieved and how the system could be strategically improved so as to be better prepared for the next dry period!"

3. Another most important seriously lacking issue that I would like to draw the Authority's attention to is the **lack of Aboriginal Water Rights** which are surely to be tied to and akin to Aboriginal Land Rights. Any texts I have read all state that water and land are to be regarded as a unit; one does not function without the other. Regarding this I ask that you speak to *Dr Virginia Marshall*, as well have regard for her new book, launched last week at ANU: '*Overturning Aqua Nullius: Securing Aboriginal Water Rights*'. Dr Virginia Marshall (Wiradjuri Nyemba woman) has also written a Doctoral thesis: '*A Web of Aboriginal Water Rights: Examining the Competing Aboriginal Claim for Water Property Rights and Interests in Australia*'.

http://www.researchonline.mq.edu.au/vital/access/manager/Repository/mq:35733?f0=sm_subject%3A%22water+law%22

'A web of aboriginal water rights' by Dr Virginia Marshall.

<http://www.michaelkirby.com.au/sites/default/files/speeches/2846%20-%20FOREWORD%20-%20A%20WEB%20OF%20ABORIGINAL%20WATER%20RIGHTS%20-%20BY%20DR%20VIRGINA%20MARSHALL%20.pdf>

Water a key social issue: the following are the words of Dr Virginia Marshall can be found at:

< <https://www.uow.edu.au/alumni/outlook/4/UOW222442.html> >

"It's disappointing that there hasn't been any positive action by the Federal Government for Aboriginal water rights – in fact, it's just the opposite."

"It's disappointing that there hasn't been any positive action by the Federal Government for Aboriginal water rights - in fact, it's just the opposite. The former Abbott government disbanded the National Water Commission (NWC) and passed its functions over to the [Productivity Commission](#). This decision put an end to the biennial reports produced by the NWC, which reported on progress being made by the states and territories, and the Murray-Darling Basin Authority, to take Aboriginal interests in water into account.

The current government has given responsibility for the water portfolio to the Minister for Primary Industries, which has served to increase the influence of the irrigation sector and to diminish the opportunities for Aboriginal people to achieve their rights and interests."

"Achieving Aboriginal water rights is absolutely a key social issue because it has a nexus to Aboriginal health and wealth generation. There are so many Aboriginal communities across remote and regional Australia that have a substandard water supply, both in quality and quantity, and that has a big impact on the health of people living in those communities. We live in a developed nation where Aboriginal communities are living in conditions you would find in a developing nation.

And despite the poverty that is endemic in many of those communities, government agencies are seeking to achieve cost recovery from them for the provision of water supplies. It is madness.

The opportunity for wealth creation is another major factor that makes Aboriginal water rights so vital. Economic water rights have underpinned wealth generation throughout rural Australia since European colonisation. Just as the doctrine of terra nullius was used to rob Aboriginal people of their land rights, so today the legal fiction of aqua nullius is being used to rob Aboriginal people of their legitimate water rights and interests. It has to change."

I ask that the MDBA study how the Water Act 2007 and the MDB Plan can ensure the water rights of Aboriginal people, as have been done for land through the --- Land Rights cases and Laws.

Thank you this opportunity and also thank you for coming to Mildura and to Dareton. Whilst I realise this is a long trip for you, it is very worthwhile and I do think that providing up to date information and actually listening to my community and their problems and thoughts on the Plan via actual face-to-face meetings is the only way to achieve a balance and eventual acceptance and success of the MDB Plan.

Maria Riedl

Whilst the Australian Constitution does not specifically give the Commonwealth powers to enact laws with respect to the environment, there have been High Court judgments that have been instrumental in enabling the expansion of its ability to enact laws that implement Australia's international obligations. The use of the Australian Constitutions' powers through interpretation of those below has contributed:

- external affairs s 51(xxix),
- interstate trade and commerce at s 51(i),
- fisheries s 51(x).
- corporation powers ss 51(xx)
- financial powers ss 51(ii), 81-83 and 96.

The COAG agreements between states and Commonwealth also widen powers to ensure that the responsibilities and interests of environmental policies are set out. Though we Australians are horrified at the outcome of the COAG meeting held yesterday 13 April 2012 where there are politicians (newly elected as well, such as Mr Campbell Newman) who want to take us back to the dark ages, before the environment was considered so important that Australia signed up to treaties that ensure its protection! The United Nations must be notified that Australia is setting in place policies and weakening laws that are meant to comply with its international obligation. Vested interests are prepared to totally ignore the requirements of future generations, and in fact trample on their rights, (as well as the rights of the present generation) with their eyes fixed

blinkerly on the present, ignoring all advice that is contrary to their power games, with greed and power and money their only agenda.

They of course use the excuse that it is about jobs and growth and they yet again refuse to comply with ecologically sustainable development and the Precautionary Principle much less obligations under Commonwealth and State and Local and international laws and agreements. Where is there any mention of population control, of resource control, of banking for the future, of leaving a better world, a healthy environment that is a requirement for a continuing future, a respect for what a healthy biodiversity and ecologically vibrant environment provides us with for free? These silly people think that they will force development without any regard for our environment and that since they won't be here it won't be their problem! This is a totally callous and irresponsible attitude that is about short-term gains whether they are political, economic or social, and they must be nipped in the bud as unacceptable and unwelcome.

As Robert F Kennedy, Jr states in the forward to *'Not a Drop to Drink: America's Water Crisis'* by Ken Midkiff (2007); *"the best measure of how a democracy functions is how it distributes the goods of the land: the air, waters, wandering animals, fisheries, and public lands, otherwise know as the 'public trust' or the 'commons'. By their nature these resources cannot be reduced to private property but are the shared assets of all the people, held in trust for future generations."*

He also draws our attention to the effects of privatization. *"[A] more subtle but equally effective privatization of public trust waters is occurring, as governments subsidize reckless and unsustainable water usages that favor greedy developers, powerful utilities, and agribusiness barons over the American public."* *"In the American West, the federal government provides oceans of money to corporate agribusiness to raise wasteful water-dependent crops like rice and alfalfa in the desert."* And goes on to say that: *"The Colorado River no longer reaches the sea or feeds the great estuaries in the Gulf of California that once teemed with life. Instead, it ignominiously dies in the Sonoran desert. What was once a dynamic and specialized ecosystem cutting through the greatest monument to America's natural heritage has been transformed into a cold-water plumbing conduit between the two largest reservoirs in the United States-monuments to greed, shortsightedness and corporate power."*

"And all the grave prophecies of the scientists and environmentalists have come true. The reservoirs are emptying because of human consumption, a situation now exacerbated by climate change. Lake Powell is now nearly 100 feet below its capacity level. Hydropower revenues for repayment to the US Treasury have been at a standstill for six years. Recreational access at the upper reaches of Lake Mead and Lake Powell is now defunct because of the impact of sediment and fill. Water quality is dropping precipitously, and farmers need more water to flush the dissolved solids from their fields. The metropolitan growth and agribusiness consumption triggered by the dam's original promise continue at a rampant pace. The Colorado River has nothing more to give, and the train wreck is imminent. But while scientists continue to sound the warning, the river managers insist on business

as usual, encouraging wasteful agricultural uses, the proliferation of urban sprawl, and dramatic increases in consumption. It is a system geared to reward the powerful and impoverish the rest of us."

"But Americans need to be aware of their rights and the jeopardy corporate power places them in. Democracy affirms individual rights to our natural resources. But those rights cannot survive without a courageous citizenry that insists that its government not merely cater to commerce and industry but aggressively protect its citizenry's right to good health; safe air, water, and food; and the enrichment of America's national Heritage and God's creation."

All of what Mr Kennedy has said applies to Australia, the actions are the same, the reactions are the same and the ongoing actions of government, corporation and vested interest groups are the same. The parallels are unbelievably similar and though there are plenty of examples of Basin failures all over the world, the MDBA and both Commonwealth and State governments fail to act; they fail to adhere to sustainability principles.

"Sustainability can be defined as 'meeting the needs of the present without compromising the ability of future generations to meet their own needs'." If one considers carefully what the sustainable use of the MDB waters for the many stakeholders is, there really is no such thing. The use is just prolonged and not sustained. If actions are not taken to reduce the present overallocation and overuse of the waters in the MDB, both surface and ground, then it is only a matter of time until the prolongation ceases and the resource disappears.

The author of the book Ken Midkiff closes with: *"The decisions facing citizens will not be easy ones, but these decisions are much too important to be left in the hands of politicians. In order for us to continue having enough drinking water and food, citizens must become involved and take the reins away from those who would continue to ensure that water flows only toward money. We must push hard for the establishment of national conservation programs that truly conserve, allocate water to those most in need, [in this instance the degraded MDB system] and call for a halt of wasteful and unnecessary projects. Water is too precious, too valuable to be entrusted to for-profit companies and transient politicians. Water is too essential to be wasted. Water is life. [for the environment, for humans as well]."*

He adds about LA: *"The plan is to catch the rains that fall on thousands of driveways and parking lots and rooftops in the valley before it gets to the drains. Trees will soak up the water from parking lots. ('porous city concept') Homes and public buildings will capture roof water into old gravel pits and their leaky places that should recharge the city's underground water reserves. It's a direct replacement for a planned storm drain."* "Plan B holds that every city should be porous and every river should have room to flood naturally. It sounds expensive and utopian, until

If one looks at the veracity of the commitment to ensure that the Basin Plan achieves the objects of the Water Act one only has to read the numerous criticisms that the Plan is receiving to come to the conclusion that it will not do

what it sets out to do.

The MDBA has taken the weakest path because of political interference and vested interests and seem to be relying on information that are a result of media and vested interests who simply have forgotten what the Basin Plan is to achieve.

What are the major impacts of drought and even floods and the huge weather events which are a direct result of climate change, and what about **climate change**? Where is that delved into with rigour? Climate change is not factored into the Basin Plan and this is a terrible oversight.

'CRIMES AGAINST NATURE'

Teddy Roosevelt's 'precept' was *"The nation behaves well if it treats the natural resources as assets which it must turn over to the next generation increased, and not impaired, in value."* The heading I have set is the title of the book by Robert F Kennedy, Jr [who is regarded as a *"passionate and dedicated environmental advocate"*] and though it focuses on the fact that *"George W Bush [among other terrible decisions he made] will go down as the worst environmental president in our nation's history. In a ferocious three-year attack, his administration has launched over 300 major rollbacks that are weakening the protection of our country's air, water, public lands, and wildlife"* though this is about America it most certainly applies to Australia right at this moment! It is clear that the Commonwealth and State governments are prepared to only listen to, and allow, *"coal, oil, power, chemical, and automotive companies, [and coal seam gas companies] to fix the game[.]"*

Why? Because developers and mining companies and other vested interest groups do not like so-called "red-tape" because it cost them money to do investigations, it takes time to adhere to environmental regulations which are there to ensure that those matters that we the people want protected are protected.

By refusing to include climate change, excluding forestry, excluding other actions that will or are likely to have undesirable and preventable impacts. Cumulative impacts are being passed over or not considered. Looking again at different areas of the MDB without considering the whole makes no sense. Extraction increases of a decrease in what is to be returned by certain areas are totally unfair. I do not agree that this type of weakening of the MDB Plan will not have a lasting impact on the entire Basin.

The ability to take government to court when government has failed to consider impacts with rigor or apply ESD and the Precautionary Principle must be able to continue even though politicians and other vested interest do not want anyone to oppose a bad decision. But we have the Federal government which proposes to/has "cut" red tape so that those matters that it is obliged to protect are left exposed to greedy developers, mining companies, and other corporations that simply take the money and run.

Look at the BP spill in the Gulf of Mexico, look at the Exxon Valdeze spill, look at the boats crashing into the Great Barrier Reef World Heritage Area and damaging it! (When will our BP disaster happen in the GBR, as it is only a matter of time) Look at the first approval for mining companies without having regard to an increase of up to 40,000 shipping movements in the GBR and the failure of the Commonwealth or Queensland to refer the matter to UN. Look at the failure of the then Queensland Environment Minister in the Nathan Dam Case where he FAILED to consider the impact of more farming and the increase of chemicals used by farmers that would have an unacceptable impact on the GBR.

PROBLEMS

The problems that have occurred are evident with the continuing degradation and loss of matters that are required to be protected under the present EPBC Act. The assessment and approval processes do not meet Commonwealth's obligations. The actual referrals are limited in their content and those proposing developments are being allowed to dictate the terms of reference. Proposals are not considered as cumulative actions, and though that may not separately have an impact, but when considered as a whole have an unacceptable one.

Matters of national significance do not include all relevant matters that must be protected, as the list is outdated or being updates or updated only with minor additions.

An example of a huge failure is the potential loss of the Coorong and Lower Lakes, which are internationally listed under the Ramsar Convention. The evidence is that the Murray-Darling Basin is in trouble because of its degraded state, still; because of still unaddressed over-allocations, because of the worst droughts in our recorded history, because of climate change, and because the states and the commonwealth have ignored scientific evidence and refuse to act decisively in protecting an endangered system.



Above is an example of inefficient watering. Water is removed from the Murrumbidgee River into kilometres and kilometres of open channels. The annual crops are watered using third world techniques of furrow irrigation and running water down these furrows that can be kilometres in length.

Taking a look at the issues of the Murray-Darling Basin, it is really pretty ridiculous that the states and other vested interests such as certain irrigators, coporations who buy water and want to open up new areas to plant mono crops. Now we have the sale of water and water trading and big coproations that own water and that is their whole purpose; to sell water, either temporarily not usually permanently. They play with the death of the entire basin as if it were a political football with no real long-term consequences.

One very obvious evidence of this was the approval by both State and Commonwealth, of the Victorian North-South pipeline project which was approved, though there was plenty of evidence by recognized authorities and opposed by the majority of Victorians who saw it as ridiculous taking water from an already degraded system forever. This when Melbourne had many other options. The inaction and refusal to stop taking anymore water from the system will result in the loss of not only the Coorong and Lower Lakes but the other Ramsar wetlands along the Murray River, as well as having a detrimental totally preventable impact on biodiversity in the MDB. The ridiculous comment at the time by Minister Garrett, that Melbourne needed the water (therefore the pipeline was acceptable) was short sighted and smacked of political interference and reflected very bad decision-making. The fact is that he made comments such as that because it suits governments, who have done deals, which find a little impact acceptable, due to lack of rigorous scientific investigation and the application of the Precautionary Principle as required. The lack of will by the then Minister, to ensure that referrals address 'all adverse impacts' and that they referred whole project not bits of one which when accumulated, would have likely had a terrible irreversible impact. This decision is one of the many that has resulted in the Commonwealth and States failing to meet their obligations in all areas of our natural environment.



An empty Darling River February 2008-due to unaddressed over-allocations exacerbated by drought and climate change and further government inaction



The water came down the Darling but most was extracted by those upstream! Same day February 2008

Some issues are stated most clearly in a book called *'Murray River Country: an ecological dialogue with traditional owners'* by Jessica K. Weir 2009 (Aboriginal Studies Press). *"Ironically, The Living Murray has starkly revealed the ongoing lack of political support for environmental flows. Commissioned research by an expert reference panel advised that at least 1990 gigalitres of water needed to be returned to the Murray for a 'moderate probability' of achieving a healthy working river [while] 4000 gigalitres needed to be returned for a 'high probability' of achieving this (Jones et al. 2002, p. 27)."* The amount recovered is only 500GL and only amounts of 350GL to 1500GL were considered, which is well short of the mark!

Jessica continues on: *"The rhetoric of support for river health is evident, but the political will to challenge the assumed terms of the relationship-between people and water, and between water entitlement holders and the river-is lacking. Instead, action to address the water crisis is focused on 'gold-plating' the system; that is, a continued focus on improving the technology (Mike Young quoted on Mares 2007). The governments believe they are involved in a very large plumbing exercise."* And *"Despite the importance of water and its management, the development of water policy has occurred sporadically in reaction to water crisis, with advances in water law and policy coinciding with periods of drought (Botterill 2003). This ad hoc approach to water policy fails to engage with the 'precautionary principle', which is a central part of sustainability. The precautionary principle*

was devised by policy-makers and ecologists to argue that (DEWHA 1992, part 1):

Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. Water policy initiatives that only occur in response to drought do not create a context for long-term precautionary planning to prevent environmental degradation in the first place."

The *Australia State of the Environment 2011* can be accessed at:

<http://www.environment.gov.au/soe/2011/report/index.html> and it is most important that the MDBA and the Minister reads at least Chapter 4 on Inland Water and most definitely Chapter 3 on the Atmosphere which can maybe inform them about the impacts of climate change which they seem to have conveniently skipped.

Following taken directly from the 2011 report:

Withdrawing water for other uses changes our inland water ecosystems.

Almost every inland ecological system in Australia is either permanently or seasonally limited by a shortage of water. Permanently withdrawing (abstracting) water from these systems will inevitably change their character in some way and degree. Conversely, this same water-limited ecology and our highly variable climate make these systems relatively resilient to small or short-term reductions in water availability.

Pressures caused by past human activities continue to affect our inland waters, and climate change poses our largest future threat.

Most of the ongoing impacts on Australia's inland water environments result from our historical legacy of land-use change, pest and weed introductions, and water resource development. The main risk to inland environmental health that remains poorly mitigated is the likelihood of a drying and warming climate in our southern catchments and warmer temperatures across Australia. Current water-sharing rules tend to favour water entitlement holders over environmental flows in dry times.

Recent droughts have had major effects on our southern inland water systems.

Over the past decade or more, the southern half of Australia experienced the longest and most severe drought in our recorded history. The drought dramatically changed the character of inland water environments and there is evidence that this drought partly reflects a changing climate resulting from human activity. Northern Australia's inland water systems are largely in good condition.

Remediation of catchment water quality is not yet well managed.

While water abstraction pressures on inland water environments are increasingly better managed (and in places alleviated), there is less monitoring, coordination and effort applied to the remediation of catchment water quality. Planning and management of these two dimensions of catchment health are still largely separate.

Better understanding is needed about how well ecosystems can withstand changes in water regime.

Except for the south-west corner of the continent, the southern drought ended in late 2010 with widespread flooding. Monitoring of the recovery of river and wetland ecosystems following these floods will provide crucial insights into how inherently resilient these systems are. Managing for extreme conditions is emerging as a vital issue for environmental flows, as the implications of a

changing climate become more certain.

Meeting our population's need for water will be a critical challenge for Australia.

Using water from our environment is fundamental to our national wellbeing and sustainability. Each year, Australian industries add about \$1.2 trillion of gross value for the water we use. Demands for urban water will increase as Australia's population grows; these demands are likely to be **met without taking much more fresh water out of the environment** (but potentially with other environmental costs, including increased energy use associated with desalination or wastewater recycling).

Introduction

Australia is the world's driest inhabited continent. □It is therefore not surprising that places where fresh water accumulates either permanently or seasonally—our aquifers, rivers and wetlands—are of particular ecological and cultural significance. These inland water environments are also the places where we get the water needed to sustain us, our way of life and our development as a nation. Perhaps no other single dimension of the Australian environment has such a 'coming together' of biological, cultural and economic values. This chapter assesses the state and trend of inland water environments resulting from historical development pressures, and the outlook for these environments given the emerging pressures we face.

1.1 A decade of change

The past decade has been the most dynamic and significant in modern Australia's water history. It has been a period of ambitious water policy reform at the same time as the worst and longest droughts Australia has ever seen. There have also been massive public and private investments in water infrastructure, significant new foundations for water knowledge at a national scale, and the widespread acceptance by the public and by governments that Australia's climate has changed and will continue to change. The decade ended with widespread, unprecedented flooding. All these factors have had, and will continue to have, a profound effect on the state of our inland water environment.

In 2004, the Council of Australian Governments agreed to a policy blueprint to improve the way Australia manages its water resources—the National Water Initiative. All Australian states and territories joined the agreement by 2006. The overall objective of the initiative is a nationally compatible water market—a regulatory and planning-based system of managing surface water and groundwater resources for rural and urban use that optimises economic, social and environmental outcomes. Key environmental elements are:

- i. **statutory provision for environmental and other public-benefit outcomes, and improved environmental water management practices**
- ii. **completion of the return of all currently overallocated or overused water systems to environmentally sustainable levels of extraction**
- iii. **inclusion of Indigenous representation in water planning; incorporation of Indigenous social, spiritual and customary objectives and strategies; and taking account of the possible existence of native title rights to water.**

The National Water Commission established a national benchmark for Australia's water resources, Australian Water Resources 2005,^a and has since assessed Australia's performance against the objectives of the National Water Initiative; the assessment is a key input into this State of the Environment (SoE) report.

New arrangements for the management of the Murray–Darling Basin were put in place by the Australian Government through the **Water Act 2007**, which:

- iv. **established the Murray–Darling Basin Authority with functions and powers, including enforcement powers, to ensure that Basin water resources are managed in an integrated and sustainable way; and to prepare the Basin Plan—a strategic plan for the integrated and**

sustainable management of water resources in the Murray–Darling Basin

v. established a Commonwealth Environmental Water Holder to manage the Australian Government's environmental water, including protecting and restoring the environmental assets of the Murray–Darling Basin, and outside the Basin where the government owns water

vi. gave the Bureau of Meteorology water information functions in addition to its existing functions under the *Meteorology Act 1955* (see Box 4.1).

vii. Salinity, Nutrients and Water Quality

viii. Many of Australia's inland water environments are in a degraded condition. In southern Australia, and particularly the Murray–Darling Basin, this has resulted from relatively high levels of water resource development, compounded by an extended drought. Although the floods of 2010 in south-eastern Australia have relieved the drought, the degree of eventual ecological recovery is unknown. In south-western Australia, the current drought (now believed to reflect a changed climate) has led to a decline in river and wetland health as a result of low flows and high stream salinities (from lack of dilution). Northern Australian and Tasmanian inland water environments are generally in good condition.

ix. Nutrient levels in guidelines for fresh water are exceeded in all metropolitan areas and most areas of intensive agriculture. Monitoring of water quality, and interpretation of trends and causes, are inconsistent and sparse. It is therefore not possible to identify improving trends resulting from improved land practices.

x. Ecological processes have been altered to some degree across most parts of the continent. For much of northern and remote Australia, these changes are not significantly affecting ecosystem function and, with a few exceptions, there is little evidence that populations of aquatic species are declining. In most southern regions, inland water ecological processes have changed substantially since settlement and ecosystem function is significantly affected, with significant declines in many native species populations.

xi. Historically, water resource development in the Murray–Darling division has caused major changes in the flooding regimes that support floodplain wetland systems in the Murray–Darling Basin. These environments are nationally and internationally important. Integrating the flow impacts through the connected rivers of the Basin shows that total flow at the Murray mouth has been reduced by 61%. The river now ceases to flow through the mouth 40% of the time; this figure would be 1% in the absence of water resource development. More than half the reaches of the Murray–Darling division assessed in 2001 and 2009 had modified hydrology, with the greatest changes found immediately downstream of dams and in lowland reaches used for irrigation supply.

xii. Saline land and water is a natural feature in many parts of Australia, but the changes we have brought about in land and water management caused large-scale increases in the salinisation of land and rivers across much of the continent. In the 2001 State of the Environment (SoE) report for Australia, salinisation of land and water was highlighted as an issue of growing concern—5.7 million hectares of land were identified as showing signs of salinisation, with 17 million hectares predicted to be at risk by 2050. The 2006 SoE report identified salinisation as a major pressure on biodiversity, with particular severity in the southern Murray–Darling, along the south-east coast and in catchments in south-west Western Australia. Through this period, a widespread belief developed that salinisation was among the greatest pressures on our environment, and major national programs (e.g. the National Action Plan for Salinity and Water Quality) were developed to mitigate or reverse these impacts.

xiii. In recent years, salinisation of land and water seems to have a lower profile in the national conversation about our environment. It does not appear among the priority outcomes for investment in the 2008–13 Caring for our Country program, and is only referred to in passing as a concern. Does this mean that the threat is diminished?

- xiv. **The Murray–Darling Basin Plan is still legislatively required to have a water quality and salinity management plan. There is also a Basin Salinity Management Strategy and an Independent Audit Group for Salinity.** Dryland salinity is of greatest extent in the South-west Coast division, but public concern and government or community initiatives to redress the issue have diminished over the past five years.
- xv. It will be very important to monitor how the widespread floods in the south-east of Australia in 2010 and 2011 change the salt balances in soil and rivers.
- xvi. **Ecological State of MDB**
- xvii. Of all the drainage divisions, the most widespread concerns are about the ecological state and trend of the Murray–Darling. **An assessment in 2001¹⁴ found that 40% of the river length assessed in the Murray–Darling was impaired, having lost a significant number of aquatic macro invertebrate species expected to occur there, and 10% of the river length was severely impaired, having lost at least 50% of the aquatic macroinvertebrate species expected to occur. More than 95% of the river length assessed had an environmental condition that was degraded, and 30% was substantially modified from the original condition.**
- xviii. In the Queensland portion of the Murray–Darling drainage division, the condition of rivers and wetlands reported for 2007 was of concern. The majority of the Victorian catchments in the division had less than 30% of their stream length in good condition as reported in 2007, and large areas in the central and western regions had less than 10% in good condition.¹⁸ In the New South Wales portion of the division, 7 of the 25 native freshwater fish species found in lowland rivers were listed as threatened with extinction—almost double the number reported in 2006.¹⁹ Three freshwater invertebrates were listed as endangered species, and the status of many other species was of concern for conservation purposes. Three aquatic ecological communities were listed as endangered under the New South Wales *Fisheries Management Act 1994*. **The health of rivers, streams and wetlands of the Murray River floodplain in South Australia is declining due to over extraction of water from the river system, increasing salt levels, drought and the non-delivery of environmental flows.**²⁰ The health of floodplain vegetation is also declining. Macro invertebrate communities of the Murray River are stable and typical of a large, permanent, slow-flowing, regulated river. The biodiversity of native fish species is declining as a result of loss of habitat as wetlands dry due to drought and management actions.²⁰
- xix. Assessments over the period 2004–07⁶ reported on fish, macro invertebrates and hydrology, which were chosen as criteria for their significance in river ecosystems, their sensitivities to interventions and their linkages to other features of river ecology. The assessments found the following:
- xx. **• Only the Paroo was in good ecosystem health.** The Border Rivers and Condamine were in moderate health. **Seven valleys were in poor health, and 13 were in very poor health.**
- Native fish populations had declined, particularly in the south. Many native fish species expected to occur in particular valleys were not recorded at all; overall, species were found in only 43% of valley zones where they were predicted to occur under reference conditions. Alien species rivalled or outnumbered native fish in 9 of 23 valleys; 10 alien species contributed 43% of abundance and 68% of biomass. Three alien species (common carp, gambusia and goldfish) were present in all rivers— carp alone were 58% of all fish biomass.
- xxi. **• Most macroinvertebrate communities showed lower diversity than the reference condition.**
- xxii. **• One-third of sites fell short of the hydrology reference condition; these were mostly sites in the main channels of the division’s principal rivers.**
- xxiii. The report on the reassessment of the Sustainable Rivers Audit for the Murray–Darling division for 2008–10 is anticipated in late 2011. Given that most of the data was collected during a drought, it is unlikely that the above results will have greatly improved.
- xxiv. **The decline of ecosystems across the Murray–Darling as a result of diminished water**

flows has been documented in many areas of ecological science (Figure 4.10). **Many of the wetlands of the northern part of the division (some of which are listed under the international Ramsar Convention) are highly degraded.** About half of the river red gums (*Eucalyptus camaldulensis*) and river coobas (*Acacia salicina*) have died.³⁴ The northern nature reserve of the Macquarie Marshes lost about three-quarters of the cumbungi (*Typha* spp.) and water couch (*Paspalum distichum*) over the 10 years to 2007.³⁵ Three-quarters of the association between water couch and spike rush (*Eleocharis obicis*) and more than half of the marsh club-rush (*Bolboschoenus* spp.) were lost between 1996 and 2005.³⁶

- xxv. Impacts on waterbird and shorebird populations of loss of freshwater habitat due to abstractions and extended drought were evident by 2008. **The annual survey of waterbird communities at the Living Murray icon sites 37 in 2008 found a 48% decrease in bird numbers from the previous year.** No waterbird breeding was recorded at the Lower Lakes, Coorong and Murray mouth, and only minimal breeding of white ibis and black swans occurred at Chowilla Floodplain and Lindsay–Wallpolla islands. The decline of inland wetlands was identified as a significant contributor to the drastic decline in shorebirds (73% and 81% declines for migratory and resident shorebirds, respectively) over the period 1983–2006.³⁸

The floods in late 2010, following years of drought, were beneficial for floodplain forests, wetlands and rivers. The prolonged drought had led to a significant build-up of leaf litter on the floodplains, which in turn led to an extensive blackwater event. Blackwater events are a natural phenomenon associated with the rapid breakdown of accumulated leaf litter on the forest floor, which causes water discolouration. The breakdown of leaf litter plays an important ecological role in delivering nutrients back into the river system, thereby supporting the growth of many aquatic organisms. **However, this process can result in very low dissolved oxygen levels, which can be severe enough to cause fish deaths. By mid-December 2010, a blackwater event extended across the Murray River in the Edward and Wakool river system and the Goulburn–Broken, Lower Darling anabranch and Loddon rivers. The Victorian Environment Protection Authority reported the death of hundreds of Murray cod later that month.**

In the southern part of the South-east Coast division, less than 30% of stream length was found in good condition; only the catchments in eastern Gippsland had more than half their stream length in good condition.¹⁸ River health did not demonstrably change over the period 1999–2004. The condition of fish populations in coastal rivers in the northern part of the division was generally poor to moderate, while macro invertebrate communities in most coastal river catchments were in fair to good condition.¹⁹

- xxvi. River health in the South Australian Gulf division, as indicated by macro invertebrates, declined due to the effects of the prolonged drought. **Wetland areas have been extensively modified, filled and drained since European settlement, and close to 90% of those in south-eastern South Australia have been lost. Along the Fleurieu Peninsula, approximately 30% of wetlands existing before European settlement remain, and just 1% of the original extent of wetlands remains in a pristine condition.**²⁰

xxvii. Long-Term Environmental Health and Climate Change

Much of the pressure on our inland water environment is a legacy of the past—the clearing of native vegetation in catchments, the intentional or accidental introduction of weeds and pests, and the drainage of wetlands. Given the scale and practical irreversibility of this history, these pressures will remain, regardless of the choices we now make about our population growth or resource use.

- xxviii. Extensive land clearing has greatly decreased over the past 30 years (see Chapter 5: Land), but urban expansion continues to affect wetlands and streams on the urban fringe. Progress has been made towards controlling some of the serious weeds affecting inland water environments. The westward spread of cane toads across northern Australia is affecting systems in this region, and introduced fish species continue to have heavy impacts on aquatic ecosystems.

- xxix. Progress towards restoring some environmental flows, and plans by metropolitan water utilities to reduce future additional demands on freshwater resources are positive changes with respect to the pressures from water abstraction from the natural environment. The breaking of the extended

drought in south-eastern Australia has provided much-needed flows. **Nevertheless, the long-term environmental health of many southern Australian systems remains compromised by the amount of water abstracted for use.** Systems in northern Australia generally have a low level of environmental pressure due to water abstraction.

- xxx. There is compelling evidence that the ongoing drought, since 1975, in south-west Western Australia is partly related to human-induced climate change.

xxxi. Projects

- xxxii. The **Sugarloaf Pipeline** was completed in 2010, connecting Melbourne's water supply system with the Goulburn River system to deliver 75 gigalitres of water each year. This water resource was expected to result from improvements in irrigation system efficiencies of some 225 gigalitres per year, to be shared with the environment in northern Victoria (within the Murray–Darling Basin). □ In November 2010, the Victorian Government announced that the water resource would only be used to bring water to Melbourne during critical water shortages, due to concerns about potential impacts on regional development (including agriculture).
- xxxiii. **A new dam wall is under construction to increase the capacity of the Cotter Reservoir, near the headwaters of the Murrumbidgee River, from □ 4 gigalitres to 78 gigalitres.** This option to increase Canberra's water supply was considered to have relatively minimal impact because the dam wall will be constructed in an area already affected by the existing reservoir, on land that was badly affected by the 2003 fires and previous forestry plantations.

xxxiv. Bushfire Impacts on water supplies and water quality

Bushfires are a natural and common feature of the Australian environment. When extensive and intense, and in our higher rainfall areas (such as the fires in Victorian catchments in 2003 and 2009), **they can have serious short-term impacts on water quality and very long-term impacts on water supplies.** **Following the 2003 bushfires, which burned 1 million hectares of Victorian high country, studies showed that the maximum reduction in water yield (at about 25–30 years after the fires) was 692 gigalitres for □ the Murray River** and 155 gigalitres for the Gippsland Lakes.⁴⁹ Analyses estimated that, one year after the fires, the Ovens, Kiewa, Hume and Snowy catchments would deliver approximately 30 times more total suspended solids, 5 times more total nitrogen, and 8 times more total phosphorus than before the fires.⁵⁰ Following the bushfires of January 2009 (which affected catchments of five of Melbourne's nine major dams), Melbourne Water had to shift some 10 gigalitres of supplies out of storages made vulnerable to contamination from ash and debris. The effects of bushfires on water quality, and the measures that can be taken before, during and after bushfires to minimise these impacts, have been recently and comprehensively reviewed.⁵¹

Planning

An understanding of the broad pressures on inland water ecosystems is good, and tends to be reflected in planning. Planning of water supply to take into account environmental needs and climate change is excellent for metropolitan areas, which increasingly are taking the approach of 'water security through diversity'. Examples are emerging of significant local or regional improvements in environmental flows or water quality.

However, **strong empirical science on the quantitative relationship between ecosystem response or health and flow regime is widely lacking, and this is hampering planning. Planning is incomplete for many water resource areas and uneven for water quality recovery. Significant investments are being made in recovering water for environmental flows, but the investment in improving water quality is small relative to the size of the challenge.**

Processes for planning and management generally fail to meet expectations for consultation to allow Indigenous input, as agreed under the National Water Initiative, and initial public reactions to the *Guide to the proposed Basin Plan* highlighted the need for additional consultation.

THE COMMONWEALTH WATER ACT AND OBLIGATIONS

The key objects of the Commonwealth Water Act 2007 are:

3 Objects

The objects of this Act are:

- (a) to enable the Commonwealth, in conjunction with the Basin States, to manage the Basin water resources in the national interest; and
- (b) to give effect to relevant international agreements (to the extent to which those agreements are relevant to the use and management of the Basin water resources) and, in particular, to provide for special measures, in accordance with those agreements, to address the threats to the Basin water resources; and
- (c) in giving effect to those agreements, to promote the use and management of the Basin water resources in a way that optimises economic, social and environmental outcomes; and
- (d) without limiting paragraph (b) or (c):
 - (i) to ensure the return to environmentally sustainable levels of extraction for water resources that are overallocated or overused; and
 - (ii) to protect, restore and provide for the ecological values and ecosystem services of the Murray-Darling Basin (taking into account, in particular, the impact that the taking of water has on the watercourses, lakes, wetlands, ground water and water-dependent ecosystems that are part of the Basin water resources and on associated biodiversity); and
 - (iii) subject to subparagraphs (i) and (ii)—to maximise the net economic returns to the Australian community from the use and management of the Basin water resources; and
- (e) to improve water security for all uses of Basin water resources; and
- (f) to ensure that the management of the Basin water resources takes into account the broader management of natural resources in the Murray-Darling Basin; and
- (g) to achieve efficient and cost effective water management and administrative practices in relation to Basin water resources; and
- (h) to provide for the collection, collation, analysis and dissemination of information about:
 - (i) Australia's water resources; and
 - (ii) the use and management of water in Australia.

It is obvious that the key purpose of the Water Act is to return extraction in the Basin to long-term sustainable levels for both ecosystems and productive use. **This Draft Plan fails to comply.** (as stated by the Victorian EDO and other documents just released) Under Chapter 5 of the Draft Plan at 5.04(1) the MDBA has stated that: “the management objective in relation to water is to maintain **appropriate** water quality, including salinity levels for environmental, social, cultural and economic activity in the Murray Darling Basin.” This airy fairy wording, with non-binding targets, and the weakest interpretation, leaves little chance that the Commonwealth can apply a Plan that achieves the objects of both the Act and the Plan. It leaves it wide open for convenient, vested interest interpretation and is in total contrast to the Water Act 2007’s strong and clear wording which states under Part 2 Basin Plan Division 1 Section 25 (1) a-b that:

25 Water quality and salinity management plan

- (1) The water quality and salinity management plan **must**:
 - (a) identify the key causes of water quality degradation in the Murray-Darling Basin; and
 - (b) include water quality and salinity objectives and targets for the Basin water resources.
- (2) Without limiting paragraph (1)(b), a salinity target referred to in that paragraph:
 - (a) may specify the place at which the target is to be measured; and
 - (b) may specify a target in terms of a particular level of salinity being met for a particular percentage of time.
- (3) In exercising their powers and performing their functions under this Division in relation to the water quality and salinity management plan, the Authority and the Minister **must have regard to** the National Water Quality Management Strategy endorsed by the Natural Resource Management Ministerial Council.

Note: A copy of the National Water Quality Management Strategy may be found on the Department’s website.

‘Must’ is not a word that equates with **‘appropriate’** unless one is politically creative which it seems the MDBA are prepared to be.

The following is taken directly from the MDBA document *‘The Basin Plan: Legislative requirements (objects, purpose and basis)’*

Under **Section 20** the Basin Plan **must provide** for the integrated management of the Basin water resources in a way that promotes the objects of the Act, in particular by providing for:

- a) giving effect to relevant international agreements (to the extent to which those agreements are relevant to the use and management of the Basin water resources)
- b) the establishment and enforcement of environmentally sustainable limits on the quantities of surface water and ground water that may be taken from the Basin water resources (including by interception activities)
- c) Basin-wide environmental objectives for water-dependent ecosystems of the Murray-Darling Basin and water quality and salinity objectives
- d) The use and management of the Basin water resources in a way that optimises economic, social and environmental outcomes

- e) Water for each its most productive use through the development of an efficient water trading regime across the Murray-Darling Basin
- f) Requirements that a water resource plan for a water resource plan area must meet if it is to be accredited or adopted under Division 2
- g) Improved water security for all uses of Basin water resources

The matters mentioned in paragraphs (b), (c), (e) and (f) are captured as **mandatory content for the Basin Plan** (see s 22). The remaining purposes are reflected in the Act's objects (s 3). While no one purpose prevails over another, it is necessary to keep in mind the hierarchy within the objects discussed above in relation to s 3.

The Victorian EDO has written a ***Legal Analysis of the Proposed Murray-Darling Basin Plan*** released March 2012 in which they make some very clear and relevant points highlighting where the MDBA has failed to align the Draft Plan with the Water Act with conveniently chosen wording that alters the whole intent of the Draft Plan. Since I agree with the EDO analysis and since the Basin Plan is going to be law, I will highlight some of these again for the MDBA and the Minister, so that they can change the Draft Plan, so that it actually complies with the Water Act, which is a legal document and law. The Authority is required to write a Basin Plan that complies with the Water Act and it is unacceptable that they '*consistently give provisions their weakest interpretation and/or give effect to them in the weakest way.*'

The MDBA has chosen to realign their focus when pursuing the objectives and outcomes of the Draft Plan differently to what the Water Act under Section 20 requires them to incorporate in the Basin Plan. In the Draft Plan at Chapter 5, 5.02, they use the wording '**healthy working** Murray-Darling Basin' which fails to reflect the actual objects of the Water Act, which requires 'the establishment and enforcement of environmentally sustainable limits on the quantities of surface water and ground water that may be taken from the Basin water resources (including by interception activities)'. See Section 3 and 20 and and Section 22. They have for their own convenience excluded the main objective of the Water Act and the Basin Plan by directing it in another direction and thus altered their focus for the entire Plan.

By prioritising the 'possible social and economic considerations and operational constraints,' they have failed to address 'what extraction level is sustainable. Whilst 'constraints can be considered in setting SDLs' the MDBA must still write a Plan that does not over ride the objects of both the Water Act and the required objects of Plan. See Water Act Section 3 and Draft Plan Chapter 5 eg 5.02 (2) (b).

The decision to increase groundwater extraction by 2,545GL from an annual average extraction of 1,795GL, to 4,340GL ignores **Section 21 (4)** of the Water Act which states that 'the Authority and the Minister must, in exercising their powers and performing their functions under this Divisions:

- a) Take into account the principles of **ecologically sustainable development**; and

- b) Act on the basis of the best available scientific knowledge and socio-economic analysis; and
- c) Have regard to the following:
 - i. The National Water Initiative;

And Section 21 (2) (b) promote **sustainable** use of the Basin water resources to protect and restore the ecosystems, natural habitats and species that are reliant on the Basin water resources and to conserve biodiversity.

As well as the **Precautionary Principle** as set out in Section 21 (2) (a) be prepared to have regard to:

- i. the fact that the use of the Basin water resources has had, and is likely to have, significant adverse impacts on the conservation and sustainable use of biodiversity; and
- ii. the fact that the Basin water resources require, as a result, special measures to manage their use to conserve biodiversity

It is evident in documentation that I have read that there is no real knowledge about groundwater systems and their interconnectedness and how climate change will impact on the surface and groundwater interactions. There is also a specific exclusion to consideration of the Great Artesian Basin system and since I have included a map that shows that the MDB and the GDB overlap to a great extent, surely this cannot be excluded or ignored. Since the Authority must have regard to the NWI which constantly emphasises that ground and surface water are interconnected and must be considered as one, that the north and south Basin must be treated as one there is a discrepancy with how the Authority came to this massive increase in groundwater extraction.

Section 21 (1) the Basin Plan (including the environmental watering plan or water quality and salinity management plan) must be prepared so as to provide for giving effect to relevant international agreements (to the extent to which those agreements are relevant to the use and management of the Basin water resources). And:

Without limiting s 21(1)

Section 21 (2)

- a) the Basin Plan **must be prepared** having regard to:
 - i. the fact that the use of the Basin water resources has had, and is likely to have, significant adverse impacts on the conservation and sustainable use of biodiversity
 - ii. the fact that the Basin water resources require, as a result, special measures to manage their use to conserve biodiversity
- b) the Basin Plan must promote sustainable use of the Basin water resources to protect and restore the ecosystems, natural habitats and species that are reliant on the Basin water resources and to conserve biodiversity

Section 21 (3) the Basin Plan **must also**:

- a) promote wise use of water resources
- b) promote the conservation of declared Ramsar wetlands
- c) take into account the ecological character descriptions of all declared Ramsar wetlands and all other key environmental sites

Subject to ss 21 ((1), (2), & (3)

Section 21(4)(c) sets out matters to which the Authority and the Minister must have regard when preparing and making the Basin Plan.

-in preparing the Basin Plan the Authority **must have regard** to:

- i. the National Water Initiative
- ii. the consumption and other economic uses of the Basin water resources
- iii. the diversity and variability of the Basin water resources and the need to adapt management approaches to that diversity and variability
- iv. the management objectives of the Basin States for particular water resources
- v. social, cultural, indigenous and other public benefit issues
- vi. broader regional natural resources management planning processes
- vii. the effect or potential effect of the Basin Plan on the use and management of water resources that are not in the Basin water resources
- viii. the state water sharing arrangements
- ix. any other arrangements between states for the sharing of water

Section 21 (5) the Basin Plan **must ensure** that there is no net reduction in the protection of planned environmental water from the protection provided for under the state water management law of a Basin State immediately before the Basin Plan first takes effect

Section 21 (6) the Basin Plan **must not be inconsistent** with the provisions of the license issued under section 22 of the Snowy Hydro Corporation Act 1997 of New South Wales

And without limiting the above

Section 86A(1) the Basin Plan **must be prepared** having regard to the fact that the Commonwealth and the Basin States have agreed:

- a) that critical human needs are the highest priority water use for communities who are dependent on Basin water resources
- b) in particular, that to give effect to this priority in the River Murray System, conveyance water will receive first priority from the water available in the system

http://download.mdba.gov.au/proposed/ESLT_MDBA_report.pdf

The Authority knows what has to be done, but has allowed itself to be caught up in political games and vested interest groups lobbying, with the result that the Plan has had the weakest possible interpretation and they have set upon a figure of 2750GL reduction almost in concrete which most scientists say will not achieve the objects of the Water Act. The Draft Plan itself when compared with the Water Act has very clear deficiencies that prevents the return of the Basin to an environmentally sustainable extraction level which addresses the over-allocation or overuse and ‘fails to protect, restore and provide for the ecological values and ecosystem services of the Murray-Darling Basin.’ *Water Act Section 3 (c) (d)*

Murray-Darling Basin Authority 2011, *The proposed “environmentally sustainable level of take” for surface water of the Murray-Darling Basin: Methods and outcomes*, MDBA publication no: 226/11, Murray-Darling Basin Authority, Canberra.

The Convention on Wetlands of International Importance (the Ramsar Convention) is one of the key international agreements given effect to by the Water Act and the Basin Plan. The Ramsar Convention is founded on the 'wise use' concept. The wise use of wetlands is defined as "the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development". "Wise use" therefore has at its heart the conservation and sustainable use of wetlands and their resources.

In 2002, in response to evidence showing the declining health of the River Murray system, governments established The Living Murray initiative. Supported by scientific assessment of environmental water requirements, the governments agreed to recover an average of 500 GL per year as a 'first step' towards securing the long-term ecological health of six icon sites, and agreed to concurrently invest in infrastructure to make the best use of the water available to the environment and achieve other ecological outcomes, including fish passage.

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Summarising across the requirements of the Act, supported by an understanding of the obligations under international agreements, and the objectives of water reform processes such as the National Water Initiative, the task for MDBA in setting an ESLT includes taking into account:

xxxv. ☐ the water required to provide for the ecological values (e.g. biodiversity) and ecosystem services of the Basin (e.g. human values like the provision of 'fit for purpose' water quality, and aesthetically appealing environment for recreation and tourism); and

xxxvi. ☐ the socio-economic benefits of water resource use, and the impacts of any reduction in take. ☐ In recognition of this, MDBA has adopted the overall management objective of achieving a healthy working Murray-Darling Basin, including a healthy environment, strong communities and a productive economy.

xxxvii. **The need for change**

xxxviii. For more than a hundred years, the infrastructure and management of the Murray-Darling Basin has been developed to secure social and economic outcomes. Many rivers have been modified and become highly managed systems to supply drinking water to towns and cities, support agriculture, mitigate floods and droughts, and allow for irrigation.

xxxix. This development has supported one of the most productive food and fibre regions in Australia. However, there have been substantial environmental impacts that now undermine the very agricultural and community values that the Basin supports.

xl. These environmental impacts have long been recognised and the recent drought exposed the limits and weakness of how water is currently managed in the Basin. The Murray Mouth was only kept open by constant dredging. Wetlands and floodplains across the Basin from Queensland to South Australia all experienced widespread environmental degradation. Some irrigators received no water in some years, while towns and cities experienced harsh water restrictions.

xli. **1.2.2 Groundwater**

xlii. A number of rivers within the Basin are understood to receive flow from significant groundwater sources and the extent of connectivity between surface water and groundwater in some areas of the Basin means that groundwater discharge can make up a large part of the flow in these streams during dry times (CSIRO and SKM 2011). The level of this contribution varies throughout the Basin and is reflected by the distribution of groundwater dependent ecosystems (GDE). Groundwater dependent ecosystems, which are ecosystems that use groundwater as part of their survival strategies, are an important component of biological diversity in the Basin. These ecosystems may completely rely on groundwater, particularly during drought, and it is the degree of this dependency which influences the extent to which they are affected by changes to the

groundwater system. The ESLT for groundwater is outlined in the companion document Groundwater SDL methodology (CSIRO and SKM 2011).

xlili. **1.3.2 Impacts of water resource development**

xliv. Water resource development in the Basin, which has included the extensive modification of the natural flow regime, has resulted in **major declines in the health of water-dependent ecosystems** (MDFRC 2011). Generally, the reduction in the frequency and magnitude of floods underpins the loss of diversity and resilience in riverine ecosystems (Arthington and Pusey 2003). This relates to the importance of flow variability and flooding, as a key component of the habitat requirements for many aquatic and floodplain organisms (Roberts and Marston 2000, Rogers and Ralph 2011).

xlv. Flow is affected by the **capture of water** in major dams, the pattern of release of water from these dams, and by the extraction of water throughout the Basin. **These factors combine to produce changes in flow that differs across the Basin in both scale and type**. The Basin's major dams modify flow patterns by storing inflows, and then releasing stored water when downstream water needs exceed downstream inflows, or on the relatively few occasions when they overflow during flood periods. The overall effect of this is to dampen out flow variability downstream of the dam with the proportion of time the river spends in flood and low flow reduced. While the increased frequency of moderate in-channel flows that can be provided by regulation with dam releases provides more reliable river flows for human use, it removes the 'boom/bust' signals that many native plants and animals require to breed, and overall will lead to a less diverse ecology.

xlvi. This decline in condition has been highlighted in a recent MDFRC (2011) report which found the Basin's water-dependent ecosystems are naturally characterised by a high degree of both natural disturbances and anthropogenic (human) pressures. **These tend to interact to increase pressure on the system and decrease resilience**. The report suggested that, given these disturbances and pressures, significant management change is required to prevent further degradation of water-dependent ecosystems in the Basin. Crucial to these changes will be the restoration of a more natural flow regime.

xlvi. There is **evidence of the detrimental impacts of flow regime changes** on native fish populations. Studies of native fish movement indicate that some species can travel hundreds or even thousands of kilometres (Crook et al. 2001, Koehn et al. 2009, O'Connor et al. 2005). The implications for populations if fish are not able to make these excursions include interrupted spawning, restrictions in accessing preferred habitat and food resources, an increased chance of predation and disease, and the reduction in genetic diversity as populations become fragmented.

xlvi. **There are major environmental benefits to restoring a more natural watering regime. Healthy riverine systems provide areas of biodiversity, nursery areas for native fish and crustaceans, nutrient sources for the rivers, and natural flood buffers. Wetlands can also provide extra water storage, tourism, recreational opportunities and are culturally significant.**

Further to item 3, some examples of ways that method takes into account the need to optimise economic, social and environmental outcomes are:

- xliv. ☐ Selecting a *healthy working basin* as an overarching objective for the Basin (rather than the restoration of rivers to a pristine state);
- i. ☐ The plan aims to protect and restore key environmental assets and key ecosystem functions, not all assets and functions;
- ii. ☐ The desired watering frequencies for key environmental assets and key ecosystem functions are selected to operate within the tolerances of associated plant and animal species, but are not the natural frequency of flows;
- iii. ☐ Selecting ESLT options for testing that give consideration to economic, social and

environmental outcomes;

- liii. ☐ The process has been bounded by current water delivery constraints, a key social and economic consideration; and
- liv. ☐ Selecting approaches and policies to source and use water efficiently.
- lv.
- lvi.

INTERGOVERNMENTAL AGREEMENT ON ADDRESSING WATER OVERALLOCATION AND ACHIEVING ENVIRONMENTAL OBJECTIVES IN THE MURRAY-DARLING BASIN

Between the Commonwealth of Australia and the Governments of New South Wales, Victoria, South Australia, and the Australian Capital Territory

PREAMBLE

- lvii. The Parties agree to implement this Agreement in recognition of the need to address overallocation of water resources and achieve environmental objectives in the Murray- Darling Basin (MDB).
- lviii. In August 2003, the Parties to this Agreement agreed to provide new funding of \$500 million over five years to address water overallocation in the MDB, comprising the following contributions; Commonwealth Government \$200 million, New South Wales \$115 million, Victoria \$115 million, South Australia \$65 million and the Australian Capital Territory \$5 million.
- lix. This Agreement establishes arrangements for the recovery and management of water to support the decision by the MDB Ministerial Council of 14 November 2003 to implement a first step to address the declining health of the River Murray system (the Living Murray First Step decision), and to address other water overallocation issues in the MDB.
- lx. The Murray-Darling Basin Agreement (1992) and the relevant legislation enacted by each of the Parties to support the Murray-Darling Basin Agreement (1992) and joined by the Australian Capital Territory through a Memorandum of Understanding dated 27 March 1998 provide the statutory framework within which the Parties will work to achieve the specific objectives of this Agreement.
- lxi. The Parties agree to implement this Agreement consistent with the National Water Initiative Intergovernmental Agreement and its objective of a nationally compatible system of managing surface and groundwater resources for rural and urban use that optimises economic, social and environmental outcomes.
- lxii. Implementation of this Agreement will be dependent upon agreement by the Parties to the National Water Initiative Intergovernmental Agreement.
- lxiii. This Agreement acknowledges the water recovery activities of the Snowy Joint Government Enterprise established in accordance with the Snowy Water Inquiry Outcomes Implementation Deed (2002) and other, State and Territory based, water recovery bodies. The Parties agree to undertake their responsibilities under these various initiatives so as to give effect to integrated water resource management outcomes.

- lxiv. Other natural resource management initiatives subject to separate agreements by the Parties, particularly the National Action Plan for Salinity and Water Quality and the Natural Heritage Trust, play an important and complementary role in improving the sustainable management of water in the MDB. Continued implementation of the National Water Quality Management Strategy will also complement the outcomes of this Agreement. The Parties agree to implement these initiatives in a manner which facilitates the achievement of their common objectives.

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COMMENCEMENT AND TERMINATION

- . The provisions of this Agreement will commence for each Party as it becomes a signatory to both this Agreement and the National Water Initiative Intergovernmental Agreement.
- . The funding arrangements under this Agreement will terminate five years from commencement, or on any later date the Parties agree in writing. Other elements of this Agreement, including environmental water management arrangements, auditing, monitoring and reporting, will continue beyond termination of the funding arrangements, until such time as agreed by the Parties.

INTERPRETATION

11. In this Agreement, words and phrases have the same meaning as in the National Water Initiative Intergovernmental Agreement, the Murray-Darling Basin Agreement (1992) and the Murray-Darling Basin Act (1993).

ROLES AND RESPONSIBILITIES

- Responsibility for overseeing implementation of this Agreement lies with the MDB Ministerial Council.
- The MDB Ministerial Council will develop and agree a Business Plan for implementation of the Agreement within three months of commencement.

i) The Business Plan will:

- (a) describe how the actions and milestones agreed in the Agreement are to be achieved, including milestones and water recovery targets;
- (b) include agreed indicative volumetric targets for each jurisdiction;
- (c) include agreed indicative financial commitments for each jurisdiction; and
- (d) detail the activities outlined in Clauses 72 to 77 of this Agreement.
- The Parties are jointly and severally responsible for implementing this Agreement and accountable for the achievement of its objectives.
- The Parties are responsible for ensuring there is adequate engagement of relevant stakeholders in the implementation of this Agreement.

OBJECTIVES

16. The objectives of this Agreement include:

- i) to establish a framework for implementation of the Parties' commitment to invest \$500 million to address water overallocation in the MDB;

- ii) to implement arrangements for cost effective, permanent, recovery of water to achieve the agreed environmental objectives of the Living Murray First Step decision (refer Clauses 3 and 17), or other such objectives as may be agreed by the Parties;
- iii) to provide water on an on-going basis to meet agreed environmental objectives in the MDB; and

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iv) to improve management of environmental water in the MDB.

17. The priority for investment under this Agreement is the recovery of water to implement the Living Murray First Step decision in regard to achievement of specific environmental objectives and outcomes for six significant ecological assets; Barmah- Millewa Forest, Gunbower and Koondrook-Perricoota Forests, Hattah Lakes, Chowilla floodplain (including Lindsay-Wallpolla), the Murray Mouth, Coorong and Lower Lakes, and the River Murray Channel, through recovered water (refer Clause 21) being built up over a period of five years to an estimated requirement of an average □500 GL/year.
18. Any measures to address water overallocation or other environmental objectives in other areas of the Basin under this Agreement must be agreed by all Parties to this Agreement.
19. Water recovered under this Agreement will be held permanently within the water allocation and access entitlement frameworks of the Parties with the security, reliability and access characteristics necessary to achieve the environmental outcomes agreed under the Living Murray First Step decision or other such objectives as may be agreed by the Parties.

ELIGIBLE MEASURES

20. Measures eligible for accreditation against funding commitments under this Agreement (eligible measures) will recover or manage water to meet the environmental water needs of the significant ecological assets identified under the Living Murray First Step decision (refer Clause 17). Other measures will not be considered eligible under this Agreement unless agreed by all Parties.
21. Funding under this Agreement shall be for new eligible measures for the recovery of water agreed by the MDB Ministerial Council as meeting the purpose of the COAG funding commitment of 29 August 2003.
22. The obligations of the relevant Parties under the Snowy Joint Government Enterprise and the Snowy Water Inquiry Outcomes Implementation Deed are additional to this Agreement and are not included within its scope.
23. Water recovery proposals which may be considered eligible for accreditation against funding commitments under this Agreement may include:
 - . i) investment in water infrastructure, whether on or off farm;
 - . ii) purchase of water on the market, by tender or by other market-based mechanisms;
 - . iii) investment in infrastructure and behavioural change to increase efficiency and reduce consumption in urban areas;
 - . iv) regulatory measures as part of a broader package of proposals; and
 - . v) any other such measures as may be agreed by all Parties to this Agreement.

REGISTER OF PROPOSALS AND ELIGIBLE MEASURES

24. A central register of measures proposed for accreditation against funding commitments under this Agreement will be maintained by the MDB Ministerial Council and be available to all Parties.

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25. The register will have two parts:

- . i) proposed measures for further development and subsequent assessment against eligibility criteria (developmental register); and
- . ii) measures approved for accreditation against funding commitments under this Agreement (eligible measures).

26. Only proposals on the register of eligible measures will be accredited against funding commitments under this Agreement.

27. Any of the Parties and other interested persons may nominate a proposal for inclusion on the register.

28. A proposed measure nominated to the register may comprise a number of identifiable sub-components, where such an aggregation is necessary to the feasibility and effectiveness of the proposal. Such a proposal will be assessed as a single measure and may not be disaggregated except at the discretion of the nominating Party.

29. Any proposed measure nominated to the register will include the means by which the recovered water will be permanently secured through statutory instruments for the objectives of this Agreement, and any terms which will apply to the use of the water.

ASSESSMENT PROCESS AND CRITERIA FOR ELIGIBILITY

30. The MDB Ministerial Council will assess a proposed measure for its:

- . i) eligibility for listing as an eligible measure on the register; and
- . ii) accreditation of recovered water against funding commitments.

31. Parties and other interested persons nominating proposed measures will ensure that proposals have been adequately investigated to determine their probable feasibility against the assessment criteria, and will make all relevant information available to the assessment process.

32. The primary criteria for accreditation of an eligible measure will be:

. i) the degree to which the characteristics of the recovered water will fulfil the requirements of the Basin Environmental Watering Plan to be developed under Clause 58, or any other environmental objectives which may be agreed; and

. ii) the cost effectiveness of the proposed measure, including initial cost per unit of water, and ongoing costs arising from the management, storage or delivery of the water to achieve the agreed environmental objectives.

33. Other matters which may be taken into account in assessing proposals for further development or accreditation for funding include social and economic impacts, salinity and water quality

outcomes, additional environmental benefits, and third-party impacts.

34. The MDB Ministerial Council will establish assessment criteria within three months of commencement of this Agreement, based on Clauses 32 and 33.
35. Proposed measures may be accepted onto the developmental register (refer Clause 25(i)) if they demonstrate sufficient likelihood of meeting the primary criteria (refer Clause 32) to warrant further investigation.

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36. In recognition of the need to expeditiously identify eligible measures from the date of commencement of the Agreement, the Parties agree that where, in the first three months from commencement of this Agreement, a proposal:

- . i) recovers new water that meets the objectives of this Agreement (refer Clause 16);
- . ii) demonstrates that the environmental water is to be managed under the Basin Environmental Watering Plan (refer clause 58);
- . iii) demonstrates that the environmental water is to be given statutory recognition (refer Clause 29);
- . iv) demonstrates that the environmental water is accounted for on registers (refer Clause 55) and is confirmed by subsequent auditing provided for in this Agreement (refer Clause 78);
- . v) acquires the water at a price not exceeding \$1,000 per megalitre of Long- Term Diversion Cap equivalent water; and
- . vi) at the time it is registered, could not be substituted by any other proposal available at the time at the same or lesser cost;

37. then the proposal would be deemed to be an accredited measure for the purposes of this Agreement and for the crediting of the volume of water recovered and the value thereof. New water, in order to be defined on a common basis, is to be defined in terms of Long- Term Diversion Cap equivalent volumes.

38. Eligible measures for recovery of water through market mechanisms, regulatory measures, or changes to river or wetland management will be credited at a price agreed by the MDB Ministerial Council which is based on the estimated market price for water access entitlements of similar characteristics.

39. Eligible measures for recovery of water through infrastructure investment will be credited at a price agreed by the MDB Ministerial Council which will not exceed an agreed multiple of the estimated market price for water access entitlements of similar characteristics, noting that the cost of the measure beyond the credited water price will be met by the relevant Party or their proposal partners from sources other than those covered by this Agreement.

40. Crediting amounts for all eligible measures in Clauses 37 and 38 above will be decided by the MDB Ministerial Council subject to agreed criteria and rules to be developed by the Council within three months of commencement of this Agreement.

41. Parties agree to recognise, in the development of the criteria and rules in Clause 39 above, the following values associated with each proposal:

- i) the average cost per megalitre of water recovered by the proposal;
- ii) the financial credit to be acquitted against each Party's commitment upon successful implementation of the proposal; and
- iii) the cost per megalitre of recovered water that each investing Party is prepared to commit in light of the above two values.

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INVESTING IN ELIGIBLE MEASURES

- 41. All Parties to this Agreement will have an equal first call opportunity to invest in any proposal on the register of eligible measures up to the proportion of their funding commitment to the \$500 million.
- 42. The jurisdiction in which the water recovery measure is to be implemented will have first call on any share not taken up by another jurisdiction and at their discretion may offer any additional shares to other investing parties.
- 43. The relevant jurisdiction for any proposed measure must agree to the measure for it to proceed in their jurisdiction.
- 44. Other interested persons not party to this Agreement may fund or implement a proposal on the register of eligible measures at the discretion of the Parties, provided that their participation promotes the objectives of this Agreement.
- 45. Funding contributions will be separately administered by each Party to this Agreement, but will be transparently accounted for at the Basin level through a financial register maintained by the MDB Ministerial Council. Financial accounting arrangements will recognise both joint and individual proposals.

WATER RECOVERY AND INVESTMENT TARGETS

- 46. Targets will be established for investment and water recovery under this Agreement which will demonstrate the commitment of the Parties to an early roll-out of implementation, establish transparent measures of progress, and ensure that effort and impacts are shared equitably between jurisdictions.
- 47. Subject to the primary eligibility criteria under Clause 32, indicative annual investment targets will be established for expenditure of the \$500 million commitment over five years and reviewed as required. Parties will contribute to the achievement of the indicative annual targets in proportion to their share of the overall funding commitment.
- 48. Three year indicative targets will be set for the amount of water to be recovered within each jurisdiction, recognising the differing opportunities within each, their relative share of water under the MDB long-term diversion caps established under Schedule F of the Murray-Darling Basin Agreement (the Long-Term Diversion Cap), and the watering regime required under the Basin Environmental Watering Plan (refer Clause 58).
- 49. Indicative water recovery targets will be described in a manner, to be settled by the MDB Ministerial Council, which reflects the differing reliability and security characteristics of recovered water, for example conversion to a common measure such as MDB Long-Term Diversion Cap equivalent volumes or description of the required product mix. Where recovered water is outside the current Long-Term Diversion Cap arrangements, the MDB Ministerial Council will agree the basis, if any, for crediting against volumetric targets.

50. Progress against the three year indicative water recovery targets will be reviewed annually, including a comprehensive assessment of progress towards meeting the requirements of the Basin Environmental Watering Plan and an evaluation of remaining investment opportunities.
51. Indicative targets for water recovery and investment shall be agreed by the MDB Ministerial Council within three months of commencement.

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ACCOUNTABILITY FOR RECOVERED WATER

52. Water recovered under this Agreement will be clearly assigned in perpetuity for the purposes of this Agreement in licences and associated water accounts, as water access entitlements, or in water sharing plans, within the jurisdictions in which it is sourced, and within the jurisdictions in which it is received and managed.
53. Where recovered water is currently within the MDB Long-Term Diversion Cap, the Cap will be amended as soon as reasonably practicable to reflect its recovery for environmental purposes.
54. Parties will be bound in the use of the recovered water by the terms and commitments which accompanied the proposed measure (Clause 29), and such terms and commitments may only be amended by agreement of the MDB Ministerial Council.
55. Recovered water will be accounted for on registers to be maintained in the State or Territory where the water is sourced, and at an aggregated Basin-wide level. Such a register shall include the origin, security, reliability, associated storage or delivery entitlements, and other characteristics of the water, its application for achievement of the agreed environmental objectives, and, where relevant, any trading of the water.
56. The MDB Ministerial Council will identify as soon as reasonably practicable consequential changes to the MDB Agreement (1992) required to implement this Agreement.

ENVIRONMENTAL WATER MANAGEMENT

57. Implementation of the environmental objectives of the Living Murray First Step decision will be the priority for the use and management of the water recovered under this Agreement.
58. The MDB Ministerial Council will develop, in consultation with regional communities and within 12 months of the commencement of this Agreement, an environmental watering plan based on best available science which will address use of the recovered water to achieve the agreed environmental objectives of the Living Murray First Step decision (the Basin Environmental Watering Plan).
59. The terms and commitments attached to each implemented water recovery measure (Clause 29) will be consistent with the Basin Environmental Watering Plan.
60. Application of recovered water to environmental outcomes or sites need not be in the jurisdiction or locality where a measure is effected or where the funding is sourced.
61. The Basin Environmental Watering Plan will come into effect when agreed by the MDB Ministerial Council. Environmental watering of the six significant ecological assets of the Living Murray First Step decision (refer Clause 17) in the interim will be through current arrangements or other agreed arrangements.

62. The MDB Ministerial Council shall enter into agreements with the relevant jurisdictions to implement the watering of the six significant ecological assets (refer Clause 17) according to the flow or other environmental triggers stipulated in the Basin Environmental Watering Plan, and in accordance with the terms and commitments entered into under Clause 29.

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63. The Parties will ensure that local watering plans will be consistent with the Basin Environmental Watering Plan prepared by the MDB Ministerial Council and give effect to any obligations therein.
64. Environmental water shall be held by jurisdictions or their nominees as an allocation of sufficient security and reliability to meet the requirements of the Basin Environmental Watering Plan, and be made available for the purposes of the plan.
65. Improved environmental outcomes in tributaries of the Murray River are to be promoted through the use of the recovered water where this is consistent with and does not compromise the achievement of the environmental objectives agreed for the six significant ecological assets identified under the Living Murray First Step decision (refer Clause 17).
66. The Parties will use their best endeavours to ensure that no detrimental effect on the environmental condition of Murray-Darling system, including its tributaries, will result from the recovery of water under this Agreement.
67. The Basin Environmental Watering Plan shall be reviewed at intervals agreed by the MDB Ministerial Council.

TRADING OF RECOVERED WATER

68. Water which is recovered under this Agreement and held as a tradeable water access entitlement may be traded on the temporary water market at times when this is not contrary to the Basin Environmental Watering Plan, the terms and conditions which apply to the water recovery measure (Clause 29) or to this Agreement.
69. Net revenue from the temporary trade of water recovered under this Agreement must be separately accounted for on the financial registers of the investing parties and set aside for the achievement of the objectives of this Agreement.
70. The MDB Ministerial Council will develop, within 12 months of commencement of this Agreement, a protocol concerning the trading of recovered water and the direction of revenue to meet the objectives of the Basin Environmental Watering Plan, or complementary river health outcomes where the revenue is not required for the purposes of the plan.
71. Water recovered under this Agreement may be traded on the permanent market only if the outcome of the transaction is to use the revenue derived to acquire water access entitlements which better match the requirements of the Basin Environmental Watering Plan (refer Clause 58).

INSTITUTIONAL ARRANGEMENTS

72. The MDB Ministerial Council will coordinate all activities under this Agreement which are to be delivered at the Basin scale, including:
- . i) development of a Business Plan for implementation of this Agreement (refer Clause 13);
 - . ii) agreement on the types of measures eligible for accreditation against funding commitments

under this Agreement (refer Clause 23);

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- . iii) development of assessment criteria and coordination of the assessment process (refer Clause 34);
 - . iv) maintenance of the register of eligible measures (refer Clauses 24 and 25);
 - . v) accreditation of measures against funding commitments under this Agreement (refer Clause 30);
 - . vi) determination of any crediting amount under Clauses 37 and 38;
 - . vii) coordination of opportunities for multi-jurisdictional funding of eligible measures (refer Clauses 41 and 42);
 - . viii) establishing indicative investment targets, and monitoring performance against these (refer Clause 47);
 - . ix) establishing indicative water recovery targets, defining the way in which they will be implemented and managed, and monitoring performance against the agreed targets (refer Clause 48);
 - . x) maintenance of an aggregated Basin-wide register of recovered water, including any permanent or temporary trade in recovered water, and adjustment of the MDB Long-Term Diversion Cap as required (refer Clauses 53 and 55);
 - . xi) development and implementation of an environmental watering plan for the Living Murray First Step decision environmental objectives (the Basin Environmental Watering Plan, refer clause 58);
 - . xii) agreeing and giving effect to the terms and commitments which are associated with each water recovery measure (Clause 29), and any amendments to these;
 - . xiii) monitoring and public reporting of outcomes against the Basin Environmental Watering Plan (refer Clauses 79 (iv) and 80); and
 - . xiv) review of the Agreement (refer Clause 81).
73. The MDB Commission will have operational responsibility for all Basin-scale activities under the oversight of the MDB Ministerial Council, as listed above, unless otherwise agreed by the Council.
74. Parties will be responsible for proposing, developing and implementing eligible measures, holding recovered water in a form which meets the requirements of the Basin Environmental Watering Plan and making it available for the purposes of the plan, and ensuring community engagement in actions taken under this Agreement. These responsibilities include:
- . i) undertaking feasibility studies and bringing forward proposals suitable for registration as eligible measures under this Agreement (refer Clause 31);
 - . ii) entering into investment sharing arrangements with the other Parties (refer Clauses 41 and 42);
 - . iii) meeting jurisdictional water recovery and investment targets (refer Clauses 47 and 48);
 - . iv) maintaining financial records, including for any trade in recovered water (refer Clauses 69 and 78);

- . v) maintaining externally audited State and Territory-based registries of recovered water (refer Clauses 55 and 78);

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- . vi) implementation of water recovery measures, and giving effect to the terms and commitments accompanying each water recovery measure (refer Clause 29);
- . vii) ensuring community consultation in the development and implementation of measures (refer Clause 15);
- . viii) ensuring that recovered water is characterised within the State and Territory water allocation and access entitlement regimes with security, reliability, and access characteristics which meet the requirements of the Basin Environmental Watering Plan (refer Clause 19) ;
- . ix) making recovered water available for the purposes of the Basin Environmental Watering Plan, and where necessary entering into specific arrangements for this purpose (refer Clauses 62 and 64);
- . x) coordinating local or regional management of environmental water, and entering into agreements with local catchment authorities or their equivalents for this when appropriate (refer Clauses 63 and 77); and
- . xi) monitoring and public reporting of outcomes at the regional, State or Territory level (refer Clauses 79 and 80).

75. Regional catchment management authorities, water authorities, water users and similar bodies may propose, invest in or implement eligible measures where this is consistent with the objectives and requirements of this Agreement.

76. Regional and local bodies will be consulted in the local management of environmental water and the development of the Basin Environmental Watering Plan.

77. Local or regional catchment management bodies or their equivalents may be responsible for local management of environmental water at the discretion of the relevant jurisdiction, provided the objectives of any such body in management of the recovered water shall be consistent with the objectives of this Agreement and occurs within the institutional framework contained in this Agreement.

MONITORING, AUDIT AND REVIEW

78. The following will be subject to annual external auditing to the satisfaction of the MDB Ministerial Council:

- . i) financial records of expenditure accredited against funding commitments under this Agreement;
- . ii) financial records of any temporary or permanent trade of recovered water;
- . iii) registries of recovered water;
- . iv) the environmental management of the recovered water; and
- . v) management of the impacts on the MDB Long-Term Diversion Cap which result from the recovery and delivery of water under this Agreement.

79. The Parties agree to establish within 12 months of commencement a suitable monitoring and evaluation plan for this Agreement that involves annual reporting to the MDB Ministerial Council on:

i) actions taken under this Agreement;

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- . ii) progress against the indicative water recovery and investment targets set for each jurisdiction;
- . iii) any trade of recovered water, and the reinvestment of any revenue so derived; and
- . iv) performance against the Basin Environmental Watering Plan and the achievement of environmental objectives, including performance against environmental indicators.

80. All reports are to be made publicly available, including on the MDB Commission internet website.

81. The Parties will review this Agreement three years from commencement.

82. The MDB Ministerial Council and the Parties shall implement sufficient monitoring and information systems as required to enable such reporting and review.

VARIATION

83. This Agreement may be amended at the request of one of the Parties, subject to the agreement of all the Parties.

ACKNOWLEDGEMENT

84. The Parties agree that measures undertaken under this Agreement will be identified in accordance with a communications plan to be developed by the MDB Ministerial Council, and that opportunities will be provided for the Parties to be involved in any promotional activities associated with this Agreement or the implementation of particular measures.

DISPUTE RESOLUTION

85. If a dispute arises under this Agreement the members of the MDB Ministerial Council will use their best endeavours to settle the dispute through direct negotiation and by acting in a spirit of cooperation.

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Signed for and on behalf of each of the parties by:

The Honourable John Winston Howard MP) Prime Minister of the Commonwealth of Australia)

The Honourable Robert John Carr MP) Premier of New South Wales)

The Honourable Stephen Phillip Bracks MP) Premier of Victoria)

The Honourable Michael Rann MP) Premier of South Australia)

Jonathon Donald Stanhope MLA) Chief Minister of the Australian Capital Territory)

25 June 2004

The following, though a document dated 1996, clearly highlights the fact that the

concerns about water for ecosystems have been considered for a very long time. The over extraction, the degradation due to land use changes, pollution and man made structures has been acknowledged in this document. The MDBA and the Minister have before plenty of evidence that a weak and ineffectual figure based on flawed or incomplete information will do nothing to achieve with a Basin Plan that does not address the key requirements of the Commonwealth Water Act. The States have agreed and the Commonwealth has agreed to the Water Act, which they passed. The COAG agreement, which all the States signed, and the National Water Initiative, which they all agreed to, sets obligations, which must be met.

Agriculture and Resource Management Council of Australia and New Zealand and Australian and New Zealand Environment and Conservation Council

NATIONAL PRINCIPLES

For The Provision Of Water For Ecosystems

Sustainable Land and Water Resources Management Committee Subcommittee on Water Resources

Occasional Paper SWR No 3 July 1996

Printed by: Littlewood Printing Sydney ISBN 0 7310 2382 X

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The Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), established in 1993, is one of a number of Ministerial Councils set up by the Commonwealth and State Governments to further co-operation and collaboration in particular fields of mutual concern. ARMCANZ consists of Australian Commonwealth/State/Territory and New Zealand Ministers responsible for agriculture, land and water resources, and rural adjustment policy issues.

The Council is a non-statutory body. It provides a forum for the exchange of views on the development of policies, guidelines and programs to assist the beneficial and orderly assessment, development and management of Australia's resources. It is supported by a permanent Standing Committee, the Standing Committee on Agriculture and Resource Management (SCARM). Membership of the Standing Committee comprises relevant Departmental Heads/Chief Executive Officers of Australian Commonwealth/State/ Territory and New Zealand agencies as well as representatives of CSIRO and the Bureau of Meteorology.

Inquiries concerning ARMCANZ publications should be directed to:

Secretary, Standing Committee on Agriculture and Resource Management GPO Box 858 □ CANBERRA ACT 2601 Australia

Tel: (06) 272 5216; Fax: (06) 272 4772

AUSTRALIAN AND NEW ZEALAND ENVIRONMENT AND CONSERVATION COUNCIL

The Australian and New Zealand Environment and Conservation Council (ANZECC) is a non-statutory Commonwealth, State, Territory and New Zealand Ministerial Council. It was formed in 1991 by amalgamation of the former Australian and New Zealand Environmental Council (ANZEC) and the former Council of Nature Conservation Ministers (CONCOM).

ANZECC provides a forum for member governments to exchange information and experience and develop coordinated policies in relation to national and international environment and conservation

issues. Its members are the Commonwealth, State, Territory and New Zealand Ministers responsible for the environment and conservation, with the relevant Minister from Papua New Guinea as an observer.

The Council is supported by two Standing Committees of senior officials nominated by the Ministers, the Standing Committee on Environment Protection (SCEP) and the Standing Committee on Conservation (SCC). The Standing Committees are advised by specialist working groups, task forces and networks set up for specific purposes.

For further information concerning ANZECC, contact: ANZECC Secretariat

Department of the Environment, Sport and Territories GPO Box 787 □ CANBERRA ACT 2601

Tel: (06) 274 1428; Fax: (06) 274 1858

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EXECUTIVE SUMMARY

I. PURPOSE

Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) and Australian and New Zealand Environment and Conservation Council (ANZECC) have jointly developed a set of National Principles for the Provision of Water for Ecosystems.

The purpose of these National Principles is to provide policy direction on how the specific issue of water for the environment should be dealt with in the context of general water allocation decisions. These Principles, in themselves, are not a framework for water allocation. They are one input to a much broader process that will consider all users in the mechanism of water allocation.

Review of the broader process will be undertaken by ARMCANZ. This review will consider all water users including the environment and will provide a balanced framework for water allocation amongst these users.

2. GOAL

The goal for providing water for the environment is to sustain and where necessary restore ecological processes and biodiversity of water dependent ecosystems.

3. PRINCIPLES

Basic premise of principles

PRINCIPLE 1

River regulation and/or consumptive use should be recognised as potentially impacting on ecological values.

Determining environmental water provisions

PRINCIPLE 2 Provision of water for ecosystems should be on the basis of the best scientific information available on the water regimes necessary to sustain the ecological values of water dependent ecosystems.

Provision of water for ecosystems

PRINCIPLE 3 Environmental water provisions should be legally recognised.

PRINCIPLE 4 to systems where there are existing users, provision of water for ecosystems should go as far as possible to meet the water regime necessary to sustain the ecological values of aquatic ecosystems whilst recognising the existing rights of other water users.

PRINCIPLE 5 Where environmental water requirements cannot be met due to existing uses, action (including reallocation) should be taken to meet environmental needs.

PRINCIPLE 6 Further allocation of water for any use should only be on the basis that natural ecological processes and biodiversity are sustained (i.e. ecological values are sustained).

Management of environmental water allocations

PRINCIPLE 7 Accountabilities in all aspects of management of environmental water provisions should be transparent and clearly defined

PRINCIPLE 8 Environmental water provisions should be responsive to monitoring and improvements in understanding of environmental water requirements.

Other uses

PRINCIPLE 9 All water uses should be managed in a manner which recognises ecological values.

PRINCIPLE 10 Appropriate demand management and water pricing strategies should be used to assist in sustaining ecological values of water resources.

Further research □

PRINCIPLE 11 Strategic and applied research to improve understanding of environmental water requirements is essential.

Community involvement

PRINCIPLE 12 All relevant environmental, social and economic stakeholders will be involved in water allocation planning and decision-making on environmental water provisions.

1. Introduction

Most water allocation decisions in the past concentrated on the provision of water for urban, industrial and agricultural uses. Dams were built to stimulate rural and urban development rather than in response to demand and water was allocated as part of the process. Little or no attention was paid to the environmental consequences of these decisions. Even less consideration was given to the ecological consequences of disposing of water after use.

Over time, the scale of our water resource developments increased and impacts on the ecological values of waterways and other aquatic ecosystems became more evident. Seasonal and annual variability of the water regimes are essential for the maintenance of aquatic ecosystems. Both have been significantly modified in many surface water systems.

In addition, this problem has been exacerbated by changes in catchment land use, clearing of vegetation, disposal of sewage and other wastes. Although there have been many social benefits from water resource development, a number of environmental problems have become evident. Australia's rivers and wetlands are under stress. Algal blooms are increasing in number and severity. There have been considerable changes to stream integrity including significant river erosion and a widespread decline in

native fish species.

Some aquatic ecosystems have been irreversibly changed by these stresses. In other aquatic ecosystems, wildlife habitats have been substantially degraded. Overall, there has been a diminution or loss of many aquatic species. Some impacts have been immediate and quite dramatic. Other impacts have been more gradual, with changes and losses becoming apparent only slowly over time.

Simultaneously, the decrease in the overall environmental quality of our rivers and streams has had a number of direct and indirect effects on our capacity to use our water resources for other purposes e.g. recreation, agriculture and drinking water.

Overall, there has been a general acceptance from all sectors of the community that aspects of our past approaches to water allocation and management were unsustainable. There is a need to review our water allocation procedures to allow use for agricultural, domestic and industrial purposes whilst ensuring that there is sufficient water allocated to maintain riverine and wetland ecosystem values. This is necessary to protect the long term viability of the water resource base to ensure that it can continue to meet all the needs of the community.

1.1 NATIONAL DIRECTIONS

This need to improve our approaches to water resource allocation and management has been recognised in a number of Federal and State policies, particularly in:

- . Principles of Ecologically Sustainable Development (1992);
- . InterGovernmental Agreement on the Environment (1992); and
- Draft National Water Quality Management Strategy (1994).

However, most recently, the Council of Australian Governments (COAG) reviewed water resource policy in Australia and agreed to implement a strategic framework to achieve an efficient and sustainable water industry.

As one of the major components of this framework, the COAG recommended the introduction of comprehensive systems of water allocations including the determination of clearly specified water entitlements, the provision of water for the environment and water trading arrangements.

The COAG provided a clear, general direction for a major review of water resource allocation policies. Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) is currently undertaking this review which will consider the rights of all water users including the environment. It has developed a paper Water Allocation and Entitlements. A National Framework for the Implementation of Property Rights in Water (ARMCANZ, 1995). This will provide a balanced framework for water allocation amongst all users.

However, before undertaking this work, ARMCANZ considered that some direction was required on how the issue of water for the environment should be dealt with in water allocation decisions. Specifically, there was a need for policy on questions such

as:

- ☐ the definition of environment in this context;
- ☐ the aim of providing water for the environment;
- ☐ methods of providing water for the environment; and
- ☐ management of environmental water provisions. (

These basic policy issues are clear for all other users of the resource but there was no general agreement on these questions when considering the needs of the environment in the water allocation process. Therefore, ARMCANZ commissioned a set of National Principles for the Provision of Water for Ecosystems. (

I.2 PURPOSE OF THE NATIONAL PRINCIPLES FOR THE PROVISION OF WATER FOR ECOSYSTEMS (

The purpose of these National Principles is to provide policy direction on how the issue of water for the environment should be dealt with in the context of general water allocation decisions. It should be noted that **these Principles, in themselves, are not a framework for water allocation. They are one input to a much broader process that will consider all users in the mechanism of water allocation.** (

A general review of water allocation processes and the development of a framework for property rights for water is being undertaken by ARMCANZ. (

Adopting the principles set out in 'National Principles for the Provision of Water for Ecosystems' is one step towards sustainable water management. However, it will not solve

all of the problems confronting aquatic ecosystems in Australia. Although very important, water quantity addresses only one of the needs of aquatic ecosystems. Attention needs also to be directed to the degradation caused by changes in catchment land use, clearing of vegetation, draining of wetlands and the disposal of sewage and other wastes. All of these have played a part in affecting river flows, groundwater and water quality.

1.3 PROCESS

The development of these National Principles has been undertaken jointly by the Agriculture and Resource Management Council of Australia and New Zealand and the Australian and New Zealand Environment and Conservation Council. This document forms part one of a three part report series:

- Part 1. National Principles for the Provision of Water for Ecosystems. ☐ Provision of Water for Ecosystems
- Part 2. Current status in States and Territories.

- Part 3. Provision of Water for Ecosystems - Issues and approaches to implementation.

DEFINITIONS

To ensure a common understanding, the following represent useful definitions of the terms used in this report:

The term **ENVIRONMENT** as used in this document refers to the natural components of aquatic ecosystems, the flora and fauna, and the natural ecological processes that take place between individual plants and animals, their surroundings, and between each other. The maintenance of species biodiversity, community structure and functioning and natural ecological processes are important elements (and indicators) of the maintenance of overall environmental integrity.

WATER DEPENDENT ECOSYSTEMS are those parts of the environment, the species composition and natural ecological processes of which are determined by the permanent or temporary presence of flowing or standing water. The instream areas of rivers, riparian vegetation, springs, wetlands, floodplains and estuaries are all water dependent ecosystems.

ECOLOGICAL VALUES are defined as the natural ecological processes occurring within water- dependent ecosystems and the biodiversity of these systems.

ENVIRONMENTAL WATER REQUIREMENTS are descriptions of the water regimes needed to sustain the ecological values of aquatic ecosystems at a low level of risk. These descriptions are developed through the application of scientific methods and techniques or through the application of local knowledge based on many years of observation.

ENVIRONMENTAL WATER PROVISIONS are that part of environmental water requirements that can be met. Environmental water provisions may refer to:

- ☐ unregulated flows in rivers and water in wetlands and aquifers;
- ☐ specific volumetric allocations and/or releases from storages;
- ☐ water levels maintained in wetlands; and
- ☐ water in transit for other users, the pattern of flow of which may be defined to meet an environmental need.

2 GOAL FOR THE PROVISION OF WATER FOR THE ENVIRONMENT

Water plays a fundamental role in all ecosystems. All of Australia's flora and fauna are dependent on water to some extent for survival. Many species are totally dependent on rivers or the flow regimes for either all or part of their life cycles. For these species, water provides habitat, enables their movement or migrations,

facilitates chemical processes, delivers or removes nutrients or assists in the dispersal of genetic products including eggs and offspring and the recolonisation of ephemeral habitats. Providing water for the environment is one action that will assist in the protection of natural ecological processes and biodiversity in aquatic ecosystems. Therefore the overall objective for providing water for the environment is as follows:

GOAL To sustain and where necessary restore ecological processes and biodiversity of *water* dependent ecosystems.

The adoption of this goal provides direction on the major aim for which water is to be provided for the environment i.e. the protection of ecological values. It is not intended to address the protection of other values provided by the instream (i.e. in situ) use of water for the community. These include provision of water for hydroelectric power, for navigation, for recreational uses and the improvement of water quality. It should be noted, however, that in many cases, the requirements for these other instream uses of water may be compatible with the primary objective of providing water for the environment. Where they are not compatible, the provision of water for the environment will be directed at the protection of ecological values. The requirements of these other instream uses as well as other consumptive uses will then be considered in the broader review of water allocation to be undertaken by ARMCANZ.

The adoption of this goal also provides some direction as to the level of environmental protection to be offered in allocating water for the environment. The objective is not to return all rivers to a pristine condition but rather to ensure that the needs of the water dependent ecosystems are considered and catered for in water allocation decisions. In general, the aim is to protect and sustain current environmental values. The exception will be those cases where there is a community decision to provide further water for the restoration or enhancement of their aquatic ecosystems.

Given that the major objective of providing water for the environment will be to maintain water dependent ecosystems and not to provide for other instream uses - these National Principles will be known as the National Principles for the Provision of Water for Ecosystems.

3 PRINCIPLES FOR THE PROVISION OF WATER FOR ECOSYSTEMS

The following section presents the principles for allocating water for ecosystems together with the rationale behind each principle. These principles will provide the policy direction for the provision of water for ecosystems in the broader process of water allocation.

The principles address seven major issues related to the provision of water for ecosystems. They are listed below with some of the main discussion points addressed by these National Principles:

1. Basic premise

2. Determining environmental water provision

- determining the basis for environmental water requirements

3. Provision of water for ecosystems

- need for legal recognition
- in relation to existing users
- in overcommitted systems □ Management of environmental water allocations
- accountability of management • uncertainty

4. Management of allocations for other uses Further research □ Community involvement

- accountability of management
- uncertainty

5. Management of allocations for other uses

6. Further research

7. Community involvement

3.1 BASIC PREMISE OF PRINCIPLES

The introduction of dams, regulating structures and water diversions to improve the availability of water for consumptive uses has altered the flow regimes of rivers and streams. Such operations have caused significant flow deviations away from natural conditions along stream reaches with the inevitable result that instream and wetland processes have been adversely affected. It must be recognised at the outset that provision of water for consumptive uses will have impacts on ecological values. This is the basic premise behind these National Principles.

P R I N C I P L E I River regulation and/or consumptive use should be recognised as potentially impacting on ecological *values*

3.2 DETERMINING ENVIRONMENTAL WATER PROVISION

Clear, consistent objectives provide a focus for the management activities of those agencies with direct responsibilities for the protection of aquatic ecosystems and those agencies responsible for activities which may impact on ecological values. These management objectives should include the maintenance of ecological values of aquatic ecosystems. The identification of ecological values is then an essential prerequisite to sustainable management. Once ecological values have been identified,

then work can be undertaken to determine their environmental water requirements i.e. the water regimes necessary to maintain these values. On this issue, it should be noted that the COAG recommended that environmental water requirements, wherever possible, will be determined on the best scientific information available.

PRINCIPLE 2

Provision of water for ecosystems should *be* on the basis of the best scientific information available on the water regimes necessary to sustain the ecological values of water dependent ecosystems.

3.3 PROVISION OF WATER FOR ECOSYSTEMS

Studies of environmental water requirements will provide information on the water regimes required to sustain ecological values. These studies where available will be used as a basis for the provision of water for ecosystems. However, determining environmental water requirements is only the first step in providing water for ecosystems. The actual provision of water requires the resolution of a number of issues including:

- the process for providing water to the environment;
- the interactions between environmental water provisions and other (users;
- reallocation of water in overcommitted systems; and
- protecting the environment in future water allocation decisions. (

The following principles provide direction on these points.

3.3.1 Process for providing water for ecosystems

Environmental water has been typically that which remains after all other users in the system have taken their share. Most water law in Australia was enacted to assist the development of water resources for consumptive uses. Where there has been a reference to protection of the environment, it has generally been too vague to guide management decisions. As a consequence, the rights to water of existing consumptive users are provided for in legislation whilst the rights of the environment are less clear. (

Water for environmental purposes should be recognised as a legitimate use of water; as legitimate as any other use. In order to ensure full protection of the aquatic environment, environmental water provisions should have formal recognition under law. Recognition should encompass provisions enabling the allocation of water to the

environment and/or provisions enabling constraints to be placed on other uses so as to achieve protection of ecological values. (

PRINCIPLE 3 Environmental water provisions should be legally recognised

3.3.2 Interactions with other users (

In providing water for ecosystems, it must be recognised that, in many cases, other users will have some existing legal rights to water. Therefore it may not be possible to meet the full environmental water requirement due to the need to provide water for these other uses of the system. In these cases, provision of water for ecosystems should go as far as possible to meet the environmental water requirements whilst recognising the existing rights of other water users.

PRINCIPLE 4

In systems where there are existing users, provision of water for ecosystems should go as far as possible to meet the water regime necessary to sustain the ecological values of aquatic ecosystems whilst recognising the existing rights of other water users.

3.3.3 Overcommitted water allocation situations

In systems where the environmental water provisions do not meet environmental water requirements, it is expected that environmental degradation will occur. These systems should be regarded as overcommitted. Where it is established on the basis of best available scientific knowledge that ecological values are not being sustained, then action should be taken to increase the environmental water provisions. Such action may include mechanisms for reallocation and water conservation. Such action should be undertaken in conjunction with appropriate monitoring to allow evaluation of the effectiveness of the action in achieving the environmental objectives.

PRINCIPLE 5 Where environmental water requirements cannot be met due to existing uses, action (including reallocation) should *be* taken to meet environmental needs.

3.3.4 Protecting the environment in future water allocation decisions

Historically the environment's requirement for water has rarely been considered in water allocation decisions. Water was extracted on the basis of actual or anticipated demand. There is now a growing concern to protect the environment in all future water allocation decisions to ensure that the mistakes of over allocation are not repeated. Therefore, all new developments should ensure that the needs of the environment are met.

PRINCIPLE 6 Further allocation of water *for* any use should only be on the basis that natural ecological processes and biodiversity are sustained (i.e. ecological values are sustained).

3.4 MANAGEMENT OF ENVIRONMENTAL WATER

Once an environmental water provision has been determined it should be managed in the best possible way to ensure ecological processes are maintained or restored. To achieve appropriate management of environmental water allocations, accountability needs to be defined, and be transparent. Monitoring is required to ascertain how adequately the objectives of environmental water provisions are being met, and hence to enable adaptive management to be implemented.

3.4.1 Accountability

Accountability in the management of environmental water provisions is an essential component in achieving community acceptance of the need to set aside water for the environment. Accountability takes on even greater importance where reallocation of water to the environment is proposed. Thus the authority, organisation or individual responsible for managing an environmental water provision, and in particular any environmental water allocations, should be clearly defined and be accountable to both the Government and the community. The authority, organisation or individual will need to establish management objectives for the ecological values to be sustained and clearly specify the way in which environmental water provisions will be managed to protect these. This will allow others in the system to manage their entitlements accordingly.

PRINCIPLE 7

Accountabilities in all aspects of management of environmental water provisions should be transparent and clearly defined.

3.4.2 Uncertainty in environmental water provisions

The techniques available for determining environmental water requirements cannot specify an environmental flow or regime that will conclusively ensure the protection of the environment. What the techniques serve to do is highlight the risks to ecological values of pursuing particular flow or watering strategies. In situations where environmental water requirements have been investigated, monitoring programs need to be established to ensure the environmental water provisions are maintaining ecological values. Monitoring programs allow for continuous or periodic review of flow or watering strategies and provide a means for assessing whether or when risks to ecological values are occurring. Where observed environmental impacts are less than anticipated monitoring programs can be scaled down accordingly. Where monitoring indicates that ecological values are at risk, monitoring programs enable immediate remedial action thereby minimising risk of permanent degradation of ecological values.

PRINCIPLE 8

Environmental water provisions should be responsive to monitoring and improvements in understanding of environmental water requirements.

3.5 OTHER USES

Water which has been allocated for other uses may contribute to the maintenance of ecological values. Water in transit to other uses may be part of an environmental water provision (without affecting the primary purpose of the allocation) provided the pattern of flow is defined in reference to specified environmental objectives. Operating rules that are sympathetic and account for environmental requirements need to be developed for both new and existing situations and implemented.

PRINCIPLE 9 All water uses should be managed in a manner which recognises ecological values.

The impact of other water uses on the environment can be lessened if those uses are as efficient as possible. Ways to encourage the efficient use of water include:

demand management;

and □ appropriate pricing mechanisms which reflect the true costs of supplying water.

PRINCIPLE 10 Appropriate demand management and water pricing strategies should be used to assist in sustaining ecological values of water resources.

3.6 FURTHER RESEARCH

Techniques for estimating environmental water requirements for Australian conditions are limited. Both the environment and potential developers would benefit if more rigorous techniques were available. For example, more water may be available for harvesting or abstraction while still maintaining a low risk of impacts on ecological values. Conversely, the case for maintaining environmental water requirements or for restoring water to the environment would be strengthened if techniques for estimating environmental water requirements were more rigorously substantiated. The need for further research on this issue should be regarded as a priority for water management and this should be recognised in the program and budget of water management agencies.

PRINCIPLE 11 Strategic and applied research to improve understanding of environmental water requirements is essential.

3.7 COMMUNITY INVOLVEMENT

Decisions on water allocation may affect many groups and individuals. Groups and individuals that benefit from water supplied from water resource developments have a direct interest in decisions on water allocations. This is especially so where decisions may affect the overall availability of water or the security or reliability of supply, thereby directly impacting on the investment decisions of these groups and

individuals. However the broader community, both within and outside a specific catchment, also has interests in decisions on water allocations and any associated costs. Accordingly, all parties with interests in decisions on water allocations (the stakeholders) should be involved in the decision-making processes, particularly where these involve decisions on environmental water provisions. An important prerequisite to involvement and consultation is fully informing and raising awareness within the community.

PRINCIPLE 12 All relevant environmental, social and economic stakeholders will be involved in water allocation planning and decision-making on environmental water provisions.

4. FUTURE DIRECTIONS

In the 'National Principles for the Provision of Water for Ecosystems', the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) and the Australia and New Zealand Environment and Conservation Council (ANZECC) are seeking to move beyond the rhetoric towards action on the water needs of aquatic ecosystems. The principles developed here will guide the granting and management of environmental water allocations. Implementation of these principles will ensure that the importance of properly functioning aquatic ecosystems is recognised and proper consideration of environmental requirements will be given in decisions on water resource allocations.

'National Principles for the Provision of Water for Ecosystems' constitutes Part I of a three part report series. Reports to follow include:

Part 2. Provision of Water for Ecosystems - Current status of States and Territories.

Part 3. Provision of Water for Ecosystems - Possible approaches to implementation.

State and Territory adoption of the principles developed in the report is necessary to achieve sustainability. Part 2 will outline the current legislation and administrative arrangements and Part 3 the possible approaches for implementation.

Appendix 1

The National Principles for the Provision of Water for Ecosystems were developed by a joint ARMCANZ/ANZECC Working Group.

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Water and the Murray Darling Basin - A Statistical Profile

Australia □ 2000–01 to 2005-06

Appendix — Policies and Programs Relevant to the Murray-Darling Basin

Brian Pink □ Australian Statistician

POLICIES AND PROGRAMS RELEVANT TO THE

MURRAY-DARLING BASIN

There have been a number of water management policy initiatives introduced in Australia during the past 20 years that have been directly relevant to the MDB. These have been developed to address social, economic and natural resource management issues within the Basin, particularly the sharing of water resources between the environment, agriculture and other users. Some of the policies are national in scope, others are MDB-specific.

THE NATIONAL WATER INITIATIVE

In 2004, the National Water Initiative (NWI) was signed by all state and territory governments except for Western Australia and Tasmania. Tasmania signed in 2005, followed by Western Australia in 2006. The NWI is the overarching policy framework that guides current water management in Australia. It represents the Commonwealth, state and territory governments' shared commitment to water reform (NWC 2008).

The overall objective of the NWI is to achieve a nationally compatible market, regulatory and planning based system of managing surface and groundwater resources for rural and urban use that optimises economic, social and environmental outcomes (NWC 2008).

The NWI represents and extends previous key policy reforms of the past two decades including:

- integrated catchment management; • tradeable water rights; □ • full accounting of resources and use; • regional water planning; and
- environmental allocations (Hussey and Dovers 2007).

One of the key objectives of the NWI is to facilitate the operation of efficient water markets and the trading of water within and between jurisdictions. Another objective is to establish best practice pricing and institutional arrangements to promote economically efficient and sustainable use of water resources, infrastructure and government water management resources (NWC 2008).

The purpose of implementing these measures is to:

- lxvii. • reduce barriers to water trade;
- lxviii. • more effectively allocate water between competing users;
- lxix. • improve water efficiency; and
- lxx. • ensure that water is allocated to its highest value use (Grafton and Peterson 2007, □ Wong 2008). □
- lxxi. **THE NATIONAL PLAN FOR WATER SECURITY**

The National Plan for Water Security seeks to facilitate the modernisation of Australian irrigation, helping to put it on a more sustainable footing at a time of

declining water resources. It seeks to address over-allocation in the MDB, to improve the health of rivers and wetlands of the MDB, and to benefit irrigators and the community (Australian Government 2007).

Under the National Plan for Water Security, the Commonwealth Government will invest up to \$3 billion over ten years to address over-allocation of water in the MDB. Planned in conjunction with the modernisation programme, this will be achieved by providing assistance to irrigation districts to reconfigure irrigation systems and retire non-viable areas, such as those at the end of isolated channels or in salt-affected areas. Assistance will be provided to help relocate non-viable or inefficient irrigators, or help them exit the industry. Where necessary, water entitlements will also be purchased on the market (Australian Government 2007).

There are three other key aspects of the National Plan for Water Security. The first is reforming governance arrangements through establishing the new Murray-Darling Basin Authority (MDBA). The MDBA will be responsible for planning the Basin's water resources in the interests of the Basin as a whole. The second is improving the accuracy, timeliness and comprehensiveness of water information, by nesting responsibility for water availability and use data collection with the Bureau of Meteorology. The third key aspect is the examination of northern Australia for future land and water development and completing the final phase of the Great Artesian Basin piping and bore-capping project (Australian Government 2007).

The National Plan for Water Security is a document of the former Australian Government. The current Australian Government's new national water plan, Water for the Future incorporates elements of the earlier plan.

WATER FOR THE FUTURE

Water for the Future is a national strategy to secure Australia's long term water supply. It is built on four key priorities:

✎ taking action on climate change, ✎ using water wisely, ✎ securing water supplies; and ✎ supporting healthy rivers (Wong 2008).

Water reforms will include:

- ✎ removing barriers to trade in water, allowing markets to operate more effectively in ✎ allocating water between competing uses, improving water use efficiency, and ✎ delivering water to its highest value uses;
- ✎ ensuring that economic settings work to promote affordable and timely investment ✎ in secure water supplies, and ensuring that alternative water supplies and ✎ water-efficient technologies can compete on a level playing field;
- ✎ improving water security in remote communities, including remote Indigenous ✎ communities; and
- ✎ making sure water planners have the **best information** on available water resources ✎ and the likely impacts of climate change (Wong 2008).
✎ Water for the Future includes a commitment to a National Greywater and

Rainwater Initiative. This provides direct incentives for household rainwater and greywater use, recognising the importance of water conservation and water efficiency to water planning. □ The policy also aims to improve the efficiency of irrigation infrastructure. Under the Sustainable Rural Water Use and Infrastructure Program, funding is provided for investment in improving the efficiency and productivity of water use and management to reduce the amount of irrigation water lost to leakage and evaporation (Wong 2008). □ In response to the challenge of securing water supplies for Australia's cities and towns, with growing water needs and declining traditional water resources, the Commonwealth, state and territory governments will work together to develop new sources of water that do not rely entirely on rainfall. An Urban Water and Desalination Program will provide funding towards new and innovative water supply projects in desalination, recycled water and stormwater harvesting (Wong 2008).

Another program, the National Water Security Plan for Towns and Cities, will target infrastructure refurbishment, new infrastructure, and practical projects to save water and reduce water losses.

Water for the Future also includes an Improving Water Information Program. Administered by the Bureau of Meteorology, this program will produce national water accounts supported by a national water monitoring and data collection network (Wong 2008).

THE WATER ACT 2007

The *Commonwealth Water Act* was initiated by the previous Australian Government in 2007 and commenced on 3 March, 2008 under the new government. The Water Act will "enable water resources in the MDB to be managed in the national interest, optimising environmental, economic and social outcomes" (DEWHA 2008c). The Act establishes the MDBA to manage water resources in the MDB in an integrated and sustainable way. **The MDBA's functions include preparing a Basin Plan that sets sustainable limits on surface and groundwater that can be taken across the Basin.** The MDBA will develop systems that facilitate water trading, and will be responsible for measuring and monitoring water resources in the MDB (DEWHA 2008c).

The Water Act establishes a Commonwealth Environment Water Holder. This holder will manage the the water entitlements that the Commonwealth acquires, in order to protect and restore environmental assets in the Basin (DEWHA 2008c).

The Act provides the Australian Competition and Consumer Commission (ACCC) with the role of developing and enforcing water charge and market rules. The aim of these new functions is to ensure that water markets are able to operate freely across state borders (DEWHA 2008c).

The Act also provides the Bureau of Meteorology (BoM) with water information collection and publication functions. The BoM will also be responsible for setting and implementing national water standards for water information (DEWHA 2008c).

In the mid-1990s, it was recognised that there were circumstances that warranted government intervention in the form of drought assistance, and drought and Exceptional Circumstances policies were initiated to mitigate the affects of extreme events on agricultural production.

Exceptional Circumstances (EC) events are defined as rare and severe events that are outside those that farmers could normally be expected to manage using responsible farm management strategies. Specifically, they are events that occur on average once every 20 to 25 years and that have an impact on income for a prolonged period (DAFF 2007a). The framework for assessing drought was based on 6 principles: meteorological conditions, agronomic and stock conditions, water supplies, environmental impacts, farm income levels, and, scale of the event (DAFF 2008).

Operationally, an area must become 'EC declared' before farmers can apply to receive assistance (DAFF 2008).

There are several policies that are MDB-specific. Some have regulatory and accounting imperatives, others concentrate on drought contingency planning, or deliver programmes comprising significant on-ground works. Furthermore, some programmes aim to improve resource condition while others are focussed towards improving socio-economic conditions. They are operated through establishing plans, setting targets, monitoring to determine whether targets have been achieved, and then reporting on, and evaluating, the outcomes.

MURRAY-DARLING BASIN AUTHORITY

In July 2008, the Council of Australian Governments agreed to changes in the *Water Act 2007* to establish the independent Murray-Darling Basin Authority (MDBA) with the functions and powers needed to ensure that the Basin's water resources are managed in an integrated and sustainable way (DEWHA 2008c).

The key functions of the MDBA include:

-  preparing a Basin Plan, including setting sustainable limits on water that can be ☐ taken from surface and ground water systems across the Basin;
-  advising the Commonwealth Government on the accreditation of state water ☐ resource plans;
-  developing a water rights information service to facilitate water trading across the ☐ Basin;
-  measuring and monitoring water resources in the Basin;
-  gathering information and undertaking research; and
-  engaging the community in the management of the Basin's resources (DEWHA ☐ 2008c).

The Basin Plan will address the following range of issues:

-  limits to the amounts of water (both surface and ground water) that can be taken from Basin water resources on a sustainable basis - known as long-term average sustainable diversion limits;
-  identification of risks to Basin water resources, such as climate change, and strategies to manage those risks;
-  the requirements that state water resource plans will need to comply with in order to be accredited under the *Water Act*;
-  an environmental watering plan to optimise environmental outcomes for the Basin by specifying environmental objectives, watering priorities and targets for MDB water resources;
-  a water quality and salinity management plan which may include targets; and
-  rules about trading of water rights in relation to Basin water resources (DEWHA 2008d). □

THE MURRAY-DARLING CAP ON DIVERSIONS □

Because of concerns about the quantity of water being removed from the MDB for consumption, and the subsequent impact on flow regimes and river health, the NRM Ministerial Council initiated an audit of water use in the MDB in 1993. **The outcome of the audit demonstrated that if the volume of water diversion continued to increase, river health would decline, and water security for irrigators and other water users in the Basin would be reduced** (MDBC 2008a). □ This resulted in a limit on the volume of water that could be diverted from rivers for use - this is called the Cap. The Cap is managed in accordance with a formal set of rules described in Schedule F of the MDB agreement. Each state and territory comprising the MDB is entitled to a share of the surface water resource under the Cap agreement, and this is managed for each designated Cap valley (MDBC 2008a). □ Schedule F of the MDB agreement requires an annual Water Audit Monitoring Report that documents water use within the Basin and assesses the five state and territory governments' compliance with the Cap. For further information about the Cap agreement see http://www.mdbc.gov.au/nrm/the_cap. □

THE LIVING MURRAY INITIATIVE □

The Living Murray Initiative was launched in 2004. The aim of the initiative is to recover an annual average of 500 GL of water for environmental use at six icon sites: □  Barmah-Millewa forest; □  Gunbower and Koondrook-Perricoota Forests;  Hattah Lakes; □  Chowilla Floodplain (including Lindsay-Wallpolla);  Lower Lakes, Coorong and Murray Mouth; and □  River Murray Channel.

Water savings are to be achieved through a variety of approaches, for example:  through purchasing water from willing sellers for use by the environment;  by improving water delivery infrastructure; and □  by improving on-farm water use efficiency (MDBC 2007).

The target date for water recovery is June 30, 2009. While water has been returned to

the river progressively, most is expected to become available to the environment between 2008 and 2009. As at July 2008, 133 GL of recovered water was listed on the Environmental Water Register, however the actual volume of available water is dependent on allocations. Plans to recover a further 471.4 GL were in place or being developed (MDBC 2008b).

MURRAY-DARLING BASIN DRY INFLOW CONTINGENCY PLANNING AND MDB SUSTAINABLE YIELDS PROJECT

At a Summit on the MDB on 7 November 2006, the Prime Minister and the premiers of New South Wales, Victoria and South Australia asked officials to examine contingency planning to secure urban water supplies during 2007–08. Contingency Planning Reports have been released for February 2008, April 2007, May 2007 and September 2007 and December 2007. The reports outline the volume of water available in the MDB and recommend different uses for the water given increases or decreases in water availability. They also describe the management practices that should be adopted by delivery and storage managers, and water users to conserve water during times of reduced availability.

At the MDB summit, the CSIRO were commissioned to report on the current sustainable yields of surface and groundwater in the MDB, including an analysis of the affect of climate change on future sustainable yields. In total, 18 reports have been published, one for each catchment.

Examples of other policies specific to the MDB include: Basin Salinity Management Strategy; Native Fish Strategy; Algal Management Strategy; Floodplain Wetlands Management Strategy; and Human Dimension Strategy.

For further information about these policies refer to: <http://www.mdbc.gov.au> and <http://www.environment.gov.au/water/mdb>.

RELEVANT ARTICLES AND PAPERS

The following are articles and other documents that I feel must be read in conjunction with my submission because it supports my conclusion that the MDBA has failed to write a Basin Plan that complies with the Water Act and has given provisions '*their weakest interpretation and/or give effect to them in the weakest way.*' Vic EDO 2012

This opportunity has been weakened to such an extent that it will not achieve a return to '*environmentally sustainable levels of extraction for water resources*' and will thus fail to '*protect, restore and provide for the ecological values and ecosystems of the Murray-Darling Basin*', nor will it '*maximise the net economic returns for the Australian community for the use and management of the Basin water resources*', nor '*improve water security for all users of Basin resources*' see Water Act, Section 3 (d)(e)

<http://www.theage.com.au/national/the-coorong-is-dead-but-can-be-reviv...>

The Coorong is dead but can be revived

THE Coorong as we once knew it is no more.

The precious wetland, made famous as the backdrop to the classic Australian film *Storm Boy*, has undergone a fundamental change according to one of the most extensive research projects conducted on the region.

Traditional freshwater plants, fish and birds — including the trademark pelican — are being replaced by a smaller number of salt-tolerant species as a result of record low flows in the Murray River.

"Essentially, there is no longer an estuary," the study said of the 145-kilometre system of lagoons at the end of the Murray, which has traditionally mixed freshwater and seawater.

The three-year study, led by the CSIRO, found the most remote southern lagoons were now experiencing "extreme hyper-salinity", with water between four and six times saltier than seawater.

The findings will add to political heat around the reform of the Murray-Darling river system, with the report nominating the removal of water from the system as a key factor in the Coorong's deterioration.

The report cited the almost complete decline of a crucial seagrass, *Ruppia tuberosa*, in the south lagoon as a significant ecological tipping point.

Decline of the plant directly influenced the departure of birds such as pelicans, black swans and fairy terns from the south of the Coorong, while just one type of fish was still found in the lagoons — albeit rarely.

In their place has arrived a dramatically **less-diverse community**, with little more than three species prospering: a species of salt-water shrimp and two birds, the banded stilt and chestnut teals.

But all hope is not lost, according to CSIRO researcher Dr Sebastien Lamontagne. He said a freshwater influx could still help.

"It's not necessarily a huge amount of water that is required, even a small amount of water over the barrages can make a difference," he said.

He said other parts of the Coorong and lower lakes were not as badly affected as the southern lagoon.

Federal Water Minister Penny Wong acknowledged the Coorong and lower lakes were under **"considerable environmental stress"**, but said governments were trying to find an enduring solution.

South Australia is investigating a last-resort engineering plan for the Coorong and lower lakes that would

The Choke at the Coorong. Photo: David Mariuz

Peter Ker July 23, 2009



1 of 2 23/07/2009 12:14 AM

The Coorong is dead but can be revived <http://www.theage.com.au/national/the-coorong-is-dead-but-can-be-reviv...>

include pumping hyper-saline waters out to sea and replacing it with sea water. This would stop exposed lake beds turning acidic.

But this proposal was criticised by one of the researchers, Associate Professor Justin Brookes from the University of Adelaide. He said this would result in the environment being traded off for short-term gain.

"It would be very difficult to get the salt back out," he said. "The system is in decline, but is recoverable.

"This goes beyond economics and science — it goes to politics. We've got ourselves into a position that is catastrophic."

The Coorong is an internationally protected wetland as it plays a crucial role in the global migration of birds.

Birds Australia spokesman Rob Clemens said the decline of the Coorong was "shocking" and it was increasingly unable to support the birds for which it was internationally listed. He said a growing number of wetlands in southern Australia no longer met the criteria for international recognition.

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SENATOR THE HON PENNY WONG

Minister for Climate Change and Water

Speech to the 4th Annual Australian Water Summit Sydney Convention and Exhibition Centre 29-30 April 2008

‘Water for the Future’

Embargoed until 12.01 Tuesday 29 April 2008 Check against delivery

INTRODUCTION

Thank you to Professor Paul Perkins for your introduction, and to the event organisers for putting together this very stimulating and topical program.

Acknowledgements

- λξξιι. Traditional owners (Cadigal people)
- λξξιιι. the Hon Nathan Rees, Min for Water Utilities in NSW
- λξξιιιι. the Hon Tim Holding, Minister for Water, Vic.
- λξξιιιιι. Ken Matthews, Chairman and CEO of the Nat Water Commission. (Today I will be outlining the Rudd Government’s new national plan on water – ‘Water for the Future’. (This plan delivers our election commitment to develop a single, coherent, national framework that integrates rural and urban water issues.

1

Water for the Future is the Rudd Government’s strategy to secure the long term water supply of all Australians.

Australia needs a truly national approach to water because it cannot be the domain of one single government.

Although State and local governments are responsible for delivering water services to Australian households, businesses and farms, the Commonwealth Government must provide strategic direction and leadership to help State and local governments secure water supplies in the era of climate change.

And whilst the Commonwealth Government now has a stronger role in the Murray Darling Basin as a result of the agreement at COAG in March, the Basin states will

nevertheless need to play their part in addressing the problems in the Basin.

It is imperative for Commonwealth, state and local government to share a common understanding of the problems in water and respond in a comprehensive and coordinated way.

Like many areas of public policy involving multiple levels of government, bickering and blame have derailed water policy.

As a result, progress on many of the important issues has been a case of too little, too late.

Water for the Future recognises that water shortages are a serious threat to our economy and way of life.

Problems like climate change, over-allocation and water shortages don't get fixed by denial, delay or pointing the finger.

Water for the Future is built on four key priorities that integrate what all levels of government should be striving to achieve in the area of water:

- . taking action on climate change,
- . using water wisely,
- . securing water supplies; and
- . supporting healthy rivers. (Climate change is a major threat – for much of Australia it means more droughts and less rain. (The rapidly emerging threat of climate change, with its inherent uncertainties and risks, is something that we must plan for and manage. (As a nation, we have not had a Federal Government alive to these threats until now. (Instead, we have been taking too much water from our rivers and aquifers – particularly in the Murray Darling Basin. (We can, and we must, make better use of our available water resources. This means improved efficiency and productivity of water use, and better use of water markets to optimise the economic benefits that water brings. (In our towns and cities, we must secure water supplies for current and future needs, including from a range of new sources that rely less on rainfall given the clear threat climate change poses to traditional water sources. (In delivering Water for the Future we will be seeking to set a new standard in national leadership and co-operative relations with state and territory governments. (Our plan delivers a much needed focus on the water crisis in the Murray Darling Basin – an issue of truly national importance. (As you know, the Prime Minister recently secured a landmark agreement with Basin states on a new Basin Authority and Basin Plan.

For the first time, Water for the Future provides a long term focus on securing water for all Australians – whether they be irrigation communities or suburban households.

‘Water for the Future’ will be driven by a ten-year, \$12.9 billion investment in

strategic water priorities; sound water governance and policy; and renewed purpose and commitment in water reform.

In a mature Federation, it is a reasonable expectation for states and territories to fulfil agreed reform objectives in return for Australian Government investment. If not, the benefits that flow from this investment would be short-lived.

Co-operation with the states and territories is a crucial underpinning to our approach – collaboration on agreed investment priorities and outcomes, co-operation on establishing new national water accounts, and co-operation on an agreed program of water policy reform.

WATER REFORM

Already, the Rudd Government has made significant progress on water reform.

This year, we will establish the independent Murray Darling Basin Authority to develop a new Basin Plan, including a sustainable cap on surface and groundwater extractions in the Basin. Just as importantly, final approval of this new Basin Plan will rest with the Australian Government alone.

In another Basin reform, the ACCC is now responsible for developing water market and charging rules for the Murray-Darling Basin. I expect these new regulatory arrangements to be in place early next year.

At the national level, the issue of water and climate change was recently identified by COAG as one of seven areas requiring urgent reform..

As Chair of the COAG Working Group on Climate Change and Water, I am now overseeing a forward work program that covers the following challenges:

- ☐ addressing overallocation
- ☐ improving water markets
- ☐ urban water reform; and
- ☐ skills and information. (This work will provide new impetus to the National Water Initiative, strengthening its role as the blueprint for continuing water reform. (As part of Water for the Future, the National Water Commission will be directly responsible for assessing state and territory performance against the National Water Initiative and agreed funding milestones under the Government's Plan. (Water reform is not just some abstract policy exercise – and Commonwealth funds will depend on it being realised. Our reform agenda directly impacts on our everyday lives.
- ☐ By removing barriers to trade in water, we will allow markets to operate much more effectively in allocating water between competing uses, improving water use efficiency, and delivering water to its highest value uses. These benefits flow right through to the supermarket shelf.

- By ensuring that economic settings work to promote affordable and timely investment in secure water supplies, and ensure that alternative water supplies and water-efficient technologies can compete on a level playing field. This will also provide customers with an appropriate financial reward for their water conservation efforts.
- By improving water security in remote communities, including remote indigenous communities, we are confirming the basic right to drinking water.
- And by making sure our water planners have best available information on available water resources and the likely impacts of climate change, we avoid problems of poor planning, over-allocation and under-investment, and we minimise the likelihood of costly water shortages into the future.

Unfortunately, years of inaction mean this reform has become urgent. Further delay will only make reform more difficult and more costly. As is the case in many areas of reform, the longer we delay, the bigger and more costly the problems become.

I'd now like to talk in more detail about the four water priorities that will be addressed through 'Water for the Future'.

TAKING ACTION ON CLIMATE CHANGE

The most pressing challenge is to ensure all Australian governments are responding to the impacts of climate change on our water supplies and the health of our rivers .

The signs that the Australian climate is changing due to human impact are already clear. Indeed, 16 of the last 18 years have been warmer than the long-term average in Australia, and across much of southern Australia, 2007 was the hottest year on record.

In the Murray Darling Basin, the last few years have seen a sequence of very low inflows to the River Murray and record-low allocations.

In the period from 1997 to 2007, inflows to the Murray River averaged 49 per cent below the pre-1997 long term average.

Over 2007/08, water allocations in the southern Basin have been at critically low levels, and at this point the outlook for the 2008/09 water year is not good.

In Melbourne, post-1997 inflows to Melbourne's water supply catchments average at 35 per cent below the pre-1997 average.

And in Perth, there has been a reduction in water flowing to dams in the order of forty per cent over the last 30 years.

Water shortages now impact on our daily lives, and it is largely through this experience that Australians now understand the threat of climate change. .

As I said before, for most Australians climate change means more droughts and less rain. We must adapt to this world where climate change is a reality.

The first part of the adaptation challenge is to understand how much water is likely to be available in our rivers and aquifers into the future.

Many of you will be aware of work by CSIRO on future water availability in the Murray Darling Basin that is expected to be completed over the next few months.

In addition to the likely impacts of climate change, this work is also looking at the future implications of groundwater use, new farm dams and land use change on the Basin's water resources.

Those of you who have read some of the reports that have come out to date will know that for the southern Basin in particular, the results are very sobering indeed.

The Australian Government is now committed to extending the sustainable yields work to other regions of Australia – to Tasmania, the south-west of Western Australia, and northern Australia.

We need to understand the implications of climate change for our farmers, cities, towns and rivers. This demands sound water resource planning to inform tough water sharing and investment decisions; decisions that are required to ensure that all needs are catered for in the face of reduced water availability and – in many instances – increased population.

In the Murray Darling Basin, the Australian Government will put a new Basin Plan in place that will take account of future climate change and address the legacy of past over-allocation. This Basin Plan will also make provisions to secure the critical human needs of people reliant on the Murray for drinking water.

With help and assistance from the Australian Government, Basin states must then put this Basin Plan into effect.

USING WATER WISELY

A fundamental priority is to use water wisely – to make better use of the water we have.

Water conservation is already a part of our lives. There aren't too many places around Australia that are not affected in some way by water restrictions – restrictions that have been in place now for quite some time.

The need to save water will not disappear with the next decent rain event. Climate change, combined with growing water demand, means that now and in the future, there simply isn't enough water to waste.

This is why water conservation and water efficiency has become intrinsic to water planning in both rural and urban settings.

For several years now, Australian households have shown a remarkable community spirit in adapting to water restrictions and helping to conserve our water resources.

However, we can do more to use water wisely. Water for the Future includes a \$250 million commitment to a National Greywater and Rainwater Initiative.

Through direct incentives for household rainwater and greywater use, this program supports the very many Australians who are prepared to take personal responsibility for conserving our drinking water supplies.

By far the biggest user of water in Australia is the irrigation sector, accounting for around two-thirds of all water use nation-wide. Around 70 percent of this irrigated agriculture takes place within the Murray Darling Basin.

Irrigated agriculture provides a wealth of food and fibre.

This not only generates considerable export income, but provides fresh food for Australian households at prices that are low by world standards.

But despite the economic importance of irrigated agriculture, we must become more efficient in the way we use water for crops.

This means improving the efficiency of irrigation infrastructure and ensuring the water market promotes high value use.

It is estimated that the amount of irrigation water lost to leakage and evaporation each year is about the same as that consumed by all of our major capital cities. Clearly there is plenty of scope to improve.

Under our Sustainable Rural Water Use and Infrastructure Program, Water for the Future provides for more than \$5.8 billion in investment towards improving the efficiency and productivity of water use and management.

Subject to due diligence, Stage 2 of Victoria's Foodbowl project will be amongst the projects funded. Other Basin states have also been invited to submit their priority projects over coming months. Private irrigation corporations in the Basin will also be invited to participate later in the year.

As I announced a few weeks ago, I will be applying three threshold tests for Government investment in infrastructure projects. I am now able to expand on these investment principles:

1. Projects must be able to secure a long-term sustainable future for irrigation communities, in the context of climate change and reduced water availability into the future. Projects must help support and drive regional investment and development, secure regional economies and support the local community. And they must demonstrate a long-term economic and environmental benefit that can be sustained over a 20 year horizon. In this context, the Government may consider community-driven proposals that actively address existing over- allocation problems by assisting regional economies and local communities to adjust in anticipation of a new Basin cap in the future.
- Projects must deliver substantial and lasting returns of water to the environment to secure real improvements in river health. The Commonwealth's share of water saved must be able to be delivered and used for environmental purposes that reflect the Commonwealth's environmental priorities. It must be in the form of a secure and transferable water entitlement, to be owned by the Commonwealth Environmental Water Holder

- Projects must deliver value for money in the context of the first two tests. This includes: □– cost-benefit analysis to test the net impact of the project on national economic welfare; □– evaluation of the cost of water returned to the environment; and □– clearly defined cost sharing arrangements.

These tests will be crucial for investment support. Progress payments for approved projects undertaken by Basin States will be linked to implementation of agreed water reforms.

In the Murray Darling Basin and elsewhere, part of the challenge of using water wisely is to realise the potential of water markets and trade.

Water trade can deliver significant economic and water efficiency benefits. Continuing improvements in our capacity to support and develop water markets will only increase these benefits.

This last year or so of very low water allocations in the southern Basin has seen a significant increase in water trading activity to protect permanent plantings and other high value crops.

If the water market did not exist, the capacity of irrigators to cope with this drought would have been greatly diminished and millions of dollars of investment lost.

The capacity for markets to manage the economic and social impacts of water shortages should not be understated.

In making better use of our available water resources, it is vital that we understand how much water we have, and how much water we use. You cannot manage what you do not measure.

‘Water for the Future’ includes the \$450 million ‘Improving Water Information Program’, administered by the Bureau of Meteorology. This program will produce the first ever national water accounts, supported by a truly national water monitoring and data collection network.

As part of this program, the Bureau has worked closely with state and territory agencies on identifying their needs, and will be providing financial assistance to assist agencies and water authorities to collect and maintain this data. The Bureau will co-ordinate the collation of all this data into a nationally consistent format, and provide an annual assessment of the condition of Australia’s water resources.

All this work to help us use water more wisely will enable us to continue to enjoy fresh produce we have come to expect.

SECURING NEW WATER SUPPLIES

The third key priority is to secure water supplies for our towns and cities – a problem of matching growing water needs to declining traditional water resources.

Brisbane is currently experiencing its worst drought in more than 100 years, with five consecutive low-rainfall years and water storages now at just 38 per cent of capacity.

As a result, Level 6 water restrictions are now in place. Most other capital cities – Perth, Sydney, Melbourne, Adelaide and Canberra – have also been facing serious water shortages.

Whilst traditional water supplies are declining, many of our towns and cities continue to grow. By 2050, it is estimated that Australia's current population of 21 million will have increased to 33 million.

This is why a key element of Water for the Future is to work with the States to develop new sources of water that do not rely entirely on rainfall.

The Rudd Government will work with states and territories to develop new water sources, and on a range of other strategies that help to secure future water supplies.

As part of our election commitments on water, the Government will invest in a \$1 billion 'Urban Water and Desalination Program'.

By working with state and local governments and the private sector, this Program will provide funding towards new and innovative water supply projects in desalination, recycled water and stormwater harvesting in areas with a population of 50,000 people or more.

Adding these new and innovative supplies to cities' water 'portfolios' will improve the water security of Australian families and provide certainty for businesses.

Individual major project proposals costing \$30 million or more will be eligible to apply for up to 10 per cent of capital costs. \$100 million will be the maximum contribution for any one project.

Funding assistance will be available through either a refundable tax offset or grants.

After consultation with state government and water industry stakeholders on the design and implementation of the Urban Water and Desalination Program, I then intend to issue a public call for funding applications in the next financial year.

In addition, funds from this program will be used to establish new Centres of Excellence in Water Recycling in Brisbane, and in Desalination Technology in Perth.

Water authorities servicing towns and cities with a population of less than 50,000 people will be able to apply for funding under a new \$250 million 'National Water Security Plan for Towns and Cities'.

This program will target infrastructure refurbishment, new infrastructure, and practical projects to save water and reduce water losses.

Investments through these two programs will be used to drive further improvements in water planning and investments needed for our towns and cities to cope with the challenge of climate change.

HEALTHY RIVERS

I would now like to move onto our final water priority – healthy rivers.

Australia's rivers and wetlands serve many functions and support many values – economic, environmental and cultural.

For too long, we have treated our rivers and groundwater systems as ‘magic puddings’; as limitless supplies of water.

Nowhere is this more the case than in the Murray Darling – our largest and most important river system. Quite simply we have been taking too much water out of the Basin for far too long. We have overdrawn the Murray and now we need to restore the balance.

The signs of decline are obvious to all, and the need to address it is urgent.

In my short time as Minister I have had the opportunity to travel through many parts of the southern Basin, to see some of this degradation, and to speak with many people whose livelihoods depend on irrigated agriculture.

Not everyone I have spoken with would agree on the extent of the problem, or on what should be done to fix it. What everyone does seem to agree on is that action must be taken to restore our rivers and wetlands to health.

To me this is particularly encouraging. It strengthens my resolve to working with affected communities and stakeholders on a lasting solution to the problems of over-allocation and declining river health.

Earlier this year I announced a \$50 million commitment to purchasing water from willing sellers for return to the environment. This initial program is now well underway – but it's just the beginning.

We will invest at least \$3 billion in Restoring the Balance in the Murray Darling Basin. Over the next ten years, we will be purchasing water to put back in the rivers.

This \$3 billion program will complement the water savings made through our investments in improved irrigation efficiency, and water promised under The Living Murray initiative and the Snowy initiative.

Again, all water purchased by the Australian Government will be held by the new Commonwealth Environmental Water Holder.

We can not afford to wait for a new Basin Plan to come into effect before more water can be returned to the environment. Under ‘Water for the Future’, over-allocation and declining river health are urgent priorities, and I intend to progress them now.

This problem is not unique to the Murray Darling – it's a problem that exists in other rivers, too. Rivers like the Yarra, Peel, Harvey, and Hawkesbury Nepean for instance.

Strategic investment in water security will help to take the pressure off these important river systems, enabling state governments to honour their environmental obligations and commitments to healthy rivers.

CONCLUSION

As I said at the outset, ‘Water for the Future’ is much more than a \$12.9 billion investment program; it’s a plan that provides a clear strategic direction that will guide the way we manage water into the future.

Without clarity around what we seek to achieve as a nation, it is very difficult for other levels of government to go it alone in tackling complex problems like water.

As the National Government, we cannot fix all problems in water, but by making our priorities clear, we are putting in place framework in which we will work with other levels of government to achieve water reform.

So how will the Government’s new plan be assessed?

An effective national water framework should have the following characteristics:

- ☐ Clear national objectives that are agreed by all governments;
- ☐ Investment that is backed by effective implementation of agreed reforms;
- ☐ Planning for balanced and sustainable water outcomes that is based on best available information and strong community consultation;
- ☐ Effective water markets that allow water to be used where it has the highest value;
- ☐ A sound economic basis for water pricing and investment;
- ☐ Effective and accountable management of environmental water that delivers (the best possible environmental outcomes; and
- ☐ Better information about water availability and use, available to all. (In adopting this new plan, the Government recognises the need for some flexibility in our investment priorities. New evidence and new knowledge will of course become available in years to come. The views of our stakeholders on the performance of the Plan over time will also form a crucial contribution. (That’s why ‘Water for the Future’ will incorporate a major review of its first three years of operation, in order to assess the performance of the Plan in meeting its objectives.

By this time the new Murray Darling Basin Plan will have been developed, and this will provide important new information on what is required for Basin states and irrigators to adopt and implement the new Basin Plan.

This review will provide us with the opportunity to further refine and target the Plan to deliver best value on the four priority challenges I have outlined today.

I believe that ‘Water for the Future’ will deliver on all these fronts. It’s a truly comprehensive plan that works in the national interest. And it is based on a co-operative approach to working with state and territory governments.

Thank you for the opportunity to speak today, and I wish you all the best for the remainder of this Australian Water Summit.

Taken from the Women's Trust booklet called The Watermark.



The water cycle is an essential backdrop to all life. It nourishes the land, sustains flora and fauna, allows food to grow and carries away wastes ...



Would it surprise you to discover that the ice in your glass of lemonade was once a snowflake? How about if the tears in your eyes, were, long ago, drops in a pool where dinosaurs came to drink? Well, both are possible. Nearly all of the water on Earth is the same water that has been here since our oceans formed nearly four billion years ago. Each raindrop and snowflake that falls is on an endless path from the sky to the ground (or ocean) and back to the sky again. This loop is called the hydrologic cycle, or water cycle.

Each drop of water takes a unique path on its quest. For instance, if a drop falls into a river it might stay there for three weeks. If it touches down in a glacier, it could remain frozen for hundreds of years. If it sinks into the soil, the drop could be trapped underground for as long as forty thousand years. Eventually, though, all water that falls finds its way back up into the air to keep the cycle going.

T Strain Trueit, *The water cycle*, Franklin Watts, USA, 2002, pp. 7–8.

We can't create new water – we can only use what already exists. Day after day, year after year, millennium after millennium, Mother Nature has moved vast quantities of water around the planet. This movement of water is the essential backdrop to all life, including human existence. However, we humans tend to notice only the more obvious signs of this ongoing exchange, such as clouds and rain.

This is an awe-inspiring cycle. Chances are, however, that you learned little about it in your school days, or if you did, you may be a bit rusty on it! It's worth reminding ourselves of its fundamentals.

All life functions against the backdrop of a continuous water cycle. The evaporation of water is the central feature of this cycle. Without evaporation there would be no rain. Water is continuously evaporating from all surfaces – from oceans, rivers and

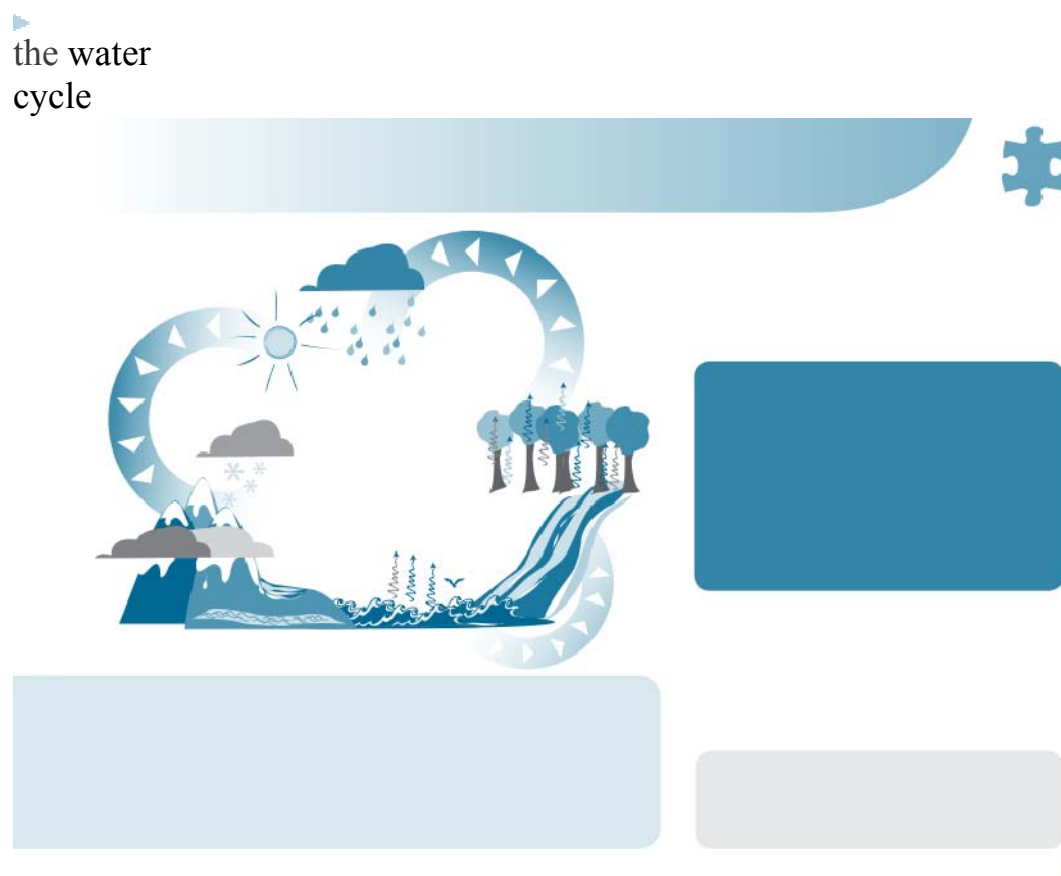
lakes, and from the land, vegetation and every breath that every animal expires. This evaporated water passes into the atmosphere and forms moisture in the cooler layers of air. The moisture gathers to form clouds, which are carried around the Earth by wind currents.

Under the right conditions these clouds release their moisture as rain, hail or snow. When this falls onto the land, much of it seeps into the soil. Some of it is taken up again by vegetation, some filters down into underground aquifers and the surplus flows as surface water into rivers, lakes and streams.

The seemingly endless quality of this cycle is deceptive. Superficially, it looks as though the supply of fresh water should be abundant. The reality is very different, however. Rising average temperatures mean that, in many places, less water vapour forms into rain. **At the same time, the burgeoning global population is placing ever-increasing demands on the planet's reserves of fresh water.**

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Victorian Women's Trust - *Our Water Mark*



Peter, Wet Williams Melbourne CBD Watermark group, May 2006

SNOW

SURFACE WATER RIVER

GROUNDWATER

WATERFALL

MOUNTAINS

EVAPORATION

OCEAN

Figure 1. The basic water cycle

This diagram neatly illustrates the idea of the water cycle as a closed system, i.e. the total amount of water remains constant. It shows how, under varying conditions, this water is presented as liquid water, water vapour or snow and ice.

From our point of view, a particularly important section of this water cycle is where rain falls onto land. Rain first seeps into the soil and some of it becomes groundwater. Once the soil is saturated, some water flows across the land as surface water, which enters streams that flow into rivers and lakes. In many places, surface water and groundwater are interconnected. The particular importance of this part of the water cycle is that it lies squarely within our capacity to manage it properly.

Source: The Watermark Team, 2007.

Some useful sources

- TS Trueit, *The water cycle*, Franklin Watts, USA, 2002.
- S Postel & A Vickers, *State of the world*, Worldwatch Institute, Washington, 2004.

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Australia has been and still is 'mining' its renewable resources (of groundwater) as if they were mined minerals. That is, they are being exploited at rates faster than their renewal rates, with the result that they are declining.

Jarred Diamond, *Collapse*, Viking Press, 2005, p. 378

In some parts of the Basin, groundwater levels are rising at alarming rates, and salinisation and the displacement of salt loads to the river systems are occurring. It is predicted that these processes will continue to severely degrade the usefulness of water resources in the Basin, in terms of the maintenance of healthy ecosystems and the provision of water of a suitable quality for irrigation and potable use.

D Ife & K Skelt, *Murray-Darling Basin groundwater status: summary report*, Murray-Darling Basin Commission, Canberra, 2004, p.10

Although it's less visible than surface water, there is also a large groundwater resource lying under vast areas of Australia. In the drier and/or more inland parts of the continent, this is the major source of fresh water used in agriculture, mining and all domestic activities apart from human consumption. Approximately 21% of the fresh water we use is groundwater.¹

Groundwater is accessed by drilling holes and installing pipes (commonly known as bores) down into underground strata which contain or enclose water. The water then comes to the surface either by pumping or by natural pressure.

The link between surface water and groundwater is crucial. When a new bore is sunk, the water drawn up is the base flow of the nearest river. Every time we look at surface water – in a lake, stream or river – we are actually looking at a 'window' into the underlying groundwater.

The flatness of our continent assists water to seep into aquifers, and Australia has vast underground reserves of such water. When rain falls onto the land it penetrates the soil. If enough falls, the water seeps down to a saturated layer called the water table. In different parts of the country, the water table is found at varying depths below the surface. Essentially, this water is held within layers of porous soils and rock.

We have many small aquifers and some very large ones. For example, the Great Artesian Basin is one of the largest aquifers in the world. Formed at least 200 million years ago, this multi-layered aquifer extends from the Gulf of Carpentaria to approximately 600 km north of Adelaide. Although the average depth is about 500 m, in some places water is contained to depths of 3000 m and it is estimated to contain 8700 GL.²

Water in some aquifers is very old, having entered the underground system hundreds, and even thousands, of years ago. Water in an aquifer can also be relatively new, entering by a process called aquifer recharge, where water leaks through geological flaws in the beds of rivers, lakes and the land surface.

A lot of recharge occurs during prolonged and extensive flooding. Thus, while large amounts of water evaporate following a flood, much also seeps down through soil and rock formations to enter aquifers.

A large part of rural and remote Australia is dependent on the supply of water from aquifers. The cities of Perth and Adelaide are also partly dependent. Each aquifer being used to supply water is divided into a number of groundwater management units. A unit can supply several hundred farming enterprises, a small town or even a mine.

Across Australia there are currently 535 such operational units supplying thousands of users. Each of these users is licensed to pump a specified amount of water during a prescribed time of year.³ Only 14% of these operational units have some or all of their water use metered.⁴

For decades people were allowed to sink bores into these major aquifers and leave them flowing continuously. This has resulted in a significant drop in water pressure and, consequently, flow rates. For instance, across the Great Artesian Basin initial flow rates were more than 10 ML per day. These days, flow rates are in the range of 0.01–6 ML per day.⁵

There is now a national program underway to cap these bores so that water is released only on demand. Funding to complete this program has been included in Prime Minister Howard's recently released *A national plan for water security*.⁶

In a number of places there are so many people pumping water (both legally and illegally) that the total volume being removed from aquifers is in excess of the volume that enters by recharge in an average climate year.

In such a situation, the aquifer is described as being 'over-allocated'.

A national assessment of Australia's water resources in 2000 indicated that 161 of the 535 groundwater management units were either nearly fully allocated or over-allocated.⁷

In our two biggest food-producing areas, the Murray-Darling Basin and the Great Artesian Basin, the known allocations of water already exceed the volumes of water that can be pumped on a sustainable basis.

As with surface water, the use of groundwater has increased dramatically since the early 1980s. In 1983–84 total groundwater use was 2634 GL. In just over a decade, this rose to 4962 GL – an increase of 88%.⁸ It's now also known that, in areas of certain geomorphology, aquifers and rivers are linked so that if too much water is removed from the aquifer, available water in the river also decreases. Conversely, if too much water is pumped from the river, the recharge of the aquifer diminishes.⁹

What we must also take account of is that the adverse effects of excessive groundwater pumping on stream flow can accumulate over a long period. A recent report to the Federal Government presented case studies from the USA and China which show that the full effects of excessive groundwater pumping were not felt for several decades.¹⁰



Figure 1. Major groundwater resources in Australia

Some of the fresh water that falls onto the land, and some of the fresh water flowing in rivers, can pass through geological strata and eventually accumulate in underground aquifers. This process has been going on in parts of Australia for millenia. By measuring the rate at which this water naturally accumulates in an aquifer, it's possible to calculate the rate at which water can be pumped from an aquifer on a sustainable basis.

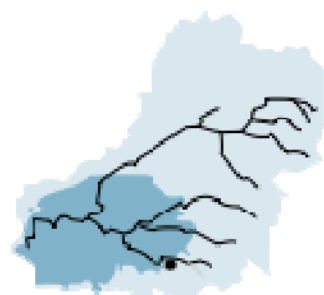
Our groundwater resources are not as well defined as surface water resources, nor is their management as sophisticated. With a number of aquifers, excessive pumping is a major problem. There is national concern about the extent of groundwater removal from the Great Artesian Basin. The Basin has 535 groundwater management units and in 57 of these (approximately 10%) the rate of water removal exceeds the calculated sustainable yield. For another 104 groundwater management units (approximately 20%) the rate of water removal is 70–100% of the sustainable yield.

The map indicates four scenarios faced by the major aquifers across the country with the shading indicating the extent of groundwater allocation.

Greater than 100% (i.e. more groundwater is being removed than the natural rate of recharge) □ Between 80% and 100% Between 30% and 70% Less than 30%

Source: Australian Academy of Technological Sciences and Engineering, *Water recycling in Australia, special report*, ATSE, Melbourne, 2004, ch. 1, p. 3, <<http://www.atse.org.au/index.php>>.

Shallow aquifers in the Murray-Darling Basin



Renmark subsystem

The Murray-Darling Basin is a shallow geological feature with connections between the surface water in the rivers of the basin and three shallow aquifers. These are the Gunnedah, Shepparton and Renmark groundwater systems. The graph and map on this page show accumulating monthly rainfall and aquifer water levels in the Renmark system.

Starting in about 1994 groundwater usage increased sharply in areas of usable supply. In many parts of the basin rates of extraction exceeded the recharge capacity of the aquifers.

The hydrograph shown here indicates that declining groundwater levels are commonplace in productive areas of the catchment. The hydrograph also shows a strong correlation between rainfall, groundwater levels and usage. In the 1980s climatic conditions were wetter and groundwater levels showed a strong correlation to rainfall.

Source: D Ife & K Skelt, *Murray-Darling Basin groundwater and climate*, Australian Earth Science Convention 2006, <www.earth2006.org.au>.

A1-1 INTRODUCTION

The Murray-Darling Basin Ministerial Council has directed the Murray Darling Basin Commission to investigate the return of environmental flows to the River Murray System. This is being done using three reference points: 350, 750 and 1500GL per year. Council will consider information produced on these reference points in October 2003. The Commission has in turn established 'the Living Murray' project to consider the ecological implications of the three reference points for eight river regions along the Murray and lower Darling system. The Goulburn and Murrumbidgee Rivers are also being considered in the Living Murray project, as they are likely to be central contributors of water should the reference point flows, or similar, be adopted in the future. The Commission will consider ecological, social and economic factors when evaluating the three reference point flows.

The Goulburn River is the largest Victorian tributary to the Murray system. The contribution required from the Goulburn River in meeting the reference point flows is not yet known. Interim coarse estimates can be based on Cap volumes, which suggest that contributions of 70, 150 and 300GL may be required from the Goulburn System. However, the implications of delivering these reference points for the ecology and condition of the Goulburn River are not clear. Thus, an environmental flows study of the Goulburn River is recognised as an important step toward

understanding the environmental needs of this major tributary. The output of such a study will be an important factor when opportunities for securing additional flows for the River Murray are considered by the Living Murray project. The Department of Sustainability and Environment (DSE) approached the Cooperative Research Centre for Freshwater Ecology (CRCFE) and the Cooperative Research Centre for Catchment Hydrology (CRCCH) to convene and manage a Scientific Panel, which will identify the flows necessary to maintain or improve key environmental values in the regulated section of the Goulburn River, which lies between Lake Eildon and the River Murray. As part of its work, the Scientific Panel intends to:

- 1) Collate and assess relevant information and data on the condition of the Goulburn River.
- 2) Undertake a field assessment to confirm environmental/ecological values associated with the river system and support the development of flow-related ecological objectives.
- 3) Develop an issues paper to identify and establish objectives for the key environmental values/assets of the Goulburn River and their likely flow requirements.
- 4) Determine the environmental flow regime to sustain the Goulburn River in an ecologically healthy condition, consistent with the Victorian River Health Strategy, the Goulburn Broken Regional Strategy and the FLOWS method developed for developing environmental flow recommendations in Victoria (DNRE 2002).
- 5) For each of the following scenarios, describe how the water would be used, in terms of a flow regime, to enhance the environmental values of the Goulburn River on a priority basis:

- current situation (BE requirement for 80GL and 30GL for flooding and water quality)
- BE requirement + an average annual increase of 70GL from the Goulburn into the Murray (as measured at McCoy's bridge);
- BE requirement + 150GL extra flow from the Goulburn into the Murray;
- BE requirement + 300GL extra flow from the Goulburn into the Murray.

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- 6) Recommend other management actions that are required to sustain the key environmental values/assets of the Goulburn River.

Provision of advice on the social and economic issues associated with the use of water for environmental purposes will be undertaken by the GBCMA using the 'RIVAS' decision support tool.

It is also intended that the Goulburn Scientific Panel will be used as a Regional Evaluation Group (REG) within the Living Murray project. This is a separate but related task to be funded by the MDB. The appointment of this Panel as the REG for the Goulburn River will provide synergies with the Living Murray project.

1.1 Purpose

This Issues Paper addresses milestones related to the first three tasks set for the Scientific Panel. The following discussion will consider the scope of the study area and compare the current regulated flow regime with that expected to occur in the absence of Lake Eildon, Goulburn Weir and water diversions (i.e. the natural flow regime expected with current land use). The environmental and ecological values associated with the Goulburn River system will be summarised, along with current and emerging threats to those values. Flow-related ecological objectives for each reach will also be outlined. These objectives will serve as the basis for environmental flow recommendations that will be developed by the Scientific Panel part of stage 2, along with observations on complementary land and water

management activities that will help to protect the environmental values of the Goulburn River. An overview of the Flows process is outlined below (Figure A1.1).
Figure A1.1:

Two Decades of Murray-Darling Water Management: A River of Funding, a Trickle of Achievement

Lisa Yu-Ting Lee and Tihomir Ancev¹ Abstract

The paper appraises the myriad of Murray-Darling Basin-related policies since the early 1990s. It contends that significant environmental improvements could have been achieved at substantially lower cost had decisive action been taken earlier. If the total expenditures in the last two decades had been put solely towards water entitlement buy-backs, an amount of water several times that necessary to significantly improve the health of the Basin would have been acquired.

Introduction

The majority of all water use in Australia is consumed in the Murray-Darling, with almost 90 per cent of the system's water diverted for extractive uses (CRCIF 2005). In recognition of inefficient water allocation among extractive and non-extractive uses,² numerous resource policies have been implemented since the signing of the 1992 Murray-Darling Basin Agreement and the 1994 Council of Australian Governments (COAG) Water Reform. It was envisaged that these agreements would provide a coordinated approach of the concerned jurisdictions to restore the Murray-Darling system to good environmental health. Correspondingly, this period saw substantial public funds injected into natural resource management, and the advent of market-based instruments (MBIs), including cap-and-trade schemes (for example, water trade) and pricing schemes (for example, cost recovery). This policy direction was in line with the abundance of literature that advocates MBIs as the conduit to cost effectiveness, and is becoming increasingly favoured over traditional regulatory controls (Bjornlund 2003).

If judged by the media coverage of water management policies and the amount of public investment poured into various programs and initiatives, the public might justifiably have a 'feel-good' perception that some progress has been made.

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² 'Extractive use' refers to water for human use, and 'non-extractive use' refers to water left in-river for environmental functioning.

However, evidence of tangible on-ground achievements in terms of actual environmental outcomes is sparse. There is limited empirical evidence of real improvements; in fact a 'report card' produced by the Cooperative Research Centre for Freshwater Ecology (2003) has shown a marked deterioration relative to 1994 conditions. The Living Murray Initiative and the government buy-back of water entitlements have received attention, particularly the recent purchase of properties such as Toorale for the purpose of procuring their water entitlements, which some have labelled a waste of money (Ferguson 2008). But the progress of other prominent, yet less-publicised, natural-resource management initiatives have been less assessed. The list of these programs includes, but is not limited to, the Environmental Works and Measures Program, the Basin Salinity Management Strategy, and the Australian Water Fund projects. Given the limited coverage and assessment of the various programs directed towards improved water management, it is difficult to discern the state of affairs in the Murray-Darling and to scrutinise successes and weaknesses in current policies.

The general perception is that progress in the Basin is somewhat disappointing, despite almost two decades of concerted management. This paper attempts to take stock of the achievements and progress of natural-resource policies in the Basin, and the reasons contributing to the lack thereof. This involves an overview of the evolution of public policy in water management in Australia, and an investigation into the range of government initiatives to clarify the relation between achievements and funding streams.

The overall conclusion is that, in spite of the numerous agreements and initiatives, corresponding achievements have been decidedly lacklustre due to poorly informed decisions and buck-passing between the states. There remain several weaknesses in institutional arrangements as water reform has evolved, underlying which is a significant information gap at the core of the frustrated progress. Notwithstanding information barriers, the most straightforward solution — to buy back entitlements — has also been resisted. It is the contention of the authors that, by having put off this difficult but seemingly necessary action, the social cost has become even greater than if the problem had been confronted sooner. **Stronger action may have resolved water-resources issues at a fraction of the expense, had decisions been based on transparent, cost-benefit criteria unbiased by political motivations.**

A Brief History of Water Management in the Murray-Darling Basin

The plight of the Murray-Darling is now a familiar story, and has been accompanied by a long string of water management policies to stem its degradation. The story also reflects the trend in favoured policy tools, from centralised regulatory directives towards reliance on market-based approaches,

Two Decades of Murray-Darling Water Management

generally classed as quantity or price instruments.³ Quantity instruments, often requiring a cap, have been used as an alternative to direct regulation, commonly in the framework of a market with tradeable property rights (Rolfe and Mallawaarachchi 2007). While there has been increased use of price instruments, there seems to be a

tendency to shy away from direct water pricing. For example, cost recovery for water was only ever limited to operational costs, and does not capture environmental costs of extraction.⁴ So price instruments come commonly in the form of auction-style tenders, grants and rebates (Rolfe and Mallawaarachchi 2007). While subsidies have largely fallen out of favour, we appear to have come full circle, with the most recent policy, the National Plan for Water Security, embracing the use of direct subsidies to ‘modernise irrigation’.

Inter-governmental arrangements have evolved from the early 1900s, beginning with the signing of the River Murray Waters Agreement in 1915, which focused on resource sharing between the States. Various amendments to the Agreement made over the 70 years of its operation were only minor changes relating to the construction of dams and weirs. The need for balance between environmental and extractive demands came to light as Australia’s water economy moved into its mature phase, symbolised by the signing of the Murray-Darling Basin Agreement in 1992 (Quiggin 2001). The 1994 COAG Water Reform (Water Reform) marked the initial shift in natural-resource management towards market-based solutions, and was integral to the Federal Government’s National Competition Policy for competitive neutrality in key industries. The Cap was also introduced in 1995, alongside the water reform to enable transferable property rights for water.⁵ The water-reform process was tied in with National Competition Payments to motivate its implementation, although this financial incentive had varying degrees of success in promoting the full water-reform agenda. The Payments represented the first of a string of Federal funding towards environmental management in the years to follow. It can be regarded as a precursor to the weak correlation between government spending and outcome in natural-resource policies.

Problems contributing to stagnating progress since the 1994 Water Reform related to institutional factors in water-sharing arrangements, pertaining to the specification of property rights for extractive and non-extractive uses which compromised the security of water entitlements. In 2004, the National Water Initiative was introduced to overcome these sticking points, resulting in an

³ Market-based instruments use market-like processes, represented by a network of regulatory and incentive structures, which coordinate individual preferences and allow greater flexibility for participants to undertake mitigation actions suited to individual circumstances (Rolfe and Mallawaarachchi 2007). ⁴ One justification for this is that higher usage charges may erode market prices if environmental costs are fully accounted for (Grafton and Hussey 2007). ⁵ The Cap is a limit placed on the level of water diversions in the Basin, relative to 1994 baseline conditions.

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agreed public–private cost-sharing arrangement if environmental flows were to be increased (Freebairn 2005). It was also agreed that priority would be given to the provision of water for the environment ahead of extractive use, representing a fundamental shift from the view that water management is designed to coordinate

increased water use (Connell and Grafton 2008). Discussions on missing property rights over externalities associated with return flows also took place, in particular on the impact of increased water-use efficiency on downstream users; and the implications that water trade between hydrological systems has for water quantity and quality. Following from this was the introduction of ‘exchange rates’, in part to try and capture transmission gains or losses for interregional trading.⁶ This was in spite of there being significant knowledge gaps in understanding hydrological systems, which raises concern over the prudence of using those exchange rates. Another example where a rush for action overshadowed the need for robust information and evaluation is the Landcare program. Government failure in this instance led to excessive and poorly distributed public expenditure on small on-ground works (Pannell 2008).

Other prominent programs developed during this period include the Living Murray Initiative and Basin Salinity Management Strategy. The Living Murray began in 2002, aiming to deliver environmental improvements through the Water Recovery and Environmental Works and Measures Programs. The 2001 Basin Salinity Management Strategy focused on salinity-related problems in the Basin, and is linked to the National Action Plan for Salinity and Water Quality. The relevant governments also agreed to build salt-interception schemes under the Joint Works Program to achieve salinity reduction at Morgan, South Australia (which is at the mouth of the Basin). These initiatives represent substantial funding to deliver environmental improvements at target sites, with increasing reliance on market mechanisms, although still conspicuously avoiding direct buy-back. This shift away from ‘command-and-control’ policies reflects greater public acceptance of economic instruments in environmental management.

The most recent policy development was in January 2007, when the Federal Government announced the National Plan for Water Security — since renamed ‘Water for the Future’ by the succeeding government in 2008. The strategy of this Plan was in accordance with the objectives outlined in the National Water Initiative; specifically; to address over-allocation, to modernise irrigation, and to create a transparent water-management system. By this stage, market-based instruments have become fairly mainstream, with one-third of the funds to be

⁶ Exchange rates are a conversion rate for water traded between hydrological systems, since the security of the entitlement is not perfectly preserved because of transmission losses. For example, 1 unit upstream can be traded downstream at a conversion rate of 0.9. Some interstate trades also occur under a system of ‘tagging’, where water traded between states continues to be tagged according to its point of origin and continue to be managed the same way (Brennan 2007). However, this is so complex it appears only one trade has occurred under the tagging system (personal communication).

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directed at buying back entitlements. Water information has also become a priority area, and for the first time irrigators are required to disclose water-use information to

public institutions. This was done in parallel with efforts to improve basin-wide hydrological modelling.

The river of funding

A large number of programs and initiatives have been implemented to manage the Murray-Darling since 1992. These programs have been accompanied by a constant stream of government funding, as well as top-ups and other funding avenues. However, much like the situation with the river basin itself, while a lot went into these policies, little seems to have come out. In this section, details of high-profile Basin-related programs and investments are provided, with the aim to show that overall achievements do not reflect the generous funding. All along, the redistribution of extractive water towards ecological uses has remained a vexing point; the justification being, the cost of water reallocation should be justified by the environmental benefit it would generate. However, there is insufficient information to evaluate trade-offs between environmental benefits and economic losses (Grafton and Hussey 2007). For all the worry, expenditure on the agreements and initiatives has likely outstripped the cost of redistributing water towards environmental use. Earlier decisive action with a good science-based approach, removed from politics and workarounds, may have avoided the excesses.

A summary of relevant intergovernmental and Commonwealth programs, and their funding contributions, is provided in Table 1.

Water Reform and National Competition Policy

The development of water markets has been highly publicised, having been regarded as the ‘holy grail’ for water-allocation problems. While water markets have been established in most catchments, water trading has remained rather limited. In the past, trade has been confined to high-security licences in middle and lower reaches of the River Murray (Connell 2007). Even with the rules relaxed, trade in permanent water entitlements was less than 1 per cent of diversions in 2001–02, with less than 1% of all trade occurring inter-regionally (Heaney *et al.* 2004).⁷ In 2005–06, permanent trade remained below 1 per cent of the entitlements, and temporary trade under 10 per cent of annual allocations. Of the total temporary trade, 41GL (5 per cent) were sold interstate (MDBC 2007b). This is explained by the existence of several barriers to trade, including a 4 per cent limit on sales of entitlements outside of irrigation districts, and exit fees that will remain until 2016 (Connell and Grafton 2008). Taxation issues

⁷ Permanent water trade refers to permanently selling the ownership of the entitlement to another party, while temporary water trade refers to selling the right to use the seasonal water allocated to the entitlement, but retaining the ownership of the entitlement.

fully tax deductible in the year of purchase whereas permanent purchases can be subject to capital gains tax (Bjornlund 2003).

Table 1: Summary of government initiatives and funding arrangements

Programs for the Murray-Darling Basin	Funding (\$m)	Timeframe
National Competition Policy (inc. Water Reform)	3900	1997–2004
The Living Murray First Step (TLM) — Water Recovery — Environmental Works and Measures Program	500 150	2004–09 2003–11
Commonwealth Supplementary Contribution to TLM	500	2006–11
National Water Initiative — Australian Water Fund	2000	2004–10
Water for the Future (formerly National Plan for Water Security)	12 900	2007–17
Joint Works Program (Basin Salinity Management Strategy)	60	2001–present
Natural Heritage Trust and National Action Plan	400/yr (tot. ≈ 3000)	2001–08
Caring for our Country (Natural Heritage Trust 3)	2250	2008–11
Retiring properties in Queensland and NSW1	50	2008
TOTAL		

(without National Competition Policy)

(21 410)

1: This new money was sourced to purchase Toorale Station. Note: State-based arrangements are not included.

There have also been several unexpected consequences, including the fallout in **increased water use as ‘sleeper’ and ‘dozer’ licences are activated in trade, stranded assets, and reduced return flows** as irrigation efficiency increases. In addition, the push for greater water trading in the National Water Initiative has encountered problems of **variability of supply and hydrology between catchments**, resulting from gaps in biophysical and hydrological knowledge (Connell 2007). Furthermore, there is a general apprehension towards the water market, drawing from concerns pertaining to community decline, threat of foreign ownership, and a perceived loss of subsidies (Randall 1981). Concern over the impact on property values of selling entitlements and policy uncertainty over future allocations are other factors limiting permanent water trade (Bjornlund 2003). To circumvent the thin-market problem, and in an effort to discover efficient prices, there has been a move towards tenders for buying back entitlements. However, there remains resistance from rural communities to recent government purchases, even though there is evidence of growing support where the buy-back is perceived to generate justifiable benefits.

The Living Murray First Step

Part of the Living Murray agreement was the First Step program, developed in 2003, which identifies **six ‘ecological assets’** in the Basin to be protected. The implementation of the **First Step was endorsed as part of the 2004 National Water Initiative under the *Intergovernmental Agreement***, in which contracting governments agreed to commit \$500 million over five years for the recovery of (on average) 500GL of water per year for the environment — known as ‘new environmental water’ or ‘new e-water’.⁸ This sum was allocated towards the Water Recovery program for a set of approved market-based variants of buy-backs and infrastructure projects.

Overall, water recovery lagged, and it was not until February 2008 that there were enough projects approved to potentially recover the full 500GL.⁹ April 2008 marked the historical first ‘water recovery’ event, with 133GL of environmental water entitlements secured in Victoria and South Australia. While the first water recovery is a significant milestone of the Living Murray, most projects are still under development; 367GL still need to be recovered at the rate of at least 1500 megalitres (ML) per day to achieve the full 500GL by mid 2009.¹⁰ Also, no physical environmental water will be released except in wet years (MDBC 2008). This has obvious implications for the sustainability of water sharing under the expected long-

term climate change, in addition to the inconsistency with National Water Initiative commitments to prioritise ecological preservation over irrigation interests.

Complementing the Living Murray First Step, the **Environmental Works and Measures Program** was created in 2003, with a funding of \$150 million over eight-years for capital works and improvements in infrastructure targeting the six ecological assets, such as upgrading weirs and fish ways. No evaluations of the effectiveness of the program are yet available; however, a task force has been established for this purpose.

In addition to the First Step, there are also substantial efforts being made towards environmental water recovery at State level. For example, the NSW Government allocated \$13.4 million towards its **Wetland Recovery Plan** in 2005, a sum that was matched by the Commonwealth via the **Australia Water Fund**. The objective is to permanently recover water for ecologically significant wetlands through infrastructure projects and buying back entitlements, which so far has acquired 6.5GL in the Gwydir and Macquarie.¹¹ There is also the NSW Riverbank Fund introduced in 2006, which allocated \$105 million towards buying back water for environmental purposes. Other Riverbank projects were also supplemented with \$72 million from the Australian Water Fund. In July 2007, 15GL of environmental water was purchased for the Gwydir, Macquarie,

⁸ Water recovery refers to the process of recapturing water from other uses and directing it towards environmental purposes. In effect, the environment has entitlement over this water. The 500GL to be recovered is ‘new’ in the sense that the States will contribute new funds to recover this water, on top of pre-existing commitments.

⁹ 1GL = 1000ML; 1ML = 1 million litres, which is equivalent to the volume of water in an Olympic swimming pool. ¹⁰ From October 2008. ¹¹ The Wetland Recovery appears to be unrelated to the Living Murray, and could be considered ‘other new e-water’.

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Lachlan and Murrumbidgee rivers in NSW. Riverbank’s role has since expanded to include the Market Purchase Measure as part of The Living Murray Water Recovery, to buy back 125GL via a tendering process (NSWDECC 2008). However, it is unclear how much physical environmental flows will eventuate from these entitlements.

Commonwealth Supplementary Fund to the Living Murray

In 2006 a one-off supplementary funding of \$500 million was made to the Murray-Darling Basin Commission by the Commonwealth, as a top-up to the \$500 million for the First Step Agreement. The supplementary contribution is to be spent over five

years from 2006. Of this, \$200 million was allocated for Water Recovery alone, bringing its total to \$700 million over five years. Of the remaining supplementary fund, \$100 million was flagged for infrastructure projects under the Environmental Works and Measures Program, totalling \$250 million. The rest of the supplementary funding was to hasten other programs, including the Basin Salinity Management Strategy, although it is uncertain how this was distributed (MDBMC 2006).

As mentioned, 133GL of water entitlements have been ‘recovered’ as at mid 2008. If the full 500GL is recovered, the average cost reduces to \$1,400/ML. Based on 2006 market prices, this is more than three times greater than permanent water rights of \$400/ML in the Murray Irrigation Limited (Quiggin 2006). Had the water-recovery funding been put entirely towards entitlement buy-back at this price, this would have resulted in a total of 1750GL of new e-water — three times greater than the *Intergovernmental Agreement* target of 500GL, and sufficient for moderate improvements in the health of the Murray-Darling.

The Cap

The implementation of the Cap has been delayed in three of the five contracting States; although most valleys are within long-term targets (MDBC 2007a). Each State is required to have water-sharing arrangements as part of its obligations under the National Water Initiative. For example, in New South Wales this takes the form of Water Sharing Plans, in which environmental flows beyond Cap provisos have apparently been stipulated (NSWDNR 2008). The Basin Plan has requirements for a new sustainable Cap to be set, incorporating the inter-linkages between surface and groundwater systems. However, how this new Cap will be reconciled with the existing commitments in current water-sharing plans is yet to be resolved (Connell and Grafton 2008).

Environmental flows derived from the Cap and investments outside of the *Intergovernmental Agreement* can be considered ‘old e- water’ or ‘other new e-water’. Since 1999, combined old and other new e-water releases from NSW and Victoria total around 770GL, made up of one major release of 500GL in 2006, for the Barmah-Millewa site, and a series of smaller flow events (NSWDNR 2008).

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Considering that 95 per cent of bulk water off-take occurs in NSW and Victoria (MDBC 2006), these releases account for almost all environmental flows to the Basin.

¹² This averages 86GL/yr over the last nine years (less if the 500GL release in 2006 is excluded). Even in aggregate with the 133GL of new e-water, average environmental water provisions remain well below the 500GL/year target. This is unlikely to have preserved environmental sustainability as per the stated purpose of the Cap.

The impact of the Cap is more difficult to discern in unregulated systems. ¹³ The available means of monitoring extractions often involve just one gauge at the upstream and downstream end of unregulated rivers, and penalties for over-extraction are based on the three-year average flow at the downstream gauge. The lack of monitoring capacity limits the extent to which the Cap and water-sharing

arrangements can be enforced. For that matter, a general lack of water information has been a persistent issue underlying the inability to manage water effectively, which, until recently, has been recognised but ignored.

National Water Initiative — the Australian Water Fund

The Australian Water Fund was set up by the Prime Minister in December 2004 for implementing actions towards National Water Initiative objectives. A commitment of \$2 billion over five years was allocated among three programs under the umbrella of the Australian Water Fund: Water Smart Australia, Raising National Water Standards, and Australian Water Fund Communities. These programs were designed to ‘improve water-use efficiency’ via technological or infrastructural means, and through increasing capacity for water management.

Given the nature of Australian Water Fund projects, it is difficult to gauge environmental outcomes against which to measure progress; for example, projects which improve water accounting and develop water markets funded via Raising National Water Standards. Projects under Water Smart Australia and Community Water Grants, such as wetland management or water-recycling systems, may deliver more tangible environmental and water-efficiency improvements. While the projects appear to follow a vague mantra of ‘increasing water efficiency’, they may not meet the efficiency criterion. For example, rainwater tanks provide a ‘feel-good’ factor, but they do not represent an efficient solution to augmenting supply; households can be better off under scarcity pricing for water, which better coordinates demand and supply and removes the need for water restrictions (Grafton and Ward 2007). Without clear targets or reliable means to evaluate a project’s effectiveness, there is no reliable indicator of its success. This

12 ‘Bulkwateroff-take’ referstodiversionfromtherivergreaterthan5GL/yr,whichsuppliesamultitude of users via delivery channels (MDBC 2006).¹³ ‘Unregulated’ catchments refer to river systems without an upstream head dam to ‘regulate’ downstream water releases.

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undermines the capacity for future investment decisions, which can become an exercise in distributing funds rather than achieving desired outcomes.

Water for the Future (formerly National Plan for Water Security)

The National Plan for Water Security added a further \$10 billion to the mix, which increased to \$12.9 billion when the Plan was re-branded as Water for the Future in early 2008. At the March 2008 COAG meeting, a **Memorandum of Understanding for the Murray-Darling Basin Reform** was agreed to by all States, including Victoria which initially opposed the reform. This took \$1 billion in sweeteners to the Victorian government, which leaves \$1.9 billion as the net increase to Water for the Future.¹⁴ The ensuing Basin Plan has an important feature whereby a final decision-

maker — a Commonwealth Minister — settles disputes between the States. This is envisaged to reduce the politicised nature of the Murray-Darling Basin Commission, which has overshadowed decision-making processes (Blackmore 2002; Scanlon 2006). The Water for the Future package has various novel — though sometimes conflicting — objectives.

Of the \$3 billion earmarked for the Addressing Over-Allocation component, \$50 million was offered in a first round of buy-backs from February–May 2008. The first round acquired 35GL of ‘other new e-water’, at an average cost of \$1400/ML; according to different sources only \$37 million had been spent to acquire 22GL, in which case the average cost is \$1700/ML (Wong 2008; Bardon 2008). It would appear that the value of entitlements has been inflated in the course of government buy-backs; the price is likely to increase as more substantial purchases are made (Connell and Grafton 2008).

The \$6 billion Modernising Irrigation component, largely in the form of subsidies for water-efficient irrigation technologies, can further increase the cost of water recovery as it is in direct conflict with the objective to retire inefficient irrigation areas. The financial assistance for water-efficient technologies allows less-efficient irrigators to remain in the industry, and to use the water savings to expand irrigated production (Ancev and Vervoort 2007). In this sense, the value of such properties becomes inflated and unnecessarily increases the cost of buy-backs.

The smaller, but significant, element of the plan is **Improving Water Information**, towards which \$480 million has been allocated. The **Bureau of Meteorology** has been given new powers to request water information from various parties to be used in a National Water Account. Under current arrangements, even where water metering is in place, water-extraction data is considered confidential and is not publicly disclosed (Hudson 2005, personal

¹⁴ The \$1 billion ‘sweetener’ is part of the old-money offered under the \$10 billion National Plan for Water Security (Milne 2008).

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communication). The new arrangement would mean this information is relayed to the Bureau of Meteorology, allowing for better water management through transparent monitoring of water use on a national basis. For this purpose, \$620 million of the Modernising Irrigation component has also been allocated for water metering and telemetry rollout, administered by the Department of Environment, Water, Heritage and the Arts (Vertessy 2007).¹⁵ This brings the total investment in water data to over \$1 billion over the next 10 years, signalling the emphasis now given to accurate water information.

The Joint Works Program: The Basin Salinity Management Strategy

The Joint Works program began in 2001, and is a jointly funded program to build six major salt-interception schemes as part of the Basin Salinity Management Strategy.

The program is estimated to cost \$60 million, with six jointly funded schemes towards keeping salinity below 800EC at Morgan.¹⁶ These new schemes are in addition to seven State-owned schemes predating 1988, and in aggregate are expected to contribute 61EC of the salinity target (MDBMC 2006). In other words, the cost to reduce salinity is at least \$1million/EC given the \$60 million investment. Despite being a pragmatic solution, salt-intervention technologies are expensive and treat only the symptom rather than the cause; that is, from non-point pollution that continues to introduce salt into the system. This is evidenced by recent experience with the Salinity and Drainage Strategy (now the Basin Salinity Management Strategy).

The Basin Salinity Management Strategy was developed in 2001, as the successor to the 1988 Salinity and Drainage Strategy. The Salinity and Drainage Strategy was a once-off agreement between the States and Commonwealth to finance activities to reduce salinity. This was initially deemed successful, as major investments made towards salt-interception schemes led to an immediate reduction in salinity throughout the 1990s. However, it soon became evident that further action was needed as salinity continued to rise, motivating the new Strategy in 2001 (Conner 2004).

The Strategy manages basin-wide salinity through end-of-valley targets and an overall downstream target at Morgan in South Australia. The States work to achieve these targets through in-valley actions, which are entered into a central Salinity Register managed by the Murray-Darling Basin Commission. The Register also captures legacy impact from previous activities and current salinity-reducing or -increasing activities, which are calculated in dollar terms using modelled cost-functions. The objective is to ensure there is net credit for each State and

lxxvi. ¹⁵ ‘Telemetry’ refers to the remote measurement and reporting of information.

lxxvii. ¹⁶ Electrical conductivity (EC) is a measure of concentrated salts in the water. A high reading indicates

high salt content.

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the Basin as a whole. Through these measures, in-valley actions are expected to offset 10EC points at Morgan, while salt-intervention schemes are expected to offset 61EC points. In 2005–06, these measures combined achieved the salinity target at Morgan (MDBMC 2006), although this success is still largely attributed to salt-interception schemes. A sustainable, long-term solution would be to change the pattern of land use to reduce the movement of salts. Targeted in-valley measures could potentially make a greater contribution; for example, Heaney *et al.* (2000) have shown that reforestation at sites with faster-responding, saline aquifers with porous soils can efficiently reduce salinity. Such long-term strategies will become feasible as greater

hydrological information becomes available.

The main stumbling block for the Strategy (as is the case for water recovery) is the measurability of outcomes, with monitoring and evaluation identified as key areas for improvement. The reliability of entries in the Salinity Register is evaluated according to a standardised classification protocol, according to which most of the entries are of low reliability. This undermines the confidence in the progress of signatory States (MDBMC 2006). A contributing factor may be that each State uses its own hydrological models to estimate salinity impacts, each of which have strengths and weaknesses and are useful for different purposes. Following from this is a strong impetus for hydrological-economic models to be consolidated so that salinity impacts are modelled consistently, and thereby improve the transparency of investment decisions. There also remain significant information gaps in groundwater hydrological functioning. For example, IQQM models surface water and MODFLOW models groundwater, each with weak hydraulic interactions between surface and groundwater (Letcher and Jakeman 2002) — which is arguably a fundamental knowledge gap to understanding salinity. This has implications for the reliability of bioeconomic models which base cause-effect relationships on such hydrological models.

Other Related Programs

This subsection covers the following programs and activities: retiring properties in Queensland and NSW; the **Natural Heritage Trust and National Action Plan for Salinity and Water Quality**; and the **National Competition Policy**.

The considerable controversy over Federal government plans to retire properties that can provide flows to the Murray-Darling can be largely attributed to unease over the socio-economic impact of such purchases. In a recent move by the Federal government, \$50 million of new money has been flagged for the purpose of acquiring land with large water storages (ACF 2008). The first purchase was Toorale, which cost \$24 million split between the NSW and Federal government. The property held 14GL of entitlements. That is to say, it was bought at an average cost of \$1700/ML, equivalent to the cost in the first round of Addressing Over-allocation under Water for the Future. Toorale seems to

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have attracted significant media attention because it was purchased in the midst of rural discontent over the buy-backs, and was particularly contentious because of Toorale's history and the potential for benefits to be offset by irrigation expansions in Queensland (Ferguson 2008). However, a similar purchase was made in August 2008 of the Pillicawarrina cotton property in the Macquarie Marshes, under a joint venture by the Commonwealth and NSW governments through Riverbank. The land was reportedly acquired for \$10 million with 7GL of entitlements (The Land 2008); at an average cost of \$1400/ML, this is similar to the cost of Toorale. Pillicawarrina was fully operational as a cotton farm, yet its purchase had widespread support from landholders, and did not attract the same media coverage as Toorale. The main issue at stake seems to be community disgruntlement over government decisions which were perceived as being questionable and not well justified in terms of the benefits they would deliver.

Other national programs include the Natural Heritage Trust and National Action Plan for Salinity and Water Quality, which funded environmental conservation activities delivered through Regional Natural Resource Management bodies. Joint funding to these programs has averaged \$400 million/yr since its inception in 2001. In the third phase of Natural Heritage Trust from 2008, a further \$2.25 billion over five years is committed towards States' natural-resource strategies operating under the guise of Caring for our Country (DAFF 2007). Another significant source of funding was the National Competition Policy. While not directly related to natural-resource management, tranche payments were tied into the water-reform process and totalled \$3.9 billion from 1997–2004 (NCC 2005).

The projects under Natural Heritage Trust and National Action Plan were largely small-scale, and unsuccessful in some instances. With some exceptions, most of the investments promoted practices that were not adoptable at the required scale, or were invested in the wrong places (Pannell 2008). In an audit report, it was noted that there was an absence of consistently validated data and insufficient information to indicate whether the programs were meeting expectations. The audit also highlighted the need to address the transparency and accountability of funds, and problems with the quality and measurability of targets directly linked to the paucity of scientific data (ANAO 2008). The issue of transparency and measurability of outcomes is a common theme throughout most natural-resources programs, compromising the cost effectiveness of on-ground actions.

In summary, public investment into natural-resource management totalled at least \$25 billion over the last 17 years, or \$21 billion excluding the National Competition Policy. In spite of the substantial expenditure, this has not produced the envisaged restoration of over-allocated river systems. Investment decisions appear to be without strong justification; the most cost-effective solution to

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buy-back rights from irrigators has, until recently, largely been avoided (Quiggin 2008). There remains resistance from the rural community, who are unconvinced of the merits of government buy-back. Furthermore, the numerous initiatives will likely benefit from better-defined deliverables to rationalise the sums allocated and develop a way of quantifying results.

Transparency, Consistency and Courage

Overall, there has been some progress and some prudent, if somewhat ineffective, measures have been implemented. Government failure here has been in the familiar tradition of funds being hypothecated without due evaluation, perhaps as temporary fixes or on account of ulterior motives. A fundamental issue is the paucity of reliable scientific information against which to scrutinise decisions, blurring accountability and the cost-effectiveness of investments. Decisions backed by good science-based criteria and well defined trade-offs will improve transparency and help avoid politically-driven motivations (Connell and Grafton 2008). It will also justify difficult decisions that are needed to prevent environmental collapse in the Lower Murray.

Information on water use has been an area of neglect, but has gathered momentum in recent years, as reflected by the investment of \$1 billion towards improving water-data quality and metering technology. The National Water Account will be based on a comprehensive ‘geofabric’ — in collaboration between the Bureau of Meteorology, the CSIRO and Geosciences Australia — which will tie together all water information including hydrological flows, water use, climate, and so on (Vertessy 2007).¹⁷ The Bureau of Meteorology will also build upon CSIRO work on the Murray-Darling Basin Sustainable Yields Assessment, commissioned in November 2006 and funded under the Australian Water Fund Raising National Water Standards Program (Vertessy 2008, personal communication). This involves building a ‘supermodel’ to estimate the current and future water availability, and the level of over-allocation, in all catchments within the Basin. A novel component of the model is that it makes use of existing State agency models (CSIRO 2007). This is an important move towards standardising the quality of hydrological information used in assessing land-use changes. It is logical that evaluations are based on a single, comprehensive basin-wide model which can capture whole-of-catchment effects and interdependencies consistently.

A useful extension may be to incorporate on-ground data to reflect tangible outcomes and environmental impacts. This will be possible as improved information of the system comes to hand, which should feed into overall water planning in order to maximise public benefits (Connell and Grafton 2008). For

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Individual irrigators will be required to provide monthly extraction volumes; however, their identities will remain confidential.

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example, the Integrated Monitoring of Environmental Flows program in NSW has been in place since 1997 to monitor the effect of environmental rules in regulated systems in the Barwon-Darling River. Integrating data from such empirical studies would help verify outcomes and provide an indicator of environmental improvement. Data from airborne electromagnetic surveying (AEM) could also be used to supplement knowledge of surface and groundwater connectivity across landscapes at high risk of salinity, and to inform strategic decisions such as reforestation.

A particular challenge to current institutional arrangements relates to water sharing between the jurisdictions. As a condition of the States agreeing to the Basin Plan, existing water-sharing plans will remain in effect until its expiry, even if sharing rules are incompatible with the sustainability principles of the National Water Initiative. This incongruence limits the capacity for effective environmental-water management across the jurisdictions, given that future shifts towards dryer climates will require that water-sharing plans be revised and be responsive to such environmental threats. Adequate revisions will likely inflict major political and economic pain on all parties (Connell and Grafton 2008). However, without the necessary changes it is likely future water security will be compromised, leading to even greater social costs.

Social Cost of Inaction

Water buy-back has long been advocated as the most efficient solution to the over-allocation problem in the Basin, but it has been left as the last resort in favour of other workarounds (Quiggin 2008). The lagging resolve meant that opportunities for acquiring low-value entitlements early on have been missed. During the current drought, prices for permanent licences have reached as high as \$2000/ML, which is a far cry from 2006 prices of \$400/ML. However, even at the likely long-term prices for permanent entitlements around \$1000/ML, \$500 million would suffice to recover 500GL — which could be achieved over five years at \$100 million/yr (Quiggin 2008). Even at the observed premium of \$1400–1700/ML in the current buy-back — indicating an endowment effect — \$850 million is enough to meet Living Murray obligations. This is but a fraction of the ‘Addressing Over-Allocation’ component of Water for the Future.

Suppose the total expenditure on natural-resource management, of \$21 billion, had been put towards buy-backs since 1992, price unadjusted. At \$1000/ML, at least 21 000GL could have been acquired permanently. Even at \$2000/ML — a significant mark-up compared to prices only just two years ago — at least 10 500GL could have been recovered. This is far beyond the recommended 4000 GL/year required for good improvements in the health of the Murray-Darling (WGCS 2008). This also suggests that only one-third to one-fifth of the total expenditure was required to achieve a high level of environmental improvement. Given the delay, and the urgency of the situation that has evolved in the Coorong

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and Lower Lakes, it may now take up to \$8.9 billion to recover the 4000GL needed to secure the long-term health of the rivers (WGCS 2008).

Conclusions

Since the Murray-Darling Basin Agreement in 1992 a string of government initiatives have been implemented along with substantial public investment. For all the effort, there is considerable underachievement as a result of poorly informed investment decisions and persistent institutional weaknesses. The upshot of this is continued deterioration in the health of the Murray-Darling system. Furthermore, in spite of information and institutional barriers, earlier resolve to address water buy-backs could have achieved environmental improvements at substantially lower cost, even if action had been taken as recently as 2006.

Limiting further social costs will require that future investments and decisions are transparent, based on clearly-defined targets and criteria. Improved governance to manage environmental threats, such as climate change, can be achieved by amending water-sharing arrangements between jurisdictions to align with obligations to prioritise ecological health. Better markets and policies could be designed where externalities are captured comprehensively and accurately through improved

hydrological knowledge. This will also allow greater transparency in investment decisions, devoid of political motivations.

References

Ancev, T. and Vervoort, W. 2007, 'The National Plan for Water Security: Taking over the Role of a Market?', *Connections: Farm, Food and Resource Issues*, The University of Melbourne.

Australian Conservation Foundation (ACF) 2008, 'Toorale buy-back shows Government is listening', Feature Article 16/9/08, ACF.

Australian National Audit Office (ANAO) 2008, *Regional Delivery Model for the Natural Heritage Trust and the National Action Plan for Salinity and Water Quality*, Audit Report 21, Commonwealth of Australia, Canberra.

Bardon, J. 2008, *Wong faces heat over water infrastructure plans*, ABC News, 21 October.

Blackmore, D. 2002, 'Protecting the future', in D. Connell (ed.), *Unchartered Waters*, Murray Darling Basin Commission, Canberra.

Bjornlund, H. 2003, 'Farmer participation in markets for temporary and permanent water in southeastern Australia', *Agricultural Water Management* 63: 57–76.

Brennan, D. 2007, 'Missing markets for storage and their implications for spatial water markets', contributed paper presented at the 51st Annual

Two Decades of Murray-Darling Water Management

Conference of the Australian Agricultural and Resource Economics Society, Queenstown, New Zealand, 14–16 February 2007.

Connell, D. 2007, *Water Politics in the Murray-Darling Basin*, The Federation Press, Sydney.

Connell, D. and Grafton, Q. 2008, 'Planning for water security in the Murray-Darling Basin', *Public Policy* 3(1): 67–86.

Cooperative Research Centre for Freshwater Ecology (CRCFE) 2003, *Ecological Assessment of Environmental Flow Reference Points for the River Murray system* (Interim Report), Prepared by the Scientific Reference Panel for the Living Murray Initiative, Canberra.

Cooperative Research Centre for Irrigation Futures (CRCIF) 2005, *Irrigation in Perspective: Irrigation in the Murray and Murrumbidgee Basins*, CSIRO Land and Water.

Commonwealth Scientific and Industrial Research Organisation (CSIRO) 2007,

Overview of project methods, a report to the Australian Government from the CSIRO Murray-Darling Basin Sustainable Yields Project, CSIRO.

Department of Agriculture, Fisheries and Forestry (DAFF) 2007, *Phase Three of the Natural Heritage Trust*, viewed April 2008, www.nrm.gov.au/funding/pubs/nht-questions.pdf.

Ferguson, S. 2008, *Buying Back the River*, transcript 20 October 2008.

Freebairn, J. 2005, 'Principles and issues for effective Australian water markets' in J. Bennett (ed.), *The Evolution of Markets for Water, Theory and Practice in Australia*, Edward Elgar, Cheltenham: 8–23.

Grafton, Q. and Hussey, K. 2007, 'Buying back the living Murray: at what price?', *Australian Journal of Environmental Management* 14: 74–81.

Grafton, Q. and Ward, J. 2007, 'Prices versus rationing: Marshallian surplus and mandatory water restrictions', *Economics and Environment Network Working Paper*, Australian National University, EEN0707.

Heaney, A., Beare, S. and Bell, R. 2000, 'Targeting reforestation for salinity management', *Australian Commodities* 7: 511–18.

Heaney, A., Thorpe, S., Klijn, N., Beare, S. and Want, S. 2004, 'Water charges and interregional trade in the southern Murray-Darling Basin', *ABARE Conference Paper* 04.14.

Letcher, R. A. and Jakeman, A. J. 2002, *Experiences in an Integrated Assessment of Water Allocation Issues in the Namoi River Catchment*, Technical Report Working Paper, ICAM, Australian National University.

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Agenda, Volume 16, Number 1, 2009

Murray-Darling Basin Commission (MDBC) 2006, *Improvement in Accuracy of Measurements of Diversions and Return Under the Cap*, Publication No. 43/06, MDBC, Canberra.

Murray-Darling Basin Commission (MDBC) 2007a, *Review of Cap Implementation 2005/06, Report of the Independent Audit Group*, Publication No. 12/07, Murray-Darling Basin Commission, Canberra.

_____ 2007b, *Water Audit Monitoring Report 2005/06*, MDBC, Canberra.

Murray-Darling Basin Commission (MDBC) 2008, *The Living Murray Progress Report (Water Recovery)*, viewed April 2008, http://thelivingmurray.mdbc.gov.au/programs/water_recovery/progress.

Murray-Darling Basin Ministerial Council (MDBMC) 2006, *Basin Salinity Management Strategy 2005–06 Annual Implementation Report*, MDBC, Canberra.

National Competition Council (NCC) 2005, *Assessment of Governments' Progress in*

Implementing the National Competition Policy and Related Reforms, NCC, Melbourne.

New South Wales Department of Environment and Climate Change (NSWDECC) 2008, *Water for the Environment*, viewed October 2008, <http://www.environment.nsw.gov.au/environmentalwater/index.htm>.

New South Wales Department of Natural Resources (NSWDNR) 2008, *Water for the Environment: Environmental Rules for Rivers*, viewed August 2008, <http://naturalresources.nsw.gov.au/water/rivers.shtml>.

Pannell, D. 2008, 'New environmental policy "Caring for our Country"' Pannell Discussions 17th March, viewed April 2008, <http://cyllene.uwa.edu.au/~dpannell/pd/pd0121.htm>.

Quiggin, J. 2001, 'Environmental economics and the Murray-Darling river system', *Australian Journal of Agricultural and Resource Economics* 45(1): 67–94.

Quiggin, J. 2006, 'Repurchase of renewal rights: a policy option for the National Water Initiative', *The Australian Journal of Agricultural and Resource Economics* 50: 425–35.

Quiggin, J. 2008, 'Buying back water', John Quiggin Commentary, viewed July 2008, <http://johnquiggin.com/index.php/archives/2008/03/04/buying-back-water/>.

Randall, A. 1981, 'Property entitlements and pricing policies for a maturing water economy', *Australian Journal of Agricultural Economics* 25(3): 195–220.

Two Decades of Murray-Darling Water Management

Rolfe, J. and Mallawaarachchi, T. 2007, 'Market-based instruments to achieve sustainable land management goals relating to agricultural salinity issues in Australia', *Australasian Journal of Environmental Management* 14: 27–34.

Scanlon, J. 2006, *A hundred years of negotiations with no end in sight: Where is the Murray Darling Basin Initiative leading us?*, MDBC, Canberra.

The Land 2008, 'Govts buy NSW cotton farm to help save Macquarie Marshes', article 7/08/08.

Vertessy, R. 2007, *Advancing Water Information*, presentation made at the Water Information Industry Seminar, Bureau of Meteorology, 22 November 2007, Sydney.

Wentworth Group of Concerned Scientists (WGCS) 2008, *Senate Submission: Senate Inquiry into the Urgent Provision of Water to the Coorong and Lower Lakes*, WGCS, Sydney.

Wong, P. 2008, 'Government water purchase secures rights to 35 billion litres for the Murray Darling', Media Release PW 69/08, Canberra.

Australia: State of the Environment 1996

Chapter 7

State

Water resources

The nature of surface water varies considerably through time and across the continent (see Fig. 7.4). Australia's environments range from the wet tropics in the north to cool temperate in the south, with the vast proportion of the inland being arid. Surface water resources are distributed extremely unevenly between Australia's 12 drainage divisions (see Fig. 7.1). Only half these divisions produce a significant level of useable run-off. The Murray–Darling Basin is now facing major environmental problems because of overdevelopment of its water resources.

Groundwater occurs almost everywhere, but is highly variable in quality and useful quantities cannot always be obtained. In large tracts of inland Australia, it is often the only practical source of water supply for the economically important pastoral and mining industries and their associated communities. The Great Artesian Basin ranks among the largest groundwater systems in the world and is of critical importance over a large area of eastern Australia. Where good-quality groundwater is readily available, it is also used extensively in coastal communities. In the Perth region, it constitutes about two-thirds of total water use and about 30 per cent of the water supplied by the Western Australian Water Corporation. Districts such as Bundaberg, Mackay and Ayr–Home Hill along the Queensland coast use large quantities of groundwater for both urban and irrigation purposes. It provides domestic water supplies for over one million Australians in about 600 communities (AWRC, 1992). Of the 15 million megalitres (ML) of groundwater estimated to be available annually for extraction in Australia, about 15 per cent is developed for human use.

Development and state of the resource

After World War II, in an attempt to ensure a reliable water supply for domestic and irrigation purposes, and to drought-proof Australia, a massive nationwide program of dam-building took place (see Fig. 7.5). Australia has the highest per capita water storage of all countries, because we have the world's most variable rainfall. Sydney stores 932 kilolitres (kL) of drinking water for every inhabitant, compared with 250 for New York, 182 for London and 86 for Birmingham. For irrigation water, New South Wales stores 1580 ML per sq km of irrigated land, compared with 760 for the United States, 380 for Egypt and 150 for India (NSW DWR, 1994). Australia's storage capacity in major reservoirs totals some 81 000 gigalitres (GL), or 3.7 times the developed resource. This is equivalent to three Olympic swimming pools for every one of the country's 17.8 million people.

The bulk of our water storage is concentrated in a few very large reservoirs. Australia's 10 largest storages hold about 50 per cent of national capacity. In New South Wales, the 10 largest storages contain 90 per cent of that State's storage volume

(NSW SOE, 1993). Most of these large water bodies are concentrated in the south-east of the continent along the Great Dividing Range, and in Tasmania. This reflects availability of run-off, topography suitable for dam construction, and population distribution. The one striking exception is Australia's second-largest storage, Lake Argyle in the north-west of Western Australia. Hundreds of small storages scattered across the rural landscape are also important for water supply and irrigation.

Changes in some farm practices, such as the move to smaller paddocks for better and more efficient management of livestock, have resulted in large increases in the numbers of farm dams (Banens, 1981). For example, in a 10-sq-km catchment in the Yass valley of New South Wales the number of farm dams increased from six in 1959 to 780 in 1985 (Srikanthan and Neil, 1989). Victoria alone is estimated to have some 300 000 small farm dams (VSOE, 1988). With such numbers, although farm dams are individually small, significant reductions in stream flow can occur, particularly under dry conditions. In the Lal Lal Reservoir catchment in Victoria, for example, farm dams reduce average annual stream flow by seven per cent, increasing to a 50 per cent reduction in drought years (VSOE, 1988). This has implications for large and local-scale water resource planning and management, as well as for the environment. On the other hand, farm dams frequently represent the only near- permanent water in the landscape and therefore can become important microhabitats for fauna and flora.

In most rural areas and for some rural communities, rainwater tanks are used extensively and often represent the sole source of drinkable water. However, in most cities and many rural towns, regulations and disincentives have prevented their wider use. Adelaide is the only major city where rainwater tanks are used extensively, and in this case the spur has been partly the poor quality of the reticulated supply. Augmentation of community water supplies by rainwater tanks can be both cheaper and more effective than building additional large storages (Gippel and Perrens, in prep.).

The development of groundwater reserves is far from uniform. Many groundwater provinces were not being used at the time of the last summary of the resource in 1983–84, while others were being tapped of their entire divertible resource. 'Mining' of old groundwater is undoubtedly occurring, although we have no reliable up-to-date database for all groundwater basins to show the amount of groundwater abstraction compared with its recharge. The Great Artesian Basin has lost an excessive amount of water as a result of the large number of bores left flowing. Groundwater pressures have declined and some bores have stopped flowing altogether. Bores are now being capped to conserve the resource, but it will take several decades to complete the work.

In 1983, the Department of Resources and Energy listed some of the important groundwater systems under stress (see Table 7.1). Four of these systems are in Queensland, which uses a far larger proportion of groundwater for irrigation than the other States. Since then, a surface-water scheme has been built at Bundaberg, thus providing an alternative source, while in the Burdekin delta additional artificial recharge works have reduced the stress on that aquifer.

Aquifers are also affected by increases in recharge from clearing of forests and introduction of irrigated agriculture. These lands use changes result in waterlogging and increases in salinity.

The irrigation industry

Of all the developed water in Australia, 70 per cent (15 000 GL) is used in irrigation. This compares with 21 per cent for urban and industrial use, and nine per cent for rural water supply. Expansion in irrigation has been the major factor contributing to the growth in water use in Australia, with consequent pressures on the resource and environment. This growth was particularly evident prior to the early 1970s, with development of the rice and horticulture industries along the Murray and Murrumbidgee rivers, and during the 1980s and 1990s with major expansion of the cotton industry in the Darling River system. About half the irrigated area in Australia is used for pasture (including dairying). This ranges from 14 per cent in Queensland to as high as 85 per cent in Victoria. Two other industries that use a lot of land and water are irrigated cereal crops (including rice) and cotton (see Table 7.2). Water use per hectare and profit margin per ML of water vary significantly between commodities (see Figs 7.6 and 7.7). These factors, coupled with total water use, value of produce and export earnings provide a different perspective on the relative importance of various irrigation commodities (see Table 7.3). Irrigated agriculture makes a large contribution to the Australian economy, with crops such as cotton, rice, wine, sugar and dairy/livestock contributing to a multibillion-dollar export industry.

Chapter 7 Inland Waters

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The area under irrigation is continuing to expand, particularly in New South Wales and Queensland. At the same time, the irrigation industry is undergoing structural reform associated with changes in water marketing and pricing. This has resulted in a shift away from low-value activities such as mixed farming towards high-value crops such as cotton and horticulture (see Fig. 7.8). The development of the cotton industry in the Darling River system has been particularly spectacular, and can be compared with earlier developments in the rice and horticulture industries.

Irrigation in the Murray–Darling Basin is nearly at the limit of the water resource (see Fig. 7.9), indicating that future expansion of irrigated agriculture will be largely through productivity increases and industry restructuring.

Water use and the environment

The amount of water in rivers in irrigation areas has been dramatically reduced during the non-irrigation season because of dam construction (see Fig. 7.12) and poorly controlled abstraction of water from rivers. The use of large amounts of water, often for low-value enterprises such as irrigated pasture and mixed farming (see Table 7.3) has increased the amount of shallow groundwater in irrigation areas.

Darling River; large scale abstraction of water has major implications for inland streams.



The message about surface water

lxxviii. Australia has the highest per capita storage capacity of all countries in the world as a result of dryness and variability of climate.

lxxix. Of the developed resources, 70 per cent are consumed for irrigation, followed by domestic, industrial and commercial uses.

lxxx. In parts of both the Murray–Darling Basin and eastern seaboard, water is grossly over-allocated and demand continues to increase.

lxxxi. Over-allocation is placing aquatic environments under severe stress in these regions, but the stress is less severe in the rest of Australia and absent in undeveloped areas such as south-west Tasmania, the wet tropics and parts of the seasonally wet tropics. □

lxxxii. **The message about groundwater**

- . Groundwater provides domestic water for more than one million Australians in 600 communities, and 60 per cent of the continent totally relies on it for all uses except drinking water.

In a number of basins — such as the Great Artesian Basin, Pioneer Valley (Mackay, Qld), Namoi Valley (Tamworth, NSW) and Burnett Basin (Bundaberg, Qld) — groundwater is being used faster than it is being replenished.

- In other areas, rising watertables from clearing and irrigation are waterlogging and salinising streams and large areas of land. Even with remedial action, this problem will continue to increase for some years.

FLOODING

By modifying catchments through land clearing and other development, we have

increased the frequency and magnitude of floods, particularly in small catchments, as well as our susceptibility to floods. Changes in land use — particularly clearing of vegetation — and increased imperviousness of the soil associated with urbanisation and soil compaction result in increased total volume and peak discharge. In addition, the time to peak run-off is greatly reduced (see figure below left). For example, in a flash flood in Canberra's Woden Valley caused by severe thunderstorms, the water rose so fast that seven people drowned before any warning could be issued (NSW SES, 1994).

The changes in flooding frequency caused by dams in many regulated lowland rivers have had a significant environmental effect, with the number of small floods on the floodplains substantially reduced. This also affects the biological health of the rivers, because nutrients and organic matter are no longer being exchanged between the rivers and the floodplain; the community structure of billabongs on the floodplain is partly dependent on flood pulses; and fish movement and recruitment depends upon links between billabongs and rivers (Boon *et al.*, 1990; Hillman and Shiel, 1991; Cadwallader and Lawrence, 1990). **For their long-term sustainability and health, rivers and their associated wetlands and floodplains will need to be reconnected to allow a return to more natural flooding regimes.**

Before the major development of water resources, it was recognised and accepted that 'floodplains are for flooding'. The harnessing of stream flow through numerous weirs and large dams over the last 45 years has resulted in significant changes to the nature of flooding and people have forgotten what floods are like or have never experienced them. This has given rise to a naive perception that river systems can be 'flood-proofed'. Developers then apply pressure to local governments for approvals for developments on floodplains. Around large urban areas this has often led to incremental creep onto the floodplain — sometimes with disastrous consequences when major floods occur. Levees built to protect communities and property may initially reduce flooding, but in the end can actually exacerbate it by presenting ineffective barriers to major floods. Sometimes such banks fail catastrophically causing even greater damage.

As the enhanced 'Greenhouse Effect' starts to exert its influence over the next 50 years or so, an increase in flooding can be expected in some regions (Bates *et al.*, 1994), adding to the effects of land clearing and urbanisation.

Water for new developments has become scarce, particularly in the Murray–Darling Basin. Some cities are also facing limitations and are now trying to conserve water through strategies such as education, pricing reforms, and recycling, rather than building new dams.

We are starting to realise the environmental consequences of the post-war development of Australia's water resources — among them, disappearing wetlands, and rivers containing too little water at the appropriate times for various fish and bird species to breed. People continue to advance schemes to direct water from coastal or tropical areas to dry areas or those running out of water. The suggestions include piping water from Lake Argyle in the Kimberley to Perth, diverting some northern Queensland and northern New South Wales coastal rivers inland, and towing icebergs from the Antarctic to Adelaide. Restoration is also being considered — the most recent widely publicised example being Lake Pedder in

Tasmania. The debate about water supplies in areas of over- allocation and interbasin transfer is now hotting up on environmental grounds. Most governments are not taking the schemes seriously because they are both environmentally and economically unsound and very expensive.

Re-allocating water for environmental purposes, or so-called ‘environmental flows’, now receives serious consideration. Few resolutions have yet been achieved, but balance between economic and environmental needs is central to the discussion.

The most useful indicator of the impact of water resource use on the non-human environment is the amount of water abstracted each year. Unfortunately, data are not consistent enough to show such an indicator through time.

Catchment pollutant sources

Catchments shed sediment, nutrients (particularly phosphorus and nitrogen), organic matter and agricultural chemicals such as pesticides. Land can also become salinised from extensive clearing or irrigation, and industry and urban areas produce a variety of wastes.



Incision of small stream resulting from land use.

Sediments and river channel change

Rivers provide sources of sediment, places where sediments are deposited, habitats for many creatures, locations for recreation and sources of water for human use. Although their physical state is difficult to report nationally, four categories of channel change can be identified: valley floor incision, dramatic widening, increased meander migration and channel burial. Some channels have not changed (Rutherford *et al.*, in press).

Channel incision occurs mostly in uplands in the humid temperate areas, as a result of increased run- off after clearing (see Fig. 7.13). A reconstruction of sediment yield from an incised catchment shows early rapid incision and high sediment yield, then a

decline as incision slows (CSIRO, 1992).

This pattern began in the 1830s in the south-eastern uplands, and as late as 40 years ago in the south-west of Western Australia. It is probably still being triggered in areas of modern upland clearing and heavy grazing. Channel incision has also occurred as a result of the straightening of rivers in Western Australia, New South Wales and Victoria (so-called 'river training'); and as a result of sand and gravel extraction, particularly in Queensland and New South Wales (see Figs 7.14).

During the early stages of incision, some parts of streams are buried by sediment originating in incisions upstream. This is happening in the south-west of Western Australia. Mining also causes channels to be filled or buried. Examples can be seen in the King and Ringarooma Rivers of Tasmania, in the gold-mining districts of central Victoria and New South Wales, and in the uranium province of the Northern Territory.

Dramatic channel widening has been documented in coastal Victoria and New South Wales. Widening can be a natural process or the result of land use. Almost all valleys in the Southern Tablelands of New South Wales are incised as a result of increased run-off due to grazing. The Avon River in Victoria has increased its width 25-fold, with little identifiable human cause. By contrast, the Latrobe River with large-scale human intervention — 70 meander cut-offs and five desnagging episodes — has widened by only 50 per cent. Sand and gravel extraction can also cause channel widening (Rutherford *et al.*, in press).

The rate of bank erosion of large streams is proportional to the amount of water in the channel, which in turn is proportional to the catchment area. Four estimates of meander migration rate for Australian streams conform to the apparent world pattern established by Hooke (1980) (see Fig. 7.15). There is no quantitative evidence that land use has increased these rates, although eroding, cleared and grazed river banks are obvious. However, other Australian rivers do not conform to the world pattern, including the low-gradient, muddy channels of the Murray–Darling Basin, in which the flow of water is very small relative to catchment area. There is no quantitative evidence that migration rates have increased since settlement, although eroded banks are evident. However, some evidence establishes widening of these channels (both of convex and concave banks) at rates between 0.16 and 0.74 m per year, probably as a result of increased flows for irrigation (Rutherford *et al.*, in press). Yet, the banks of these muddy rivers contribute less than five per cent of the total sediment in transport (Olley *et al.*, 1995).

Channel change alters some habitats. Generally, the new habitats are less diverse than the original ones, and so are likely to be biologically of lower quality. Using the criteria of rate of channel change, increase of sediment yield and the number of cases, it appears that gullying has wrought the largest change, followed by channel incision in valley floors, mining, meander migration, urbanisation and river 'training'.

Dramatic channel changes produce large quantities of sediment, the fine-grained part of which moves quickly downstream or onto floodplains. The coarse fraction often moves as a 'slug', burying the riverbed, increasing local flooding and causing additional channel widening as the channel through which it moves adjusts to accommodate flood flows. Mining also produces slugs of sediment, often of

enormous size. The biological effects of these coarse-grained slugs are poorly known, but are likely to be significant because they move slowly and so have a prolonged period of impact. Granite catchments yield more coarse grains than others, and so slugs can be natural features, although land use can increase their size (Rutherford *et al.*, in press).

Sand and gravel extraction — already noted as a secondary cause of channel change — can directly cause such change. Almost everywhere in eastern Australia these resources are being extracted at a rate faster than they are renewed (Rutherford *et al.*, in press). The rate of extraction in both New South Wales and Queensland is steadily rising, to meet demand for construction (see Fig. 7.14).

Salinisation

In some parts of Australia — most notably the large irrigation areas of the Murray–Darling Basin, which were established at the turn of the century — salinised surface soils, caused by land use, have been present for a long time. The south-west of Western Australia has also suffered from dryland salinity since early this century. In other areas, such as the dryland agricultural areas of central and northern New South Wales, salinity is regarded as a more recent phenomenon. However, it is difficult to assess the scope of the problem, as large areas of the continent lack long-term data. Available data sometimes conflict, indicating that we need standard definitions of relevant parameters. The key indicators of environmental state are rate of rise of groundwater levels, area of land underlain by shallow watertables and rate of change of stream salinity. The best-documented area is in south-west Western Australia (see the box opposite).

Irrigation-induced land degradation

All irrigation practices add water to underlying groundwater. If more water is being added than can move laterally in the aquifer, groundwater levels will rise. Unless the groundwater is highly saline, most irrigation-induced land degradation begins as waterlogging. After time, and depending on evaporation rates and degree of flushing, salt concentrations increase until they affect crop yield. Waterlogging alone also reduces crop yield.

In 1985, the Murray–Darling Basin Commission estimated that 360 000 ha of irrigated land had shallow watertables, and 87 000 ha of land in the Victorian portion of the Basin were visibly salinised (MDBC, 1993a). Victoria's 1991 State of the Environment Report contained an estimate of about 140 000 ha of salinised irrigated land, representing about 30 per cent of the State's irrigation areas. It has been estimated that high watertables lie under some 220 000 ha (41 per cent) of the Shepparton irrigation region. In South Australia, 4600 ha of shallow groundwater exists in irrigation areas (State Dryland Salinity Committee, 1989–90).

The Wakool, Deniliquin and Murrumbidgee irrigation areas of New South Wales were estimated to contain 199 000 ha of land with shallow watertables and 9000 ha of land that is visibly salinised (1985 figures, MDBC, 1993a). By 1991, the area of land overlying high watertables had increased dramatically. **For example, the salinised area in Berriquin (part of the larger Deniliquin area) had grown from 22 000 ha in 1985 to 91 300 ha in 1990).**

Salinity problems associated with irrigation in other States are much less significant and quite localised at present. However, the prospects of waterlogging and salinisation have caused authorities to reassess the area available for development in the Burdekin River Irrigation Area in north Queensland.

Dryland salinisation

Dryland areas are those that depend solely on rainfall for plant growth. They are susceptible to hydrologic disturbance when deep-rooted native plants are cleared and replaced by introduced shallow-rooted crops that use less water. More water then moves below the root zone, raising groundwater levels to a higher point in the soil profile and remobilising salts in the higher, previously unsaturated zone. Salt usually then appears at the surface after evaporation follows periods of waterlogging.

For Western Australia, the estimated area of salinised land in 1994 was 1.6 million ha or nine per cent of the area of cleared agricultural land in the State (see the box opposite). The Murray–Darling Basin Commission estimated that about 200 000 ha of the Basin suffered from dryland salinity in 1992, although this is now regarded as an underestimate (MDBC, 1993a). In South Australia and Victoria, estimates of areas affected by dryland salinisation stand at about 400 000 and 150 000 ha respectively. (Sustainable Resources Group of the Primary Industries Department of South Australia Conference Workshop paper, 1993)

While no one has completely documented the scale of the problem in New South Wales and other States, in 1992 about **20 000 ha were recognised as salinised in New South Wales (MDBC, 1993a)**. In Queensland, about 10 000 ha were estimated to be affected in 1990, and Tasmania has only recently mapped small-scale scattered pockets of dryland salinisation.

Rate of watertable rise

The most comprehensive available information on rates of watertable rise exists for the irrigation areas of the Murray–Darling Basin. Watertables are rising at the greatest rate (about 100 to 500 mm per year) in the developments of the south-eastern parts of the Basin. It is not yet clear whether the rate has slowed as a consequence of improved irrigation efficiency or because of the dry conditions of the last few years. But the rise in salt transport rate in the Murray River at Morgan is slowing (see Fig. 7.29), which may indicate such changes.

Although data on rates of watertable rise in dryland catchments are very limited, long-term observations indicate rises of many tens of metres in some regions since clearing began. Observation indicates that groundwater levels have increased by up to

30 m since the 1880s in parts of south-eastern Australia and by about 20m in the south-west of Western Australia.

Salt load in streams

In south-west Western Australia, the average rate of rise of stream salinity has ranged between one and 76 mg/L/year over the last few decades (Schofield, 1989). The 1992 State of the Environment Report for Western Australia quotes rates of increase

between 11 and 117 mg/L/year for 17 major streams in the south-west of the State for the period 1965–1986. Elsewhere, very few reliable data quantifying the rate of change of stream salt loads exist. In the Murray–Darling Basin estimates of the rate of increase in salinity of the Murray River at Morgan, made in 1985, suggested a figure of about 1 mg/L/year, compared with an annual fluctuation of about 200 mg/L in river salinity. Preliminary analysis of salt loads in other streams in the Basin shows similar trends.

In South Australia, increasing salinity has made several reservoirs useless for human consumption, and the cost of treatment for Adelaide's water supply is likely to increase as catchments in the Lofty Ranges become salinised. About 21 per cent of the divertible surface water in the State has a salt concentration of about 1500 mg/L, which is above the National Health and Medical Research Council guidelines for human consumption (State Dryland Salinity Committee, 1990).

The message about catchment pollutant sources

- lxxxiii. Catchments are the sources of a range of aquatic pollutants, including sediments, nutrients, salt and pesticides.**
- lxxxiv. The natural character, human disturbance and management of catchments control the nature and amounts of pollutants. Intensive uses produce the most pollutants.**
- lxxxv. Sources of sediments and phosphorus include land adjacent to streams, channel beds, banks and gullies. The relative magnitude of these sources varies across the country and through time.**
- lxxxvi. Fine sediments usually transport other pollutants such as phosphorus, pesticides and pathogens.**
- lxxxvii. Nutrients also come from point sources like sewage-treatment plants, feedlots and urban and industrial run-off and discharge.**
- lxxxviii. The relative importance of diffuse and point pollutant sources varies between catchments and with run-off, with point sources being more important in low-flow conditions and in areas of urban development and animal waste disposal.**
- lxxxix. The spread of salinised land is increasing salt loads to rivers in many parts of Australia, although the rate of increase of load in the Murray River might have begun to slow.**
- xc. Increasing agricultural use of pesticides will result in increasing levels in waters with unknown biological and health consequences.**
- xc. Other pollutants such as trace metals and synthetic organic chemicals are important in some localities, although their biological and health consequences are largely unknown.**
- xcii. The leaching of nitrate to surface and groundwaters from sewage, intensive**

animal industries, food-processing, fertilisers and natural sources is a potential human health hazard in some areas.

xciii. **Impacts of forestry**

xciv. As in all cases where the vegetation cover of a catchment is changed, forestry — both native forests and plantations —inevitably affects soils and water. Although it occurs in lowland regions of Australia, the impacts on water quantity and quality are likely to be most extreme in the uplands where run-off is produced.

xcv. **Water quantity**

xcvi. Plants draw water from the soil, and transpire some of it to the atmosphere. As well, they catch rain on their leaves, from where it can evaporate. Through these processes (known as evapotranspiration), surfaces covered by vegetation lose more water than those that are bare. When a forest is removed, more water flows into streams, from run-off and soil seepage. Vigorously growing young trees use a lot of water. The amount depends on the number and type of trees, and can be greater than that used by a mature native or plantation forest.

xcvii. In forested areas the flow of water in streams increases immediately after clearing and logging (Bosch and Hewlett, 1982), and then is reduced as regeneration begins. Fire can produce results similar to clearing and logging.

xcviii. Some of the differences between initial water- yield increases in different catchments are due to different forestry practices. Among these, the most significant are in the area of logging. **Run- off has a tendency to increase as the logged area of a catchment increases.**

xcix. Native forests in Australia are a mosaic of untouched, logged and regenerating patches, producing a stream-flow response that is difficult to relate to specific forestry operations. Few streams have large entirely forested catchments, and agriculture also influences flow rates in large catchments. The only way of describing the state of water yield as a result of forestry land use is therefore by using small research catchments, of the kind illustrated in the diagrams, where the individual effects can be isolated and measured.

c. **Water quality**

Increased run-off and flow through soil after logging can increase the sediment load of streams by increasing slope erosion. It may also increase stream size, and so sediment that moves out of forests can be derived from the streams themselves (Olley *et al.*, 1995). In spite of this, few quantitative data are available to demonstrate relationships clearly. A recent review (Campbell and Doeg, 1989) concludes that timber-harvesting operations have significant effects on stream sediment levels, water quantity, water temperature, nutrients and aquatic biota. The effects appear to be site-specific, with some studies (Grayson *et al.*, 1993; Olive and Rieger, 1987) failing to demonstrate any effect of forestry operations on water quality because of very high natural variability or good forestry practice.

During the establishment phase of plantations, erosion of forest roads, hauling of

logs downhill and clear-felling cause increased turbidity and sediment loads (Boughton, 1970; Cornish, 1989). Elevated sediment loads are therefore likely to occur at a number of times during the growth/harvesting cycle of both native and plantation forests. However, few studies in Australia last long enough to detect these changes. Studies in other countries show that the effects are still evident 20–50 years after logging, in the form of elevated stream sediment loads and woody debris (Beschta, 1978). Only one Australian catchment has been studied for more than 30 years, at Coranderrk near Melbourne (Doeg and Koehn, 1990).

Ecological impacts

While changes in flow regime and water quality associated with logging activities have been shown to cause significant impacts on stream ecosystems in other regions of the world, research in this area in Australia is still in its infancy (Campbell and Doeg, 1989). Recent studies of streams in Western Australia, Tasmania and **New South Wales have shown that logging and associated road building cause significant changes.** For example, spread of tree disease, changes in characteristics of bed sediments, amount of wood debris, water temperature and shading that are associated with declines in the abundance and diversity of macroinvertebrates and fish (Richardson, 1985; Grown and Davis, 1991; 1994; Davies and Nelson, 1993; 1994).

Chemicals are widely used in forests to control competing plants and pest insects. Commonly used chemicals include the atrazine and glyphosate herbicides, and a variety of pyrethroid and other insecticides. These chemicals have been shown to cause disturbance and mortality of stream fish and invertebrates (Barton and Davies, 1993; Davies *et al.*, 1994). In some areas public concern is high over the contamination of untreated rural domestic water with chemicals used in forestry. Concentrations of 1–100µg/L of atrazine were regularly recorded in some Tasmanian plantation forests (Davies *et al.*, 1994).

Responses

Although people have long recognised the threat that forestry operations pose to water resources, they have rarely considered the value of water or the role of forests in ecological processes, in calculating the value of forests. Responses in some States, particularly Western Australia and Victoria, have been to carry out research into water quantity and quality in relation to forestry operations. Victoria, Western Australia, New South Wales and Tasmania now have codes of forest practice and practical guides for field operations to protect water quality. Education and enforcement of these codes is essential. Where water supply either is at risk (for example, in the mountain ash forests near Melbourne) or could be enhanced by thinning (for example, part of the Perth supply), careful research has played a key role in identifying options. The closed-catchment policy for Melbourne's supply has been maintained because of the risk posed by logging and human recreation (O'Shaughnessy and Jayasuriya, 1987). A similar policy exists for Sydney and Perth.

In general, forest activities and their impacts have not been explained to the public and research has been either non-existent or patchy, with research results often neither analysed nor published. Under such circumstances, it is difficult to be confident that policies and practices are appropriate. Continuing public protest over logging is partly a response to a lack of information, among other concerns.

Groundwater: a vital but often neglected resource

People living in about 60 per cent of the Australian continent are totally dependent on groundwater, and those in another 20 per cent use more groundwater than surface water. The volume of groundwater in the upper one kilometre of the earth's crust is 10 times larger than the combined volume of all rivers and lakes on earth. Groundwater allows streams to flow through prolonged dry periods and yet, for many people, it has a certain mystical quality, perhaps because it cannot be seen until it is pumped or flows to the surface. This mystique is reflected in the widely accepted but scientifically baseless practice of water-divining.

Despite its vital role in supporting communities and industries, people often abuse groundwater. **They often regard it as free and unlimited in quantity and generally do not appreciate that groundwater can be over-used and become polluted.** Not long ago the tendency in waste disposal was to deposit waste underground and to ignore any consideration of leakages from surface facilities, presumably on the premise 'out of sight, out of mind'. The huge groundwater clean-up costs that many countries are now facing provide ample evidence of the folly of these practices.

Groundwater is an integral component of the hydrologic cycle and constitutes the largest terrestrial water store in that cycle. At its source, it is inextricably linked to the surface environment. It sustains many wetlands and supports vegetation. In turn, disturbances to the surface environment affect aquifers. Management of land and water resources must therefore be approached in an integrated way that takes full account of both groundwater and surface water.

At the broadest level, the way in which groundwater occurs in aquifers is not difficult to understand. Aquifers may be unconfined or confined, and may be further classified as 'surficial', 'sedimentary basins' and 'fractured' (see diagram below). They are all susceptible to pollution where they intersect the surface, but surficial ones are at greatest risk in the short term because they are hydraulically connected to the surface over much larger areas proportionally, and through shorter flow paths.

A key factor in groundwater management is the very much longer time period for aquifers to respond compared with surface waters. For example, it takes a matter of weeks for water to travel in surface streams from inland of the Great Dividing Range in Queensland to central Australia after flooding rains. In the Great Artesian Basin it takes a million years for water to travel a similar distance. While surficial aquifers react significantly more rapidly, the slow response time still needs to be recognised in managing them. In particular, cleaning up polluted aquifers is a prolonged and costly process.

It is not hard to find examples of groundwater contamination in other countries. In Bangkok, the large resource underlying the city is subjected to major pollution from human and industrial waste products deposited in the recharge areas above it as well as from salt-water intrusion from the sea because of overpumping for water supply. In Europe, both industrial and agricultural contamination are widespread. In many places, the nitrate level in groundwater has soared above the 50 mg/L permissible

drinking water limit and continues to increase. Given the large number of possible contaminants, and the fact that several hundred new organic molecules are fabricated and released into the environment each year, this obviously presents a control problem that can only be tackled at the national or international level.

Internationally, the quality of surface water in some locations has improved substantially in the last 30 years — thanks to the construction of waste-water treatment systems and the recognition of the need to protect and rejuvenate catchments, streams and their ecosystems — but the same cannot be said about groundwater. Over the same period groundwater quality has decreased markedly. Its usage has increased in the last 30 to 40 years — doubling in the United States since 1950. In Australia and worldwide, aquifer systems are suffering from dual pressures; the level of exploitation of the resource is increasing at the same time as they are sustaining increased levels of pollution. In Australia there is still time to reverse these trends if action is taken soon.

The Great Artesian Basin — the lifeblood of much of eastern inland Australia — is recharged mainly along the western slopes of the Great Dividing Range running parallel to the New South Wales and Queensland coastlines. It lies under one-fifth of the continent, but at considerable depth (1000–2000 m) in the areas where its water is used. Uncontrolled flow from bores in the Basin has caused major and unnecessary depletion of water resources (see figure below). A program of bore capping is under way, which will gradually stem the water, although at considerable cost.

If pollution were to occur in the Great Artesian Basin, the time scales already mentioned make it obvious that a clean-up would be almost impossible to achieve. It is therefore a matter of concern that in 1990 the Australian Water Resources Council listed the New South Wales recharge area as a possible site of major groundwater contamination. It listed dissolved solids, metals, pesticides, and nitrate as contaminants, and agriculture and mining as sources (AWRC, 1990).

Wetlands

Wetlands are areas of land that are flooded naturally or are inundated or waterlogged on a permanent, seasonal or intermittent basis. They include marshes, ponds, lakes, billabongs, meadows and swamps. Australia has a wide variety of wetlands, many of which have unique features and are of high ecological value. Numerous species of birds, fish, amphibians and other aquatic life depend on them as habitats for survival (McComb and Lake, 1990). National inventories of wetlands were developed in 1985 (Paijmans *et al.*, 1985; ANCA, 1993), listing the various types and their locations (see Fig. 7.18). The Ramsar Convention lists 567 wetlands of international significance, 40 of them in Australia (Phillips, 1993). Although significant wetland areas are protected by various levels of reservation within national parks and World Heritage Areas, on a national scale wetlands are not well-protected from human impacts.

The extent and condition of Australia's wetlands have deteriorated greatly since European settlement by draining, changes to water regimes and increased sediment and nutrient inputs (Usback and James, 1993).

In Victoria, one-third of natural wetlands have been destroyed, including half of the area of non-permanent fresh-water wetlands. A survey of New South Wales coastal

wetlands estimated a 70 per cent reduction of some types (Goodrick, 1970). In a 1992 survey, 38 per cent of New South Wales lakes were found to be degraded by nutrient enrichment and only 18 per cent were considered to be in 'good' ecological condition (Timms, 1992). Some 70 per cent of wetlands on the Swan Coastal Plain, Western Australia, have been lost since European settlement and a survey of those north and south of Perth has shown that most lakes and seasonally wet areas have been substantially or completely altered (Halse, 1989–94). In South Australia, drainage has reduced wetlands in the south-east to 11 per cent of their former area.

Wetlands



Kakadu National Park (above); a healthy wetland and Lake Wyangan, near Griffith, NSW; a degraded wetland

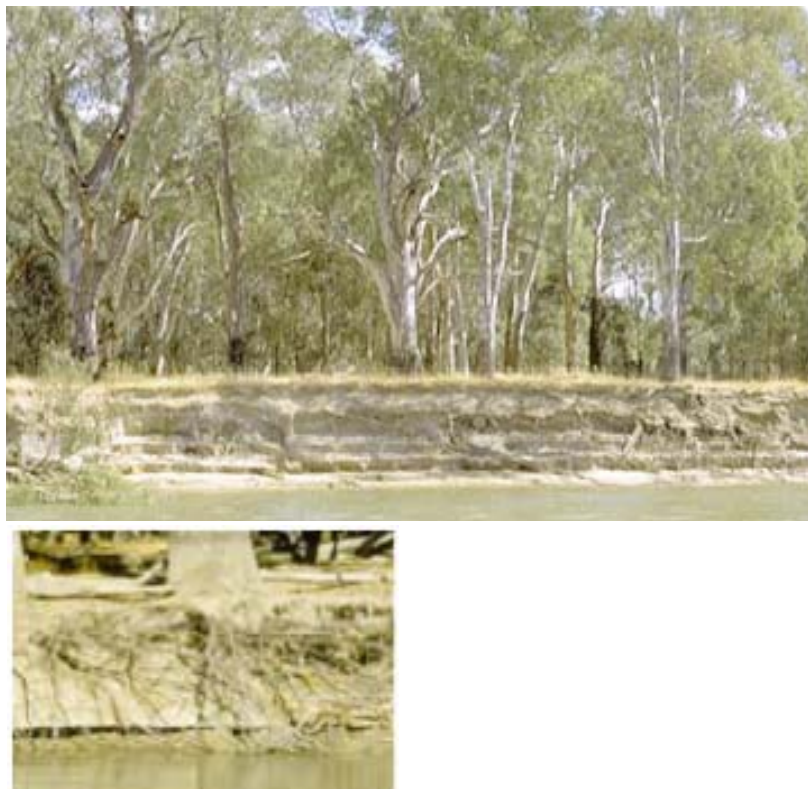
Rivers

Australia has a wide diversity of rivers, ranging from upland perennial streams and lowland floodplain rivers to the ephemeral rivers of the arid interior. Most rivers in the lowlands and in agricultural catchments are degraded, with moderate to severe disturbance of riparian and channel habitats as well as increases in salinity, decreases in flow, changes in flow regime and increased nutrient loads. **For example, in Victoria, the water quality and aquatic animal and plant life of most rivers and streams are seriously degraded (VSOE, 1988). This is worst in the central, north-west and south-west of the State, where high levels of turbidity, nutrient contamination and salinity occur, and where erosion and riparian vegetation losses are severe. A survey of the state of 27 Victorian river basins revealed that only 44 per cent (12) had more than half of their stream length in an excellent or good environmental category (Mitchell, 1990).** A recent survey of the Maroochy

River catchment, Queensland, found that only 14 per cent of stream length was rated environmentally as very good and the largest category (26 per cent) was classified as poor (Anderson, 1993). Such results are typical of many Australian rivers on the developed coasts.

By contrast, the northern Kimberley, Central Desert and Nullarbor Plain regions of Western Australia have suffered little disturbance or land clearing and rivers in these areas retain many of their natural values. However, rivers of the south and east of the State are frequently highly modified with multiple problems of high nutrients, sediment inputs and salinity (WASOE, 1992).

Changes in wetland and river hydrology



Downstream of Gogeldrie Weir on the Murrumbidgee River; eroded, degraded riverbank

Regulation has drastically altered the flow regime of many Australian rivers. The construction of dams and weirs causes changes in hydrology, and small farm dams and the operation of pumps in the main river channels and their tributaries also often affect flow. Only a few Australian rivers have not been altered hydrologically by human activities. For example, all 22 coastal drainages between Fraser Island (Queensland) and Lakes Entrance (Victoria) are impounded (Harris, 1985). Most unregulated rivers are in sparsely populated areas — that is, northern and central Australia.

The allocation of river flows for environmental purposes is now a major issue in Australian water management. The hydrological cycle links changes in the catchment,

changes in river flow, and in riparian and channel habitats. Most Australian rivers have been degraded by a combination of these factors (Cullen *et al.*, in press).

Changes in Australian river flows may take the form of all or one of the following:

- ci. decreases in the volume of discharge or occasionally, increases (for example, with inter- basin transfers)
- cii. changes in and reversal of seasonal flow patterns (for example, higher summer instead of winter flows)
- ciii. reduction or enhancement of the natural variability of flows on scales from hours (in hydro-electric dams) to months and years (for large irrigation or urban supply storages)
- civ. changes in the frequency, typically suppression, of small to medium floods
- cv. changes in the form of floods, especially the rate of rise and fall □ These changes affect the channel form, sediment transport, water quality, habitats and biota of Australian streams — from small creeks to large lowland rivers. Consequently, regulation of the rivers has had major impacts on their ecological health: changing biological communities; eliminating species and reducing water quality through erosion; reducing habitat diversity; disrupting biological processes linked to floods; and flooding or de- watering key habitats. For example, the reduced frequency of flooding on the floodplain of the River Murray has severely affected red-gum forests, with reduced growth, greater mortality and minimal regeneration (Cullen *et al.*, in press). With fewer flows, forest litter accumulates and floodwaters lose oxygen and can become toxic to fish. Since European settlement, reproduction and recruitment of fish in floodplain habitats of the Murray has been reduced and is now limited to small species such as gudgeons (Cullen *et al.*, in press).

Changes caused by humans in the water regimes of Australian wetlands include changes in water-level fluctuations (size, frequency and seasonality) and changes in water balance (input, output and seasonality), all of which affect their ecological health. Such changes have occurred to the majority of wetlands along the River Murray, the western Victorian lakes and those on the Swan coastal plain (Pressey 1986, Williams 1992, Froend *et al.*, 1993).

Significant environmental degradation commonly occurs when major water inputs are reduced in flow or diverted (see the box on page 7-27). However, prolonging wetland flooding well beyond the natural pattern may also have significant impacts. The wetlands of the River Murray have a total area of about 2200 sq km, including the Coorong and Lower Lakes (Pressey, 1990). Some 35 per cent of the area that used to be flooded intermittently now never dries out, and 11 per cent receives irrigation water and now may be virtually permanently wet.

- cvi. **Changes to the structure of inland water habitats**

Wetland and river habitats rely for their ecological health on their physical environment being maintained. In Australia, physical destruction or degradation of

inland water habitats is widespread due to the removal of riparian (bank-side) vegetation, increased bank erosion, river engineering — including realignment, straightening and desnagging — and construction of barriers to fish migration. While the impacts of these practices are well demonstrated in the River Murray, their effects are common to most Australian rivers. Clearing of native bank-side vegetation for agricultural and urban development has been extensive in lowland sections of most of our rivers.

A recent survey of the Murray and its side-channels found that riparian vegetation was in generally poor condition due to clearing, weed infestation, soil salinisation, grazing and regulation of flow (Margules *et al.*, 1990). At least 30 per cent of the study area was cleared, and introduced weeds constituted 18–63 per cent of plant species. Regeneration of red gum and black box was also affected.

Bank erosion is widespread in Australian rivers, causing increases in sedimentation and changes in channel form, both of which have negative impacts on river health. The Murray suffers conspicuous bank erosion, where slumping of banks follows rapid drops in water level. An estimated 1.8 million tonnes of material fell into the lower Murray over a 153-km section in 1988–89 alone (Walker, 1992) and channel-widening has averaged 16 cm per year since 1977 in the Lake Hume–Lake Mulwala reach (Tilleard *et al.*, 1994).

Storages trap sediment, increasing river erosion immediately downstream. Impoundments trap up to 73 per cent of sediment in the Murray (Thoms and Walker, 1992), and at least 50 km of river could be deepened substantially from its sediment supply being trapped in the Hume Reservoir (Tilleard *et al.*, 1994). The 180-km Hume–Lake Mulwala reach conveys all the regulated flow destined for downstream use. Here, channel changes include lateral migration of bends, channel deepening and widening, and side-channel development. Regulation has also slowed development of key side-channels. The river bed between Hume Reservoir and Albury has deepened by up to 24 per cent since 1977. Natural changes in channel form are also occurring in the Murray — for example, near Mildura.

River engineering works, designed to provide improvements for human use, have often caused river ecosystems to deteriorate. Along the Goulburn and Upper Murray rivers some 870 and 400 stream-management works respectively, have been recorded (Vic. DWR, 1989), resulting in serious environmental degradation. Levee-bank construction separates rivers from their floodplains, as it has done for the Murray downstream of Mannum, and in many other areas of the country.

Desnagging — the removal of logs and wood debris from river channels, usually to facilitate the passage of water or boats — results in loss of biological habitat and increased stream erosion. Extensive desnagging was carried out in lowland reaches of the Murray–Darling until road and rail transport replaced paddle steamers (Pressey and Harris, 1988). Desnagging and willow removal in the Barmah Choke section of the Murray have reduced overbank flows at the Edward River and Gulpa Creek off-takes for a distance of about 20 km, affecting the health, growth and reproduction of trees in the Millewa Forest (Murphy, 1990).



Pesticides sprayed on crops sometimes end up in rivers as run-off.

Other pollutants

A wide range of other pollutants is produced by industry and urban waste disposal. The most important source industries and activities are listed below.

- waste disposal and treatment industry • electricity generation
- town gas production □ • fire-fighting □ • transport industry □ • agriculture and aquaculture □ • chemical and petroleum industries • mining and mineral-processing
- manufacturing industry □ • domestic and commercial developments

The main contaminants of industrial waste streams are metals and inorganic chemicals, organic chemicals such as phthalates, phenols and cresols, aromatics, polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls and related compounds (PCB), halogenated aliphatics, pesticides and metabolites, radionuclides and biological compounds (AWRC, 1990).

While these contaminants probably all occur in Australian catchments, few measurements are available even on a local scale and certainly very few at a national level to assess the scale of the problem (O'Loughlin *et al.*, 1992). The accuracy and thoroughness of reporting and recording incidents of point-source pollution varies widely between and within States. It is unlikely that the situation will change for some time. Legal sensitivity makes people reluctant to disclose the nature, extent and location of most actual and potential contamination sites. For more information about waste-generation rates, see Chapter 3.

Table 7.8 gives one example from each State and the Northern Territory as an indication of contamination incidents.

Of the diffuse sources of pollutants, pesticides are probably the most important. While it should be possible to determine their level of use from sales or import figures, as far

as can be determined no one has collated this information nationally, or for most regions. An exception is a pesticide audit conducted by Rayment and Simpson (1993).

Societal responses and actions

The world's largest toxic algal bloom occurring in the Darling River with all its associated water supply problems, was the single most important factor in generating or accelerating government and community action. Responses included: algal and nutrient management strategies focusing on both operational and longer-term actions to manage the problem; a Senate enquiry into toxic blue-green algae; major research funding initiatives; and community education programs.

Research into the primary causes of eutrophication, namely nutrient inputs to aquatic systems, resulted in a series of best- bet management activities targeting the reduction of both diffuse and point sources of phosphorus. For example, better farming practices to ameliorate nutrient loss to streams were identified and guidelines for the use of buffer strips and other techniques for sediment and nutrient interception are being developed. Other research explored and developed options for improved sewage treatment, including phosphorus precipitation, off-river disposal and effluent re-use.

Community-based nutrient management strategies are being developed and implemented through catchment management plans. Such plans include the upgrading of sewage-treatment plants and treatment to reduce point sources, and a review of stream-flow management options to reduce the impact and likelihood of algal bloom development. Community education is an important part of any strategy to deal with the eutrophication problem. This is because long-term management of diffuse nutrient sources requires individual landholders to adopt best- practice methods, while urban dwellers need to change their behaviour in relation to nutrient polluting activities.

One obvious target for nutrient reduction has been the high phosphorus levels in detergents, which form a major phosphorus component of sewage effluent in many cases. As a result of pressure from governments and the scientific community, the detergent industry agreed to a voluntary maximum phosphorus level of five per cent, in conjunction with a labelling program that indicates whether detergents contain phosphorus. This action was followed up by a number of trial community-awareness programs focusing on point source phosphorus reduction from urban areas. Targeting both school and adult groups, these programs educate the community about the benefit of widespread use of low- phosphorus detergents, as well as other individual activities to reduce nutrient input into rivers. Initially trialled in Albury, New South Wales, and since adopted in nearby Wagga Wagga and other places, the phosphorus-reduction campaign has been particularly successful in modifying community behaviour and reducing the phosphorus level in sewage effluent discharged to these rivers.

Research has also been undertaken into the management of algal blooms in inland waters. This has mainly focused on the use of flow and destratification to reduce the likelihood of blooms developing, as well as water-treatment processes to cope with the associated toxins and odours. Contingency plans to cope with the outbreaks of toxic blue-green algal blooms have also been developed. These include emergency water treatment and the identification and development of alternative sources of

water. Few management options are available for management of algal blooms in estuarine and marine environments, and prevention remains the best approach.



A 'red tide' at Lake Macquarie, NSW caused by the dinoflagellate, *Noctiluca*, an expression of eutrophication.

Pressure

Virtually all human activity has accelerated the process of eutrophication both directly, through increased nutrient inputs to waterways, and indirectly through modifications to make water available for human use. Nutrient inputs originate from both point and diffuse sources (see Table 7.7). Point sources include sewage effluents, irrigation drains, stormwater run-off and drains from intensive livestock industries. Diffuse sources originate from leaching or soil loss from farmland and stream banks. In some aquatic systems such as reservoirs, stagnant inland rivers or estuaries, nutrients may also be derived from bottom sediments and decaying organic matter.

One of the reasons why eutrophication problems are so widespread, particularly in rural areas where diffuse sources dominate, is the large difference in nutrient concentration between nearby land and water systems. Soils typically have a nutrient status of between 200 and 500 ppm phosphorus, whereas the minimum threshold concentration for algal bloom development in water is between 0.02 and 0.05 ppm — that is, one-ten-thousandth the concentration of phosphorus in the soil. This means that even a small, barely noticeable leakage of phosphorus from well-managed agricultural land may be more than sufficient to stimulate excessive algal growth in a water body.

Studies in Australia and overseas have shown that, in general, the more intensive the land use, the higher the loss of nutrients from the land into the surface waters (see Table 7.6). Typically, phosphorus generation rates increase from 0.1 kg/ha in forests to 1.0 kg/ha in cropped and urban areas, and much higher values under intensive agricultural use.

Water conservation and management

Many people will remember the 1000-km algal bloom that occurred in the Darling River in late 1991 and focused world attention on Australia. Such incidents are caused by a number of factors, including: modification and reduction of river flow by reservoirs and direct take-offs; point-source pollution from sources such as town sewage treatment works and industry; non-point-source pollution from farming and horticultural practices; and lower-than-expected rainfall and run-off.



H

Catchment management is now an important community activity.

Total Catchment Management is a New South Wales initiative that is underpinned in legislation. Queensland and Western Australia have State- level integrated catchment management policies. South Australia and Victoria are using the same principles to coordinate various programs and agencies to

bring about whole-catchment management.

Whole-catchment management is quite a challenge, even when a river system occurs wholly within one State. Bringing about environmental improvements often involves considerable amounts of money as well as goodwill from landholders. In the case of the Peel–Harvey estuary system, Western Australia, the strategy involved catchment management in the coastal area and the construction of a new channel to the ocean costing more than \$50 million (see page 7-46).

The challenge is even greater where a river system crosses State boundaries. The approach taken by the Murray–Darling Basin Natural Resources Management Strategy (NRMS) provides an outstanding example of integrated catchment management. The NRMS provides a mechanism for coordinating management goals between the Commonwealth and State governments and for funding investigations and implementation. However, the Australian constitution gives the States primary responsibility for land management, and hence strong political will and persistence is necessary to cooperate on a common approach and avoid lowest common denominator decisions.

Water conservation and management

Many people will remember the 1000-km algal bloom that occurred in the Darling River in late 1991 and focused world attention on Australia. Such incidents are caused by a number of factors, including: modification and reduction of

river flow by reservoirs and direct take-offs; point-source pollution from sources such as town sewage treatment works and industry; non-point-source pollution from farming and horticultural practices; and lower-than-expected rainfall and run-off.

The responses to conservation and management of water include water conservation and demand management, water pricing, water rights or transferable water entitlements, education, recycling, monitoring, research, agricultural advice, reservoir management, reservoir redesign, flood control, water-sensitive urban design and regulation.

In a system of transferable entitlements, water rights can also be bought or reserved to protect the environment. Nowadays, people are starting to think of 'sustainable yield' as the amount of water that can be sold after an adequate amount has first been allocated to the environment. Such allocations need to take account of years of very low flow, when the amount of water available may be severely reduced. Ideally, any water allocation should indicate a range available, not guarantee an absolute entitlement. The actual amount available should range from a minimum (to take account of very- low-flow years), which in some cases might be nil, through to a more generous amount in high-flow years.

Biological conservation and management

Once native species are lost from an area, it can be extremely costly or impossible to reintroduce them. In many cases, the changes in biodiversity are absolute with many species and assemblages being lost permanently. The range of approaches to achieve biological conservation and management includes: promulgation of reserves, policing of protected areas, allocation of water to ensure continuation of environmental flows, education, monitoring, research, restoration of wetland systems, pest control, conservation extension advice and management of threatened commercial, recreational and introduced species.

Water quality control and management

Responses aimed at quality control and management include: setting water quality guidelines, standards and objectives for drinking water, recreational water use, stock watering, irrigation, environmental (including aesthetic) uses and various types of waste water; licensing; education; monitoring; research; recycling and re- use, including stormwater management and water- sensitive urban design; water treatment; and best-practice, best available and best-bet technology.





MEDIA RELEASE

Embargoed until 9.30 am, 4 February, 2009

Hot, dry January keeps southern Basin in record drought

Hot, dry conditions in January kept Murray inflows close to historic minimums and the southern Murray-Darling Basin in the grip of record drought.

That's the stark message in the Murray-Darling Basin Authority's (MDBA) latest drought update released today.

Chief Executive Mr Rob Freeman said this was disappointing as November and December had looked promising with lower temperatures and higher rainfall.

"In addition, rainfall across the higher yielding Victorian Alps and Snowy Mountains - the region from which a substantial proportion of the Murray system inflows are normally derived - is continuing its below average pattern of the past few years," he said.

"The northern half of the Basin received some good rainfall in November and December and even some flooding along sections of the Peel and Namoi Rivers. But the total volume of water was fairly small and after dissipating across the lower Namoi floodplain, only about 40 GL reached the Barwon River.

Mr Freeman said the **MDBA's total active (useable water) storage was now 1,470 GL or 16 per cent of capacity, slightly higher than at the end of January 2008, but well below the January long term average of 5,400 GL.**

The recent hot weather and lower than normal flows, has increased the risk of algal blooms and aquatic plant growth along the river. High water temperatures have also increased the stress on fish populations, and resulted in three fish kills in shallow anabranches and channels along the mid- Murray.

Mr Freeman said the prolonged water shortage across the Murray system was continuing to cause severe environmental impacts to riverine and floodplain ecosystems. Low river levels have kept many wetlands and billabongs disconnected from the river for several years, impacting on waterbird communities, river red gum and black box trees.

"The Lower Lakes remain in a critical state, with record low water levels, high salinity and the ongoing risk of acidification. The water level in Lake Albert is decreasing at a slower rate only because of the water we are pumping into it from Lake Alexandrina," he said.

“The immediate prospects are not good as only about 10 per cent of Murray system inflows normally occur between February and May and the latest rainfall outlook from the Bureau of Meteorology shows only neutral conditions across the Basin for the next three months.

“We need a sustained period of above average rainfall during the coming autumn and winter months for inflows to recover toward the long term average.”

Mr Freeman said the prospects for irrigation in 2009-10 would depend substantially on future rainfall and system inflows, though enough water would be carried over to meet critical human needs in 2009-10.

Media contact: Sam Leone, phone (02) 6279 0141



Thursday, 7 August 2008

Basin wide water storage remains critically low

Water held in public storages across the Murray-Darling Basin is estimated to be at only 21 per cent of total capacity. Water in private storages is also at low levels.

That's the main finding of a Basin wide preliminary collection of public and private storage carried out by the Murray-Darling Basin Commission over the past week.

Acting Chief Executive Mr Les Roberts said figures supplied by all basin partner governments estimated that, at the end of July, total public active storage held was about 4800 GL. The capacity is 22,609 GL. (Active storage is water which can be released using only gravity).

“Most of this water is already earmarked for critical human needs and a small amount is held as carry over or announced allocations,” Mr Roberts said.

Carry over water is already “owned” by users who chose to carry over part of the water available to them last year for use this year.

“The amount of water currently available for use as a carry over or already allocated is about

1400 GL or only 6 per cent of capacity.

“Some areas of the Basin are still in deficit meaning they do not have enough water to cover the delivery of even water for critical human, stock and domestic needs and will be relying on further inflows to their dams to make up the shortfall,” Mr Roberts said.

“Estimates from partner governments show that private storages in the **north of the Basin are estimated to be holding about 810 GL - which is less than estimates being reported in the media.** In the southern Basin, private storage is spread across many smaller farm dams.”

Mr Roberts said the MDBC had also released a fact sheet today showing the water needs at the Lower Lakes.

“Given the current level of storage it’s not feasible to refill the lakes by transferring water from other parts of the Basin without any further significant rain.

“As little as 20 per cent of any water released in the north of the Basin would reach the Lower Lakes in South Australia, meaning that four or five times the water needed at the lakes would need to be released from that far upstream.

“Management of many issues in the Basin are now heavily reliant on inflows over late winter and spring and governments will need to maintain flexibility to manage the situation based on real time information,” Mr Roberts said.

A copy of the fact sheet on Lower Lakes is available at www.mdbc.gov.au

Media contact: Sam Leone, Phone: 0407 006 332 Trim ref: 08/7960



MEDIA RELEASE

Senator the Hon Penny Wong

Minister for Climate Change and Water

PW 10/08 5 February 2008

DROUGHT ARRANGEMENTS FOR THE MURRAY DARLING BASIN TO CONTINUE

Special water sharing arrangements in the Murray Darling Basin will continue into 2009 as a result of climate change and the prolonged drought.

Minister for Climate Change and Water, Senator Penny Wong said the arrangements had been approved by the Prime Minister and the First Ministers of Victoria, New South Wales, South Australia and the ACT under the Murray Darling Basin contingency planning process.

In its seventh report to First Ministers, the Senior Officials Group responsible for contingency planning warned of a **75 per cent chance there would be less water available in the River Murray system in June 2008 than there was in June 2007.**

“Despite the recent flooding in Queensland, we are still a long way from being able to resume normal operations in the Murray Darling Basin,” Senator Wong said.

“The situation across the Basin remains very serious, and the cooperative approach being taken by the States to share water through this difficult time is commendable.”

“The Rudd Government is committed to working with the States to ensure the Murray Darling Basin is healthy and provides a sustainable water supply.”

Senator Wong said the States would now implement measures to ensure the critical human needs of Adelaide and towns reliant on the Murray continue to be met throughout 2008/09.

The Murray Darling Basin contingency planning process was established on Melbourne Cup Day in 2006 to ensure the critical drinking water needs of people reliant on the Murray – including Adelaide residents - were able to be met following the unprecedented dry conditions across the Basin in 2006.

When the contingency planning process was established, it was envisaged normal operation of the Basin would resume in 2007, but continued low inflows mean the transition back to normal Murray Darling Basin operations is very unlikely to take place in 2008.

The two year period to November 2007 recorded the lowest ever inflow to the Murray River.

Inflows during this period were 43 per cent lower than the previous record low, which occurred at the end of 1938.

Senator Wong said the Prime Minister and First Ministers had agreed in full to the recommendations of the Murray Darling Basin Drought Contingency Senior Officials Group as set out in the joint statement released today.

Media Contact: Geraldine Capp (02) 6277 7920



MEDIA RELEASE

Senator the Hon Penny Wong

Minister for Climate Change and Water

PW 23/09 6 February 2008

TRANSCRIPT OF INTERVIEW WITH MATT ABRAHAM AND DAVID BEVAN, ABC
891 ADELAIDE

SUBJECT: LOWER LAKES, WATER BUYBACKS, MURRAY-DARLING BASIN E & O
E – PROOF ONLY

JOURNALIST: Well, are the Lower Lakes dead? Can we now just agree that we’ve given up on the Lower Lakes? I asked that question because the lady who’s perhaps got more power than anyone else in the country, when it comes to the Lower Lakes, is South Australian Senator, Penny Wong.

She’s the Federal Minister for Climate Change and Water and she writes in a piece in The Advertiser today that in the current heatwave, six to seven billion litres of water are evaporating from the Lakes every day. So 30 billion litres bought on Monday would

evaporate by Friday. \$10 million dollars would vanish into thin air in less than a week.

Penny Wong joins us now. Good morning Minister.

WONG: Good morning to you both.

JOURNALIST: Do those sums mean that effectively the Lakes are gone, we've given up on them?

WONG: No, look, we haven't given up on them. That's why we put \$200 million dollars on the table to work with the South Australian Government for a lasting solution.

But the point I was making in the opinion piece today was that the politicians who say there is a simple solution, are simply not telling the truth. I was making the point that these calls for purchasing water – temporary water to the tune of \$10 million – would not be a good use of taxpayers' money, nor would it provide a lasting solution to the Lakes, for the reasons you outlined.

JOURNALIST: You'd spend more than that on advertising in a year, wouldn't you? What's the Federal Government's advertising? You spend more than that on advertising in a week, I would think.

WONG: I don't think that's correct. You will recall, Matt, that we went to the election with a commitment to tighten up on Government advertising and we have done so with Auditor-General's guidelines and we're complying with those. We've implemented that commitment.

JOURNALIST: Well, if you don't buy water for the Lakes this week, when do you buy water for the Lakes?

WONG: Well, there are two types of water, which I think both of you understand. The first is people's entitlements – irrigation licences. So you hold a type of licence against which the

Government then allocates each year ... every month ... during the season, a proportion of water depending on what's available. The second type is temporary water which is the actual allocation level. Now we are buying entitlement and the reason we're buying entitlement is that gives a permanent reduction in the amount of water that is taken out of the river in years to come.

So this is about permanently trying to shift the Murray-Darling onto a more sustainable basis. What is being called for by some politicians is a purchase of the temporary water allocation and not only is that problematic in terms of value, but also in actually achieving an outcome for the Lower Lakes. The other point is that it will in fact increase prices for irrigators who are also seeking to purchase that water such as irrigators in the Riverland and further upstream.

JOURNALIST: Well Minister, long-term or short-term, it's water. How much have you purchased that will be arriving in the Lakes in the next few weeks?

WONG: We'll announce some of those figures on the subsequent tenders soon. We've currently got two tenders on foot, another northern Basin tender and we still are in the second tender – that is the tender process where we're looking for water from willing sellers in the southern Basin.

JOURNALIST: And whatever you purchase is going to evaporate, so getting back to your earlier point...

WONG: Oh, but there's a difference between purchasing entitlements which ensure that you permanently reduce how much water is up the river, and you give the river a permanent entitlement. There's a difference between that and purchasing a temporary allocation which simply evaporates and does not reduce how much water ...

JOURNALIST: What, the other water doesn't evaporate?

WONG: No, no ... Dave, I'm sure you understand this. One is a purchase of entitlement which is always then allocated to the river. The other is a purchase of temporary water which does not result in any reduction in how much water ...

JOURNALIST: Well, why throw in the evaporation argument?

JOURNALIST: It's almost as though, when you said ... there's two types of water, I almost thought you were going to go on and say: the sort that evaporates – that's the Lower Lakes water, and the sort that doesn't – that stops at Adelaide, the Adelaide intake. I mean, why use the evaporation argument when really you're using an argument of whether it should be a long-term purchase or sort of a crisis one-off purchase?

WONG: The point about the evaporation argument – it's not just an argument, it's a fact. I think people in Adelaide are entitled to know some of the difficult decisions that governments are confronted with and they're also entitled to know that some of the so-called simple solutions are not so simple. I mean is it really the proposition that we should spend millions of dollars each week through this period, to purchase water that will not improve the health of the system in the long- term, won't reduce how much water is taken out of the river and will keep evaporating? Is that really the solution?

What we need is a longer-term solution: we need to reduce how much water is taken out of the river. We are seeking to do that but this is, as we've spoken about previously, a problem that has built up over many years and has been exacerbated by the current extraordinarily low levels of inflow.

JOURNALIST: Minister we do appreciate your time. Penny Wong, Federal Minister for Climate Change and Water.

ENDS



MEDIA RELEASE

Senator the Hon Penny Wong

Minister for Climate Change and Water

PW 153/09 10 June 2009

LATEST MURRAY-DARLING BASIN DROUGHT UPDATE PROVIDES DISTURBING SNAPSHOT

Today's *Murray-Darling Basin Authority Drought Update* presents another disturbing snapshot of the critical situation in the Murray-Darling Basin, confirming the need for continued action on climate change and water reform, Minister for Climate Change and

Water, Senator Penny Wong, said.

“The drought update reports May inflows into the River Murray were the third driest on record at only 90 billion litres, well below the long term May average of 390 billion litres,” Senator Wong said.

“The report also shows the Murray-Darling Basin has experienced its ninth consecutive autumn with below average rainfall.

“These are disturbing statistics that confirm the need to take action to tackle the impacts of climate change and help Basin communities and irrigators prepare for a future with less water.

“Our \$12.9 billion *Water for the Future* plan includes a comprehensive strategy to restore the Murray-Darling Basin to health – including \$3.7 billion already committed to specific projects nominated by the States to make irrigation infrastructure more efficient.

“We have also committed \$3.1 billion towards buying water to return to the Basin’s stressed rivers and wetlands – recently announcing the biggest environmental water purchase in Australia’s history of some 240 gigalitres of water entitlements from Twynam Agricultural Group.”

Other measures taken by the Rudd Government to tackle the critical situation in the Murray-Darling Basin include:

- cvii. Achieving agreement with the States to establish the independent Murray-Darling Basin Authority to manage the Basin as a single entity;
- cviii. Initiating development of the new Basin Plan by 2011 that will include a new, lower, scientifically-based limit on water use in the Basin;
- cix. A series of water purchase tenders which, including the Twynam purchase, have so far provided 297 gigalitres of water entitlements for the environment at a cost of \$380 million;
- cx. A new \$300 million on-farm irrigation efficiency grants program;
- cx. Funding to support the purchase of the Toorale cotton farm by New South Wales, which is
 - returning an average of 20 gigalitres annually to the Darling River;
- cxii. A Small Block Irrigators Exit Grant program to enable small-scale, non-viable farmers to
 - leave the industry while remaining in their homes and communities, and returning their water
 - entitlements to rivers and wetlands;
- cxiii. Inviting groups of irrigators wishing to leave the industry to submit proposals to sell their
 - water entitlements together in ways that provide benefits for farmers and rivers.

<http://www.theaustralian.com.au/national-affairs/climate/water-minister-urged-to-show-more-concern-for-murray-darling-communities/story-e6frg6xf-1225935828353>

CLIMATE change will underpin the day's politics as the government braces for a long fight over efforts to return water to the Murray-Darling Basin.

Fears grow in Murray-Darling Basin over possible impact of cuts in water allocations

- UPDATE: Joe Kelly
- From: [The Australian](#)
- October 08, 2010 11:41AM



Griffith irrigation farmer Laurence Salvestro and his stepson Amos with their Semillon grape vines. Picture: Stuart McEvoy *Source: The Australian*

THE head of one of the nation's largest irrigation companies is warning of civil unrest over cuts in water allocations in the Murray-Darling Basin.

The warning of "riots" in rural communities came as Water Minister Tony Burke was urged to show more support and concern for regional Australia as he oversees the process to decide the future of the Murray-Darling Basin.

The independent Murray-Darling Basin Authority will release a guide later today to outline a new way to manage water in the food bowl that better balances environmental and irrigation needs.

Rural communities are worried by reports the draft guide will recommend water allocations be reduced by between 27 and 37 per cent.

The federal government is urging farmers and communities to keep in mind the guide is not a final document, referring to the consultation process that will follow release of a draft basin plan.

Start of sidebar. [Skip to end of sidebar.](#)

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- [Act now to avoid big dry](#) *The Australian*, 2 days ago
- [Chequebook won't save dry communities](#) *The Australian*, 10 Aug 2010

End of sidebar. [Return to start of sidebar.](#)

However there were more warnings today the whole communities could fail if such cuts are implemented, and provoke desperate action.

“I actually think there could be riots in the streets, and by that I mean it's not just the farmers,” said Gillian Kirkup, the chairwoman of Murrumbidgee Irrigation, which manages \$500 million of infrastructure assets and services water entitlements worth \$2.5 billion.

“You take a third of the water away, there is no livelihood for a lot of people,” she told ABC radio.

The NSW Irrigators Council warns cuts of that magnitude could slash up to 23,000 jobs in that state alone.

The warning rings in the ears of Griffith grower Laurence Salvestro, who believes any cut to irrigators' water allocation would be another nail in the coffin of the Riverina region of NSW.

“When you start taking away 37 per cent of the water you use, it's like cutting 37 per cent of your legs off,” he said.

Liberal MP Sussan Ley, whose NSW electorate of Farrer is located within the basin, urged Mr Burke to take a more active approach to inject more confidence in Murray-Darling communities that may be affected by proposed changes.

“At the moment they don't have any confidence in the government,” she told ABC television.

“What I want to see is Mr Burke step up, not step back and wave this through.”

Ms Ley said the minister needed to demonstrate a level of concern and support for regional Australia and “ensure the social and economic aspects are fully tested or evaluated before a final decision is made”.

The NSW Irrigators Council said it was worried allocations in the Murrumbidgee region could be cut by up to 43 per cent, and close down communities.

“It sits well and truly within the firing line,” chief executive officer Andrew Gregson told ABC Radio.

“You're talking about the wholesale closure of communities along the Murrumbidgee River ... that obviously is unacceptable.”

Mr Gregson said the Murray River system needed rain, not a policy solution, to help it recover from drought.

“What it needed was rain and it got it,” he said referring to good falls during winter and early spring.

Mr Gregson argued the river system had always experienced flood and drought and would continue to do so, saying it was not a “European rivers system which runs long and strong and deep all year round”.

Tim Stubbs, an environmental engineer from the Wentworth Group of Concerned Scientists, admits some basin communities might fail if water allocations were cut significantly.

“That doesn't mean every town in the Murray-Darling Basin is going to be decimated,” he told ABC Television, adding there would still be 7000 gigalitres of water available for irrigation.

Up to \$3 billion was being made available to assist severely-affected communities adjust to a future with less water.

“We're talking about numbers in the order of \$200-300 million per community,” Mr Stubbs said.

“That is an opportunity to do some really serious, positive reform in these regional communities that are battered by being connected to simply irrigation.”

Doing so would protect those communities from the next drought cycle, Mr Stubbs said.

Environmental scientist Richard Kingsford said more flows need to be returned to key wetlands if the system is to survive long-term.

“What this plan aims to do is deliver water back to those systems and bring them back to a more sustainable place,” he said.

Perception of Water in Australian Law: Re-examining Rights and Responsibilities

John Caldecott of the Water Action Coalition has sent this excellent commentary on the legal history of water management, the present legal and social challenges. It is laced with incisive observations on water management. This excellent paper was produced by the Australian Academy of Technological Sciences and Engineering. ATSE is an independent, non-government organisation. It is recommended reading. Against a background of questions being raised about water rights and responsibilities, the questionable effects of unbundling water from the land and the obvious problems of water trading, this narrative is clear, authoritative and apt. While written in 2003, the content provides an excellent measure to judge recent legislation and the present intentions of so called co-operative federalism in relation to water administration. The following extract from the conclusion may encourage a careful study of the entire text:

Traditional legal forms defining rights and responsibilities, and narrow conceptions of these constructs will limit this potential to transcend the dilemma of water. Australia has a unique history of statutory based public water management regimes. These public regimes need to continue as the main forum for articulating rights and responsibilities in regard to water to ensure that the capacity to respond to environmental and social challenges remains flexible and adaptive. The foregoing discussion of rights and responsibilities in relation to water has indicated the need to re-conceive traditional property constructs to highlight the public interest component of these rights – that is if we are to still invoke the discourse of property rights in relation to water. More significantly, it is suggested that the discourse of property given its historical association with the singular promotion of narrowly based economic considerations might be an ineffectual model for water regulation. A range of other legal constructs are available such as contract, trust and duty of care that could be examined in terms of their utility in ensuring a proper ‘balance’ between rights and responsibilities in water regulation. Arguably in our perception of water, there has been a great deal of attention given to the rights component but less attention to fully articulating – and enforcing – responsibilities and duties.

Academy Symposium

Perception of Water in Australian Law: Re-examining Rights and Responsibilities

Introduction: Changing Perceptions of Water in Australia

Patterns of Australian life since European colonisation have been characterised by periods of ‘boom and bust’. Many of these cyclical trends have been linked to the periodic droughts that affect the Australian continent.¹ Water and its availability has long been a key issue in Australian society. A significant proportion of Australia’s public resources and private investment has been devoted to overcoming perceived deficiencies in water supply and/or its distribution.² As Australia continues to be heavily dependent on primary industries,³ and as the demands for urban water supply continue to grow,⁴ water will remain a sensitive issue in economic, social and political terms. In many ways, water is a more acute indicator of trends in development and conservation than the land itself, even though the interrelationship between land and water is now beginning to be given due acknowledgement.⁵ The more diffuse interaction between water, environmental sustainability and human quality of life arguably remains largely under explored. However, the recent attention directed to water issues in Australian society highlights, yet again, how integrally water is connected to a diverse range of human and environmental outcomes.⁶

Water acts as an environmental ‘limit’ as it is a key element in sustaining life itself, yet the perception of that limit varies across time, technological and social change, and interest group

standpoint. For much of the colonial period, and into the mid to late 20th century, the prevailing attitude toward what we now term the natural environment was one of 'development'.⁷ The natural world, including water was perceived to be the raw materials for the promotion of human well-being and thus open to exploitation.⁸ Moreover, the Australian continent was regarded as strangely perverse – it did not fit established Western European visions.⁹ In a similarly perverse fashion rather than substantially modify cultural practices, the population set about modifying the land and waters to better accord with their perceptions. The fractures inherent to such a culturally inspired 'modification' are now becoming increasingly evident in the Australian continent.

The legal constructs that regulated this early interaction reflected a similar resource-oriented approach.¹⁰ In the latter part of the 20th century the rise of ecological thought emphasising the interdependence of human and other components of the ecosystem has been significant in providing an alternative perspective.¹¹ This approach has been particularly important in stressing that human development and technology is not imposed on inert matter but occurs in the context of a dynamic living system. With respect to water this has meant *inter alia*, an increased emphasis on issues of water quality and the health of inland riverine systems. More recently, there is increasing evidence of ecosystem stress, such as salinity¹² and the decreasing flows experienced in major catchments, such as the Murray-Darling Basin.

Law also needs to respond to the challenges in fashioning a more responsive regulatory system. In this regard, there has been increasing acceptance of the need for environmental sustainability. The rise of environmental law has been influential here, together with the adoption of the goals of ecologically sustainable development (ESD) across a broad range of legal and policy fields. Yet it would be overly simplistic to suggest that we have seen a wholesale move away from a resource-oriented approach and a complete shift from inappropriate environmental management practices. Significantly, there is often a considerable 'gap' between the espousing of the objectives of ESD and concrete implementation of practices that contribute to these goals.¹³ Thus the tensions between varying perceptions of water remain apparent in legal frameworks,¹⁴ and are reflective of similar tensions in the social, economic and political fabric.¹⁵

Moreover, the manner in which water is regulated reflects not only broader social forms but occurs also in relation to the particular legal constructs that define rights and responsibilities. In this way the legal forms that define rights and responsibilities assert their own influence upon social and environmental structures.¹⁶ As the mechanisms of 'implementation' for social goals, the legal constructions of rights and responsibilities can either constrain or enable the adoption of particular public 'perceptions'. Further, in many aspects there remains an anachronistic approach to water regulation as earlier forms of legal understanding continue to exert an influence often well after the structures and attitudes that initially gave rise to the legal forms has been displaced, or at least substantially challenged by new understandings.¹⁷

The manner in which older forms of thought and action maintain a hold over current legal thinking can be formulated in the following terms, 'the discourse of law – its categories, arguments, reasoning modes ... fits into a complex of discursive practices that together structure how people perceive and therefore act to reproduce or try to change people's social reality.'¹⁸ The discursive realm holds the key to why many older forms of understanding are difficult to dislodge – '...legal forms and practices don't shift with every realignment of the balance of political forces, but tend to become embedded in relatively autonomous structures that transcend and to some extent help to shape the content of the immediate self interest of the groups.'¹⁹ While these comments were initially applied to the political influences shaping people's perceptions, this analysis is just as relevant to changing environmental, economic and technological shifts as the political. These points can be illustrated by reference to the debates that confront legal conceptions of rights and responsibility in relation to water.

With this overview in mind, this paper first outlines the changing nature of frameworks for regulating water in Australian law. These trends are linked to broader changes in understanding the environmental context of water, and in the light of the particular legal constructs that govern the interaction between water, environment and society. The paper

argues that cultural perception and legal forms should be regarded as in a continuous process of revision in the light of the 'limits' set by the need for sustainable development of water resources. To provide legal frameworks that can address the dilemma facing Australian water will require innovative thinking and responses that do not simply revert to the 'autonomous structures' of previous regimes and perceptions. The horns of the dilemma lie in holding together the seemingly antithetical concepts of resource use efficiency and environmental protection to achieve ecological sustainability. Arguably, market based mechanisms are effective in achieving some goals but a more nuanced and adaptive approach of co-regulation is suggested as it accommodates a diversity of approaches and ensures that our regulatory frameworks effectively interface with the dynamics of water and its ecological context. To this end, the paper explores a range of legal constructs that could be considered in defining the range of rights and responsibilities in relation to water.

An 'Inherited' Water Law

Australian common law was received from England.²⁰ Clichés abound to the effect that it always rains in England. What Australia inherited then in the colonial period was a system of law developed in a quite different environmental and social context. Common law constructs were those that predominately regulated water use until the late 19th century. Water at common law, is regarded as a fugacious substance and when it is flowing and uncontrolled it is not subject to 'ownership'.²¹ At common law there does not exist a property right in water per se, as the rights of water use are derivative of property in land. With regard to 'rights', the common law approach to water had two main components – first, the riparian rights doctrine which concerned water flowing in a river, and secondly all other forms of water. Water not flowing in a defined river channel could be accessed by a land owner without restriction.²² Thus ground and surface waters – very significant parts of the total flow volume of many Australian drainage basins – were able to be harvested without limit. This view of unrestricted use was a concomitant of the traditional view of property rights in land as conferring 'sole, despotic dominion' over the property object.²³

By contrast, the doctrine of riparian rights which allowed land owners adjacent to the river to use the water for 'ordinary and domestic purposes' did impose a limit in that such uses should not substantially affect water quality in the river. Nonetheless, this common law system of rights favoured a highly individualistic approach with very restricted 'responsibilities' except where use of water by one person interfered with another individual's economic use of their land. It served a well-watered, intensively developed England quite well.²⁴ However, its deficiencies became apparent in the environmental context of Australia. Australia's unique environmental characteristics include low overall rainfall in many regions, coupled with high variability and distinctive geomorphologic characteristics associated with these precipitation and flow regimes.

At colonisation, the continent had already been modified over a long period by Aboriginal people exercising particular land and water management practices – arguably of a more sustainable character than European equivalents.²⁵ As settlement spread, Australia was characterised by vast distances, sparse populations and a much more extensive system of land and water use and management than in England.²⁶ The combination of a unique physical setting and the needs of rapidly establishing colonies required a different regulatory framework.²⁷ While the immediate water needs of the early colonial period were pressing they were not regarded as a major 'limit' to settlement.²⁸ Much of the water law in this period specifically focused on the promotion of agricultural and pastoral land uses, and mining development after the mid 19th century.²⁹ Urban water supply and quality was also of importance in a period of rapid settlement. For example, many early 'environmental' laws prohibited the clearance of river banks to protect Sydney's water supply from degradation.³⁰

The continued expansion of the various colonies in the second half of the 19th century coupled with a series of droughts in the 1880s, underscored the extent to which water might be perceived as a 'limit' to development especially as settlement pushed into the drier margins of the continent. In this context, the common law foundation for water uses was found to be inadequate, especially as water was emerging as a public 'responsibility'.³¹

A Statutory Framework for the Public Management of Water

To enable development of public infrastructure for water, especially irrigation, water resources in most jurisdictions were vested in the Crown or government instrumentalities through specific legislation.³² Nonetheless, the role of the common law was not displaced entirely, as the range of rights and responsibilities in relation to water and the dimensions of the powers of government authorities to 'the right and the use and flow and the control of water' have been variously interpreted by the judiciary.³³ Today, pursuant to various statutes, state governments continue to hold vested water resources or to have rights of control over water. Regulation of waters within State boundaries is constitutionally the States' domain, although waters outside the limits of the States fall within the competence of the Commonwealth.³⁴ There is some scope for Commonwealth involvement in inland water management through powers such as defence, interstate trade and commerce, financial assistance, and external affairs, yet primarily the Commonwealth has restricted itself to policy formulation.³⁵ Nonetheless, the Commonwealth has used financial policy to exert considerable influence on water management, with the current phase of Federal/State governance in resource management being characterised as one of 'co-operative federalism'.³⁶

Moreover, Australia is distinguished by a long history of administrative and governmental regulation of land use and natural resource management.³⁷ Arguably, this has given rise to a regime of rights and responsibilities different in key aspects from the regimes that developed in many, more strictly common law jurisdictions.³⁸ In Victoria, for example, following the 1884 Royal Commission on Water Supply, the common law riparian doctrine was substantially replaced by a system of grants of water access from government authorities.³⁹ Significantly under the Irrigation Act 1886 (Vic) that enacted many of the recommendations of the Royal Commission, water allocations were explicitly tied grants of water to land. The nexus linking water use to land and property rights as a basis for 'efficient' agricultural development remained unbroken for over 100 years.⁴⁰

One of the significant features of Australia's land and resource management is the high proportion of land and resources vested in the Crown. In rural areas, for example, much land is made available to users through various types of statutory tenures rather than through full alienation from the Crown under freehold title.⁴¹ These factors allowed government authorities considerable scope in planning for public infrastructure and development, and more recently for environmental management. Similarly, the unique statutory frameworks developed in relation to water from the 1880s onward relied on the overt development of administrative policy.⁴² The first comprehensive water statute with a public management emphasis was the Water Rights Act 1896 (NSW). While perhaps the most significant policy development of this period was the promotion of irrigation schemes and associated water storage facilities. Indeed modifications for irrigation have affected nearly every natural characteristic of Australian inland waters.⁴³

The move to a predominately statutory basis for water regulation continued after Federation. Until the latter half of the 20th century, governmental policy was primarily concerned with the provision of the physical infrastructure components of urban and rural water supply and with the accompanying regulation of the water use concerned with such schemes.⁴⁴ This was the period of major projects such as the Snowy Mountains Scheme,⁴⁵ and it was characterised by large scale modifications of river systems and the surrounding environment. Arguably the metaphoric building of Australia as a nation had synergies with the building of these large scale water infrastructure projects. Certainly there was a public perception that Australia's prosperity was linked to its continued exploitation of water resources. For example, in Victoria after 1880, 'most of the official water mangers were attracted by a garden imagery and its anthropocentric idealisations of 'drought proofing' and a cornucopia rural arcadia'.⁴⁶ This type of perception was not seriously challenged at a public policy level until the rise of the conservation movement in the late 70s and early 80s.⁴⁷ It is perhaps telling that the seminal environmental law case – Tasmanian Dams involved a proposed water storage and public infrastructure development by a state government.⁴⁸ This project was halted by an emerging national consciousness that Australia's unique natural environment should, at times, take precedence over development.

Water Legislation and Water Resources Management Federation to 1970s

Tremendous growth in statutory law making is a feature of the 20th century, with this trend

clearly evident with respect to water law. Statutes governing water proliferated from the 1890s onward and many were highly specialised. For example, legislation was often enacted for particular urban water supply or mining projects.⁴⁹ With respect to water regulation more generally, a complex institutional structure of multi-level water instrumentalities developed which supported water resources policy.

Public water authority management practices largely developed to satisfy consumptive demand for water. Initially much regulation was premised upon authorities regulating specific water infrastructure and the supplies connected to such infrastructure.⁵⁰ From the Second World War onwards a more comprehensive viewpoint developed which took into account water users, management purposes, and land-water connections, and the growing acceptance of the river catchment management. There was also a growing awareness of environmental and social impacts, in addition to the traditional focus on technology.⁵¹ Water resources management and policy moved to more efficiently manage existing water supplies rather than continually develop new sources.⁵²

The major components of the legal system which supported these trends from Federation to the seventies/eighties can be characterised as:

- statutorily defined rights to access river waters for given uses;
- the allocation of water rights under irrigation schemes; and
- various licences and permits.⁵³

The situation under irrigation schemes was complex and various forms of water 'rights' existed. Victoria, for example instituted a fairly comprehensive system of water rights from an early stage.⁵⁴ One of the drawbacks of the various water rights systems during this time was that the compulsory charge for a water allocation favoured high consumption of water as there was no conservation incentive instituted through price mechanisms.⁵⁵

Across the various states there was considerable variation in water regulation practices – particularly in water licence characteristics, such as the term of the licence. While theoretically the water authorities had the power to cancel or amend licences, this power was rarely exercised.⁵⁶ Significant administrative discretion characterised decision making by many water authorities. Governing legislation generally did not prescribe detailed criteria for allocations and annual 'water releases'. These factors were considered to fall within the technical expertise of water managers.

Moreover, there were few legislative restraints to curb the growth in water users under a given scheme. This led to continual pressure for more supply and the result was often an over-allocation of water beyond capacity in many catchments.⁵⁷ In addition, the actual nature of the rights enjoyed by water users was often poorly described and subject to uncertainties of security and priority vis a vis other water rights holders.⁵⁸ There were also wider systemic failures as the bodies of governing legislation in the various states became fragmented. For example, in some jurisdictions, the regulation of groundwater⁵⁹ became distinct from surface water, and there was a separation of issues of water quantity from water quality and pollution. Perhaps the most significant systemic weakness of the regulatory regimes of this period was the failure to adequately address the environmental implications of the exploitation of the water resources in any coherent manner.⁶⁰ The highly consumptive oriented pattern of water use was accompanied by a minimal enunciation of environmental 'responsibilities' in relation to water use.

The Advent of Water Resources Reform

The 1970s were marked by a series of changes across many areas of Australian life and these shifts also precipitated changes to the administration and policy governing water resources during the 70s and into the 80s.⁶¹ The 1980s saw concerted efforts to establish new water resource management techniques based around integrated catchment management principles. An impetus for these movements was the realisation of the significant environmental impacts associated with water resource development.⁶² For

example, salinity, while receiving prominent attention recently has long been recognised as a problem associated with irrigation across the nation as a whole.⁶³

The emerging dimensions of the environmental problems associated with water resources development,⁶⁴ were accompanied by a growing realisation of the extent of over-allocation of water and the problems of water supply security across several jurisdictions.⁶⁵ The discretionary administrative practices of many water authorities were based on decision making which factored in the under utilisation of existing water 'rights'. Several reviews highlighted these problems and prompted legislative and organisational change.⁶⁶ A range of reforms were initiated, particularly in New South Wales and Victoria. Yet the various forms of 'release sharing of water' which developed still posed a disincentive to conserve water.⁶⁷ In Victoria, the Water Act 1989 followed a comprehensive review and it represented a major overhaul of existing water legislation.⁶⁸ The Act introduced a series of environmental protection objectives and adopted an integrated approach to the regulation of surface and groundwater but yet protected all existing public and private rights to water. In this respect, there was a more definitive articulation of the 'rights' to water but little guidance on how the competing interests of consumptive and environmental uses were to be resolved.⁶⁹

In both New South Wales and Victoria water trading of a limited nature was introduced. Most of the trading (intra-state until 1997) occurred in the context of temporary transfers in periods of water shortage but both jurisdictions progressively allowed permanent transfers.⁷⁰ These reforms were portents of a much more fundamental re-thinking of rights and responsibilities in regard to water.

CoAG Reforms and Rights and Responsibilities in Regard to Water

While there were reforms to water legislation from the 1970 and into the 80s, it was recognised that more substantial change was required particularly, in the light of Federal Industry Commission inquiries in the early 90s and competition reforms in other utility sectors.⁷¹ Major issues to be addressed were the widespread environmental degradation of many watercourses and catchments, urban water pricing, and the need to ensure a security of water supply in the face of increasing competition for water, especially in rural regions. The Commonwealth initiated the main thrust of reform through the forum of the Council of Australian Governments (CoAG) Water Resource Strategy. This initiative tied a package of financial assistance to the implementation of water law reform by the States.

The resultant National Water Reform Framework endorsed established principles in relation to water pricing, allocation, trading, environmental considerations and public participation in water management. The guiding principles included: pricing should be consumption-based and operate on the principle of full cost-recovery and removal of cross-subsidies.⁷² Water allocations should include reviewable allocations for the environment based on the best scientific information⁷³, and restoration of environmental allocations in over allocated systems; water allocations should be clear, separate from land title⁷⁴ and tradeable, including interstate where this would be 'socially, physically and ecologically sustainable'.⁷⁵ The public should be consulted in relation to irrigation management, rural water supply, environmental measures and water allocations and trading thereof.⁷⁶ Integrated Catchment Management was adopted as a guiding principle for the integration of water resource planning.⁷⁷ Catchment management policies, market based and regulatory measures were to support environmental requirements.⁷⁸ State and Territory Governments have progressively legislated to implement the CoAG reforms although the progress of the States in implementing the Agreement has been varied. There has also been an adaptation of CoAG principles to local state circumstances.⁷⁹

These reforms introduced key changes, particularly an increased emphasis on water resource forward planning for ecological sustainability.⁸⁰ Perhaps one of the most radical developments has been the separation of an entitlement to water from land holding. Such separation, as a legal construct, is required to form an entity which is transferable in a market situation and which can then be put to 'efficient use'.⁸¹ The other major change was the recognition that the environment also required an 'entitlement', variously defined, but captured best perhaps by the idea of an environmental flow. 'Environmental flows' refers to a flow regime that supports an ecologically healthy river system.⁸² The widespread changes

initiated by the CoAG reforms to water law in all jurisdictions across Australia continue the trend where the principal forum for the construction of rights and responsibilities in relation to water lies with a specific policy platform implemented by legislation. In this regard, it is the designated goals of economic efficiency and environmental sustainability under the various statutes that implement the CoAG policy that set the overall parameters for determining rights and responsibilities in regard to water.

Co-Regulation of Water

Nonetheless, the reforms do represent something of a transformation from the primarily public management /statutory authority focus that have been a feature of Australian water law and governance since the late 19th century. Trends in water law and policy reflect similar movements in natural resource management and even regulatory governance models more broadly.⁸³ Yet it is argued that this move to market mechanisms to secure policy goals should not be seen as a wholesale move to a 'free market' situation in a traditional laissez faire economic sense. Economic objectives are to be constrained by the achievement of complimentary environmental goals.⁸⁴ Trading in water has been possible for some time, and administrative frameworks and the extension to the market in water that is proposed will exist in the context of the specific regulatory framework of water law and policy. This situation arguably is more appropriately deemed one of co-regulation⁸⁵ where market forces are used to achieve outcomes such as efficiency of resource use but where governments maintain a degree of guidance in terms of setting overall objectives.⁸⁶ This model is becoming a familiar one in other utility and environmental areas.⁸⁷

The model of co-regulation as a system of checks and balances is important as there is a need for close circumspection of any legal and governance structure that is instituted in the area of water law reform. The shortcomings of a technology dominated, command/control type of water management have been highlighted. Older style water management technology solutions and associated command and control mechanisms to regulate use have often resulted in cumbersome and costly regulation. Clearly also there has been a failure to fully develop and implement sustainable practices in water law and policy over the last hundred years or so. While a largely exploitative regulatory emphasis has prevailed, but one might question why? Arguably this emphasis was in turn influenced by broader trends in colonisation and globalisation in the 19th and early 20th century, ie by economic, political and social forces. These 'market forces' are now advocated as a mechanism, albeit at a micro rather than macro level, to address governmental regulatory failure.⁸⁸

The 'development' orientation that characterised the previous government instrumentality mode of water regulation was one that was widely shared as a common public perception. The belief in the efficacy of the market to achieve a wide range of economic, political and even environmental goals has more recently gained support as a public perception.⁸⁹ Given that even our best available science cannot ensure complete certainty of prediction in dealing with dynamic ecological systems and our knowledge of human systems remains incomplete, then the current swing to market mechanisms also needs to be treated in a circumspect manner. Arguably it was the forces of the market – capitalism and colonialism in the 19th and national growth in early 20th century that in part produced the environmental degradation and the patterns of unsustainable agricultural and settlement that have precipitated the current water crisis. Now it is this very same ideal – that of the market that we are now appealing to in an effort to redress the forces that were initiated by the 'market' and then taken up with gusto by government authorities in the management of water. 'The market' in some ways might be perceived as contributing to both the 'cause' and 'solution' of the water management problems. Therefore it is suggested that we need to interrogate carefully the manner in which this market ideal is translated into the concrete mechanisms of legal constructions of rights and responsibilities in relation to water.⁹⁰ To address a complex problem requires a nuanced, flexible and adaptive approach. For as the CoAG principles suggest the key to achieving the twin goals of economic efficiency and environmental protection is 'adaptive management practices.'

These factors suggest a need to institute a range of incentive and sanctioning methods, rather than overt reliance on a narrow range of regulatory mechanisms. Given the wide range of factors affecting the achievement of environmental sustainability in water use, it is perhaps

not realistic to expect one framework, or process to be able to achieve all the goals encompassed under environmental sustainability.⁹¹ Therefore market mechanisms, such as water trading need to be understood not as a complete answer to a singular problem, but as part of an approach that must address a complex, multilayered, multi-faceted dilemma. If we are now beginning to understand the dynamic and holistic nature of ecosystems and the need for an integrated approach,⁹² it seems inappropriate to institute the human interface/component of such systems in terms of a one dimensional regulatory approach. Thus a broadly conceived approach to the water dilemma will need to address many dimensions; from the role of public perceptions and values down to the actual design of the legal instruments that implement public policy goals.⁹³ These general points can be given more discrete articulation in relation to issues surrounding the designation of rights and responsibilities in relation to a water entitlement.

Defining Water Entitlements as 'Rights'

It seems appropriate to consider the concept of a water entitlement in more detail in the light of 'public perceptions' and the designation of rights and responsibilities in relation to water. However, it is important not to allow previous legal forms and understandings to become 'autonomous structures'. Thus it may be counter productive to import older common law forms and understandings, such as traditional property constructs,⁹⁴ when seeking to capture the nuances of the rights and responsibilities that are required to address the extent and nature of the problems associated with Australian water management at the beginning of the 21st century.

In resource economics, property is often seen as a key means for delivering 'certainty' and transferability of rights.⁹⁵ Moreover, a particular understanding of property tends to be associated with natural resource regulation frameworks,⁹⁶ even though this construct is not strictly necessary to a model of legal exchange.⁹⁷ Arguably it is contract rather than property that is the principal modern common law construct that facilitates exchange.⁹⁸ Property and contract are distinct legal constructs at common law although contractual rights can for example include a right to exchange property interests.⁹⁹ Contractual obligations are only enforceable against parties to the contract. The key distinction between property rights and contractual rights at common law is that proprietary rights attach to land and as such, are enforceable against third parties (ie people not involved in the initial exchange relationship), irrespective of any contractual obligation.¹⁰⁰ The very fact that traditional property rights are enforceable against third parties on the basis that the right attaches to land indicates why it may be inappropriate to designate the changes in legal constructions of water initiated by the CoAG reforms as akin to traditional 'property rights' at common law. The thrust of reform in this area was to separate any necessary conjunction between land and water at common law as a means to facilitate legally enforceable exchange of 'rights'.

Accordingly, given that this intent to separate water and land holding is manifest in the various statutes that implemented the CoAG reforms then it suggests it is more appropriate to designate such 'water rights' as a statutory construct.¹⁰¹ Thus the terminology of a transferable water entitlement reflects the statutory basis of the rights and provides greater flexibility in designating the nature of the entitlement comprehended. Nonetheless, if under the force of earlier discursive practices we are to revert to common law constructs, arguably contract,¹⁰² rather than property, represents a more flexible legal form for acknowledging rights and responsibilities in regard to water. Yet far less attention has been directed to the application of contractual or statutory agreement modes of regulating natural resources and the environment.¹⁰³

Moreover, the 'bundle of rights' model that is typically associated with traditional property constructs had a particular genesis in a period when legal rights were widely conceived to denote primarily a free-standing exercise of individual autonomy.¹⁰⁴ This model of property tends to ignore legitimate third party interests and the general community interest in water.¹⁰⁵ The evolution of property concepts in resource economic frameworks also has been heavily influenced by the situation in the USA. Property concepts in the USA, while sharing a common derivation from the UK have a particular history and constitutional tradition that differs in significant aspects to the Australian experience.¹⁰⁶ As noted, Australia developed a unique approach to the regulation of land and resources in the colonial period. A

key aspect was the development of statutory based regimes of entitlement. Accordingly, most 'new property' forms related to administrative 'dispositions' under statute and there are gradations in the type of rights so disposed.¹⁰⁷ Property, in this manner it is suggested has always been the most public rather than private of institutions. It depends upon the sovereign power of the state to support and enforce any claim to entitlement.¹⁰⁸ Moreover, the Courts have not consistently equated statutory entitlements that depend on administrative dispositions with common law property interests – much depends upon a careful evaluation of the factual circumstances.¹⁰⁹

However, if we invoke property as a concept in water regulation, then we need to ensure that we emphasise that property entails both rights and concurrent responsibilities. One of the most recent examinations of property concepts by the Australian High Court¹¹⁰ noted that the definition of property was not a constant, but rather varied over time and circumstance and was related to a socially mandated form of control. The majority judgment stated: *'Property' does not refer to a thing; it is a description of a legal relationship with a thing. It refers to a degree of power that is recognised in law as power permissibly exercised over the thing. The concept of 'property' may be elusive. Usually it is treated as a 'bundle of rights'. But even this may have its limits as an analytical tool or accurate description, and it may be, as Professor Gray has said, that 'the ultimate fact about property is that it does not really exist: it is mere illusion'... Much of our false thinking about property stems from the residual perception that 'property' is itself a thing or resource rather than a legally endorsed concentration of power over things and resources.'*¹¹¹

A social utility emphasis (ie the view that property denotes both an individual and public interest component) has also progressively displaced the model of property as a bundle of rights associated with individual freedom.¹¹² Property constructs, if we go back to the feudal source on which Australian real property is founded, were clearly a reciprocal system of 'individual' rights and corresponding social duties.¹¹³ Now again it seems the public interest dimensions of the property concept are being widely recognised in the calls for sustainable use of water.

Nonetheless, the earlier view favouring a robust individualism, as an 'autonomous structure', has attained considerable political power. Thus debates about property in water have tended to revolve around a narrow 'bundle of rights' view where the 'legal notion of property ...is still articulated in terms which are strikingly crude and unsophisticated'.¹¹⁴ Indeed as a 'public perception' of property this earlier understanding has been highly influential in lay people's conception of water rights.

Further, the bundle of rights property concept was tied to a specific 'theory' of the role and function of law that saw the protection of individual interests as abstract entities. In Australia over the past two centuries, we have slowly and painfully learnt the lessons of any view of the world that is a-contextual; a view that suggests that human society can be fashioned as an abstraction from its surrounding environment. We need to clearly incorporate these lessons into the institutions and practices that implement rights and responsibilities in relation to water. At a more discretely legal level, legal forms cannot continue to be defined in an abstract sense which does not take in to account the environmental and social context in which those rights and associated responsibilities will operate.¹¹⁵

Accordingly a 'water entitlement' needs to be seen as a complex of rights and responsibilities – social and environmental. To date the main thrust of thinking about the responsibilities that are generated in relation to water has focused on the public dimensions. Responsibility for water management has been seen as largely falling within the scope of public institutions. A growing array of legal instruments at an international, national and state level, prescribe a wide range of 'responsibilities' for the protection and sustainable management of the environment including water.¹¹⁶ Yet the extent to which these responsibilities are regarded as mandatory and enforceable varies greatly from jurisdiction to jurisdiction, and indeed from statute to statute. The key role that public participation has to play in ensuring these responsibilities are met needs greater attention.¹¹⁷

There is a need to re-iterate the long-term responsibilities of governments, individual water

users and the community as a whole in regard to water and not just focus on crisis responses. Sustainability requirements should permeate not only the decisions of government as to whether to approve proposals or not but also the decision of entrepreneurs about whether to proceed with a given project, as well as the long term management of the project over a number of years.¹¹⁸ Such a long term view needs to be accompanied by an articulation of a holistic 'responsibilities' spectrum instead of creating an artificial division into public and private spheres. Responsibility needs to be associated more clearly with 'rights' at an individual level. If we continue to separate water 'rights' from 'responsibilities' under a notion of 'absolute ownership' or 'secure rights' philosophies then even 'well intentioned people – people who know better and would like to do better – can hardly avoid the ruthlessly destructive logic of self interest.'¹¹⁹ Thus we still need to engage more fully in debates about the importance to be attached to the 'responsibilities' entailed in water use at all levels of Australian society.

In this vein, concepts such as a statutorily imposed 'duty of care' might be useful to explore in the context of water use to support the regulatory frameworks, such as water shortage restrictions etc. We are all each others neighbours in the context of water in the Australian environment. Do we have a responsibility to ensure that our use of water does not harm our neighbours even if we are urban water users and our neighbours are many thousands of kilometres away? Moreover, who and what should we include within our 'neighbourhood' to which legally enforceable duties might be owed? Should that term encompass all elements of the environment that depend on water – and even water itself? Even to engage in such debate requires a major change in public perceptions, and indeed in legal frameworks.

Our legal frameworks were largely developed from a scientific understanding that espoused an anthropocentric viewpoint where human values predominate. Accordingly the legal framework remains overwhelmingly a structure of human rights and responsibilities. The very urgency of the water dilemma suggests though that we need to re-examine the very foundations upon which our public perceptions and accompanying legal frameworks are built.

Redefining Rights and Responsibilities: Breaking with Entrenched Legal Forms

Central to the concept of sustainable development is the view that there must be a balance between development and environmental protection and that the current use of environmental resources should not deplete their availability for future generations. As frequently occurs there is general agreement on this as a goal, but a great deal of disagreement on the specifics as to how it is to be achieved. Yet the severity of the dilemma facing water renders it acutely necessary to engage with the specifics in order to provide innovative thinking about the range of rights and responsibilities that might achieve this balance and not to simply revert to established forms and practices.

As discussed one approach to ESD has been to impose duties or responsibilities on humans and human agencies to achieve this goal. This approach is a variant of a stewardship role. These types of statutory responsibilities are familiar. For example, recent Victorian amendments enable the Minister to issue Water Authorities with 'statements of responsibility' that may contain environmental sustainability obligations.¹²⁰ These responsibilities can then be enforced as human duties and obligations.

Another possible mechanism is to ascribe 'rights' to the environment and to water specifically. In this vein, sometime ago it was proposed that rocks should have rights and that trees should have standing to sue. ¹²¹ In Australia it is now being proposed that water – principally the Murray-Darling River system should be the recipient of a 'right' to have ecologically sustainable flows,¹²² and that this process should be overseen by an entity that could represent the water interest. The concept of an environmental allocation is now firmly established in legislation. Indeed in certain jurisdictions there are now statutory water trusts. Recent Victorian amendments, for example, instituted a Victorian Water Trust Advisory Council to provide the Minister with advice on future water security, water recycling, reuse and funding for water resource sustainability.¹²³ So it seems only a short further step to a water trustee who could act as a custodian of the rights for water.

Again this idea is not new. Indeed the idea of an enforceable public interest in land and

natural resources is of long standing in the common law. For example the public trust doctrine, which is prominent in the USA, derives its origin from communal property ideas.¹²⁴ Upon colonisation, a similar construct of common law 'rights' in public resources was received into Australian law. Most of these rights have now largely been subsumed or altered by statutory regulation. However, the public trust doctrine relies on the idea of a common property in natural resources, such as rivers. It has theoretical appeal in that it can potentially draw on established legal concepts such as fiduciary relationships, trust property and trust beneficiaries. The reception of the public trust doctrine in Australian law has been very limited to date although similar concepts underlie emerging international environmental law principles.¹²⁵

The time may be propitious to re-examine public trust concepts in relation to water.¹²⁶ These legal concepts have long histories and entail the view that humans should not seek to dominate nature but instead should use natural resources in a manner determined by particular principles or ethics. The basis for the revised attitude toward water is that the relationship between humans and the environment should be regarded as one of custody or a trust or even 'gift' rather than one denoted by individualistic property constructs that emphasise control over, and use of, water.¹²⁷

The main purpose in asserting this alternative relationship is to argue that rights for nature can then be enforced by humans who hold such resources in trust for the future.¹²⁸ The legal conceptions that could be used to denote water as 'trust' or 'gift' derive from the equitable legal jurisdiction which had its genesis in the realm of fairness and 'good conscience'. It is interesting to see how the dire situation with water has invoked a return to public perceptions that are increasingly framed in terms of ethical obligations and social responsibility.¹²⁹ Perhaps our legal conceptions of water need also to re-engage more directly with ethical obligations in order to provide an effective designation of rights and responsibilities. The mechanism to ensure this re-engagement could be a general water trustee or a statutory trust body set up in relation to a specific river catchment. Such a body would need to be independent of both government and other stakeholder interests and to be guided in its operation by the 'best interests' of 'water'.

Obviously there is considerable scope for dissension about how to define such best interests and who should be charged with such responsibility. These difficulties of formulation are not insurmountable. In many other legal contexts we have a representation of the interests of non-human entities or those people who do not have the capacity to adequately represent their own interests.¹³⁰ Even so, to fully implement any 'rights' not of water, but for water, will require some further changes to public perceptions, even given that there are strong movements already in this direction. Primarily, this will involve a public recognition of the full costs that are associated with implementing the goals of ecologically sustainable development. We have been borrowing against the future for far too long. Many statutes for environmental sustainability create a considerable architecture of duties and responsibilities for sustainable water management but without the proper funding, such a technology of words leaves little imprint in the environment.¹³¹

Rights, Responsibilities and Market Failure

The idea of a full costing in relation to water leads to some final points in regard to public perceptions and the designation of rights and responsibilities in relation to water. These ideas are loosely collected under the concept of distributive justice or equity and relate to unpacking some assumptions about what we might mean by 'cost'. The postulation of a market model and market based mechanisms deals of necessity in simplifying assumptions. For example, many aspects of water law and policy reforms are premised on the assumption that water users will act as economically rational agents. In this manner efficiency and highest value uses of water will be achieved. Research on privatisation in other countries, and preliminary research in Australia, suggests that this may not be a valid assumption in all contexts. More attention needs to be directed to understanding the gamut of public perceptions in relation to water and its management so that regulatory responses can be effective. For example, how might people's information asymmetries in regard to water trading impact on the model of 'efficiency' that is a cornerstone of the water reforms?

The market as a 'meta- narrative' is often used to justify certain policies and practical directions. While the market is well suited to achieving outcomes tailored in terms of efficiency criteria, but arguably it is not so well suited to achieving a range of other goals related to distributive justice.¹³² The concept of sustainability is not limited to achieving a narrowly conceived 'physical' outcome but embraces wider concepts of social and environmental equity. Any sustainable management of water will need to ensure that outcomes are 'socially sustainable'. 'Equity involves more than a distribution of wealth, because it is constructed from a base of values about who we are and what we are here for.'¹³³ Thus as part of discerning what we are here for – and perhaps what we are going to be here for in the future – we need to be very clear about what is entailed in 'efficiency' and whether the potential social and environmental outcomes are desirable. Trading will favour the most economically efficient water users in a strictly market-based regime.¹³⁴ We need to consider perhaps whether these efficiency maximisers are also environmentally neutral users of water. Another question arises to what extent are we prepared to allow other less efficient users to be forced out of the market? If there is to be some 'intervention' what broader forms of regulatory control may be required to address various forms of 'market failure' in order to achieve some 'balance' between market 'rights' and social responsibilities.

A number of 'market failures' have already been foreshadowed with perhaps the most troubling the potential for monopoly control of water.¹³⁵ There has been little discussion of the environmental impacts of such a process. Thus we need to give particular attention to envisioning the regulatory frameworks and legal constructs that might address various forms of 'market failure' as well as the current pre-occupation with addressing 'regulatory' failure. A market is not simply a private institution as it is enabled and supported by the state at an institutional level – ie governments and courts formulate and enforce legal rules that facilitate the functioning of the market.

These last points in relation to distributive justice and social and environmental equity have only been raised in a cursory manner but they loom as issues that will need to be taken into account in any ongoing adaptive management in relation to water sustainability.

Conclusion

Recent events such as the drought that not so long ago gripped large areas of inland Australia, and the ongoing water restrictions in urban centres such as Melbourne have focused public perceptions on the importance of water in the Australian continent. It has taken some time though for Australians to appreciate that we inhabit the driest continent and that, 'the distinctive, physical chemical and biological characteristics of Australia's inland waters have to be managed using criteria that are appropriate to Australian systems and conditions'. The 'appropriate criteria' however needs to be extended in two directions to ensure the sustainability of water. First it is necessary to extend the dimensions of those criteria to include a range of economic and social goals that support sustainable environmental practices. Secondly the criteria, together with the rules and institutions that implement them, need to be extended to emphasise flexibility and dynamic adaptation to complement the characteristics of the system that is to be regulated.

Central to that flexibility and adaptive management practice is the need for legal systems also to be flexible and responsive to unique Australian conditions and the situation of simultaneously promoting economic efficiency and environmental protection. In the past, Law has largely developed constructs that promote either economic efficiency or environmental protection. The challenge introduced by water reforms – and these are responses to pressing environmental and economic problems – is to ensure that these regulatory frameworks transcend this either/or situation.

Traditional legal forms defining rights and responsibilities, and narrow conceptions of these constructs will limit this potential to transcend the dilemma of water. Australia has a unique history of statutory based public water management regimes. These public regimes need to continue as the main forum for articulating rights and responsibilities in regard to water to ensure that the capacity to respond to environmental and social challenges remains flexible and adaptive. The foregoing discussion of rights and responsibilities in relation to water has indicated the need to re-conceive traditional property constructs to highlight the public interest

component of these rights – that is if we are to still invoke the discourse of property rights in relation to water. More significantly, it is suggested that the discourse of property given its historical association with the singular promotion of narrowly based economic considerations might be an ineffectual model for water regulation. A range of other legal constructs are available such as contract, trust and duty of care that could be examined in terms of their utility in ensuring a proper ‘balance’ between rights and responsibilities in water regulation. Arguably in our perception of water, there has been a great deal of attention given to the rights component but less attention to fully articulating – and enforcing – responsibilities and duties.

References

- 1 Heathcote R., ‘Drought Perception’ in J Lovett, (ed) *The Environmental, Economic and Social Significance of Drought*, Angus & Robertson, 1973, 17-40.
- 2 Pigram J., *Issues in the Management of Australia’s Water Resources*, 1986, Preface.
- 3 See the discussion of agricultural performance in Gleeson, T., and K. Piper, ‘Institutional Reform in Rural Australia Defining and Allocating Property Rights’ in *Land and Water Australia, Property Rights and Responsibilities*, Current Australian Thinking, 2002, 99-118.
- 4 Victorian Government, *Green Paper, Securing Our Water Future*, October 2003, 12.
- 5 See the promotion of Integrated Catchment Management as recognition of the inter-relation between land and water. Nheu, N., ‘The Continuing Challenge of Water Management reform in NSW’, (2002) 19 EPLJ 217, at 218.
- 6 For a discussion of the need to ensure environmental values are taken into account for future benefit see the submission by Mr F Tromp Director Resource Science Division Western Australian Department of Environment, Standing Committee on Agriculture, Fisheries and Forestry, House of Representatives, Commonwealth Parliament, *Inquiry into Future Water Supplies for Australia’s Rural Industries and Communities* Hansard Transcript of Evidence, 646, 17 September 2003.
- 7 This term is a generalisation but a number of researchers detail similar ‘perceptions’ of Australian history. For example Powell describes the orientation of this period of water resource policy in Victoria as one favouring a ‘settlement/production’ objective. For a discussion of the Victorian situation see Powell, J, *Watering the Garden State*, at 287. See also Pigram, J., above n 2.
- 8 ‘The availability of water has, and will remain, central to the nature and direction of Australia’s development.’ Commonwealth Parliament, The Senate Standing Committee on National Resources Report, *The Commonwealth’s Role in the Assessment, Planning Development and Management of Australia’s Water Resources* AGPS, 1978, at 3.
- 9 Ryan argues that European perceptions of the Australian landscape were highly influential in the approach taken to the exploration and initial development of Australia. See generally, Ryan, S., *The Cartographic Eye*, Cambridge Press, 1996.
- 10 Pigram, J, above n 2 at 59. Yet as Fisher suggests, ‘Even the earliest legislation providing for the public management of water resources acknowledged the need for conservation and protection of these resources.’ Fisher, D., *Water Law*, Law Book Company 2000 at 265.
- 11 Calls for more holistic approaches to land and water management, and the idea of an environmental limit, were voiced much earlier. The seminal work of Griffith Taylor is illustrative here. See for example, *The Australian environment* (especially as controlled by rainfall: a regional study of the topography, drainage, vegetation and settlement, and of the character and origin of the rains. Melbourne, Government Printer, 918.
- 12 For example the situation in Western Australia is dire with approximately 40% of agricultural land affected by salinity.
- 13 Fisher, D., ‘Sustainability- The Principle, its Implementation and its Enforcement’, (2001) 18 EPLJ, 361, at 364.
- 14 For an overview of the difficulties in achieving a comprehensive regulatory framework for the Murray-Darling basin see Clark, S., *The Murray-Darling Basin: Divided Power, Co-operative Solutions?* (2003) 22 ARELJ 67,
- 15 For examples of the range of views about water issues see the public submissions to Standing Committee on Agriculture, Fisheries and Forestry, House of Representatives, Commonwealth Parliament, *Inquiry into Future Water Supplies for Australia’s Rural Industries and Communities* 2002. Accessed on 13 October at

<http://www.aph.gov.au/house/committee/primind/watering/index.htm>

16 The sustainable character of water use is as much a function of social and legal constructs as the physical properties of ecosystems. See Commonwealth Government, Australia: State of the Environment 1996 CSIRO Publishing 1996 at 7.

17 Fisher, D above n 10 at 9.

18 Gordon, R 'Critical Legal Histories' (1984) 36 Stanford LJ 57 at 95.

19 Gordon *ibid*, at 101.

20 Fisher, D., Water Law, LBC, 2000, at 3.

21 At common law property rights rely on a demonstration of physical control over the object and an intention to control. Water once controlled could be 'owned' but these rights were derivative of the underlying ownership of land over or through which the water passed.

22 The emphasis upon defined channels reflects the European experience and practices and reiterates the need for control and confinement to establish a 'right'. Many Australian rivers, prior to modification at least, do not flow in sharply defined channels but spread over wide flood plain areas.

23 The term, 'sole despotic dominion' derives from Blackstone. See Wayne Morrison (ed) Blackstone's Commentaries on the Laws of England, (2001) vol 2, 2. Blackstone's commentaries were written only 20 years before the colonisation of Australia. His views represent the apogee of individualistic 'rights' based approaches to property. Even earlier, Locke recognised that there was a public interest rider on appropriation from the state of nature to the effect that such appropriation could only occur if 'there was enough for all'.

24 As Tan notes many of the English court decision reflected a policy emphasis that reflected different hydrological regimes. See Tan, P. L, 'Legal Issues Relating to Water Use', in Land and Water Australia, Property Rights and Responsibilities, Current Australian Thinking, 2002, 13- 42, at 15.

25 See for example the aboriginal fish traps in Western Victoria described in Powell, JM, Watering the Garden State Water, Land and Community in Victoria 1834-1988, Allen & Unwin 1989, 1-3.

26 Godden, L., 'Feudalism Capitalism and the State: A Revision of Land Law in Australia?' (1997) 5 Australian Property Law Journal 162, at 163-4.

27 Tan, P. L, above n 24 at 16.

28 The exception here is South Australia where settlement 'limits' have consistently related to rainfall 'limits'. See for example 'Goyder's line'.

29 For a discussion of the Victorian situation see Powell, J, 'Community Adaptations and 'The Selection and Mining Frontiers', in Watering the Garden State at 37-61 and 62-90 respectively.

30 Powell, J, Environmental Management in Australia 1788-1914, Oxford University Press, 1976, 19.

31 Powell, above n 100-104.

32 An initial Australian model was found in the Irrigation Act 1886 Vic which vested the rights to water in the Crown in right of Victoria and enabled the Crown to control the flow and use of defined. Versions of this 'model' were adopted in other Australian jurisdictions. For a discussion see Fisher above n 10 at 92. Note however that statutory control of water resources at this point did not apply to unconfined surface flow.

33 For a discussion of the prominent common law cases see Fisher, D., 'The Common Law,' in Water Law above n10 at 64-89.

34 New South Wales v Commonwealth (1975) 135 CLR 337.

35 The Constitution does not provide the Commonwealth with a specified head of power under s 51 to legislate for water. The only reference to water resources in the Constitution is in s 100 which 'protects states rights to interstate trade and the use of rivers for conservation [ie water storage] and irrigation.

36 For a discussion of the complexities of state sovereignty over water resources and the need to rely on 'agreements' in relation to the Murray-Darling Basin see Clark S, above n 15 at 67-70.

37 The vesting of water in government authorities, although well established in Australia has not always been the legal practice in many other countries.

38 Ashworth v State of Victoria [2003] VSC 17 June 2003 Gillard J confirms that statutory regulation of water under the 2002 amendments to the Water Act 1989 (Vic) displaces the common law with respect to water flowing across land surfaces.

39 Tan above n 24 at 16.

- 40 The disaggregating of rights of water from the underlying land title is a key plank of the CoAG reforms. See CoAG, Report of the Working Group on Water Resource Policy to the Council of Australian Governments Unpublished, February 1994.
- 41 For a discussion of the uniqueness of Australian statutory land tenures see *The Wik Peoples v The State of Queensland & Ors* (1996) 187 CLR 1.
- 42 See for example the situation in western USA where there has been much more private sector development of water resources.
- 43 For a general discussion of agriculture and environmental impact see Curtis, A., and M. Lockwood, 'Natural Resource Policy for Rural Australia' in Pratley, J. and A., Roberston, (eds), *Agriculture and the Environmental Imperative* (1998) 211.
- 44 See the prominent role played by the MMBW and the State Rivers and Water Supply Commission in the planning and management of water resources and the building of major infrastructure associated with water use in Victoria. Powell, J., 'Water Managers Ascendant', above n 7 at 193-232.
- 45 For a discussion of the scheme as a 'modern gargantuan' see Powell, J., above n 7 at 233-240.
- 46 Powell, J., above n 7 at 294.
- 47 Hutton D. & L. Connors, *A History of the Australian Conservation Movement*, Cambridge, 1999 chs 5 & 6.
- 48 *Commonwealth v Tasmania* (1983) 158 CLR 1.
- 49 Tan above n 24 at 17.
- 50 Fisher, above n 10 at 132.
- 51 Powell above n 7 at 232.
- 52 Pigram, above n 2 at 62.
- 53 Tan above n 24 at 17.
- 54 Tan *ibid*.
- 55 Industry Commission, *Water Resources and Waste Water Disposal Report No. 26*, 17 July 1992, AGPS, at 86.
- 56 Gardner, A., 'The Legal Basis for the Emerging Value of Water Licences – Property Rights or Tenuous Permissions', (2003) 10 *Australian Property Law Journal*, 1 at 4.
- 57 Gardner, A., above n 58 at 4.
- 58 Tan above n 24 at 19.
- 59 See for example the *Groundwater Act 1969* (Vic).
- 60 Industry Commission, *Water Resources and Waste Water Disposal Report No. 26* 17 July 1992, AGPS, 57.
- 61 Powell, above n 7 at 285.
- 62 Green, K. *Water 2000: A Perspective on Australia's Water Resources to the Year 2000* AGPS Canberra, 1983, v-viii.
- 63 Three quarters of Victoria's irrigated land, or 460 000 ha, is at risk of salinity. Ten thousand kilometres of Victorian waterways are salt-affected. The annual cost to Victoria of lost agricultural production is \$50 million. Cameron, J., *Managing Victoria's Growing Salinity Problem* (2001).
- 64 Powell above n 7 at 255-262.
- 65 Tan, above n 24 at 19.
- 66 Tan above n24 at 19.
- 67 Industry Commission, *Water Resources and Waste Water Disposal Report No. 26* 17 July 1992, AGPS, 146.
- 68 Fisher, D., above n 10 at 270.
- 69 Tan above n 24 at 21.
- 70 For a discussion of this trading see McKay, J. and H. Bjornlund, 'Recent Australia Market Mechanisms as a Component of an Environmental Policy', in *Land and Water Australia, Property Rights and Responsibilities, Current Australian Thinking*, 2002, 137 at 138 9.
- 71 Earlier inquiries were, Industry Commission, *Measuring the Performance of Selected Government Enterprises* (1990), and Industry Commission, *Water Resources and Waste Disposal* (1992).
- 72 CoAG Water Resource Policy cl 3(a) (i).
- 73 CoAG Water Resource Policy cls 4, 5.
- 74 CoAG Water Resource Policy cl 4.
- 75 CoAG Water Resource Policy cl 5.
- 76 CoAG Water Resource Policy cls 6(g), 7(b), 8(b).

- 77 CoAG Water Resource Policy cl 6(b).
- 78 CoAG Water Resource Policy cl 8.
- 79 National Competition Council, *Assessment of Governments' Progress in Implementing the National Competition Policy and Related Reforms: Volume Two — Water Reform* (2002).
- 80 See Cullen, P., Whittington, J. and G. Fraser, *Likely Ecological Outcomes of the COAG Water Reforms* (2000).
- 81 McKay, J., and H. Bjornlund, above n 73 at 139.
- 82 See for example, Department of Natural Resources and Environment, State of Victoria, *Healthy Rivers, Healthy Communities and Regional Growth: Victorian River Health Strategy – Environmental Flows* (2002).
- 83 In many areas of natural resource and environmental management there has been a move away from command and control legislation and policy in favour of a mix of regulatory approaches that include market based mechanisms such as pricing policies. See for example, Bates, G., 'The Structure and Content of Environmental Law, in Bates, G., *Environmental Law in Australia*, 89-118 at 97.
- 84 See for example High Level Steering Group on Water, *A National Approach to Water Trading Draft Discussion Paper*, January 2001 (1).
- 85 See for example, Commonwealth Government Department of Agriculture, Forestry and Fisheries, *Managing Natural Resources in Rural Australia for a Sustainable Future*, December 1999.
- 86 Bond, M. and D Farrier, 'Transferable Water Allocations – Property Right or Shimmering Mirage', (1996) 13 EPLJ 213 at 215.
- 87 See generally Gunningham N, and P. Grabosky (eds), *Smart Regulation: Designing Environmental Policy*, Clarendon Press, 1998.
- 88 For a widely based critique of the manner in which de-regulation policy has affected the rural environment see Lyster R., '(De) Regulating the Rural Environment', (2002) 19 EPLJ, 34.
- 89 Lyster, R., *Ibid* at 35.
- 90 Bossleman, K., and B Richardson, (eds) *Environmental Justice and Market Mechanisms: Key Challenges for Environmental Law and Policy*, Kluwer, 1999.
- 91 For example McKay and Bjornlund suggest, '...markets make very blunt choices between social justice and sustainability. For each positive social outcome there is a negative and the same for environmental outcomes.' McKay, J., and H. Bjornlund, above n 73 at 146.
- 92 House of Representatives Standing Committee on Environment and Heritage, *Parliament of Australia, Co-ordinating Catchment Management: Report of the Inquiry into Catchment Management* (2000).
- 93 McKay, J., and H. Bjornlund, above n 73 at 146.
- 94 Fisher argues that, 'While legislation may be based upon the notion that water is a valuable public asset – conceptions of common property- most statutory regimes in Australia neither recognise nor create rights of property in water as a natural resource.' Fisher above n 10 at 154.
- 95 Connor, R, and Dovers, S, 'Property Rights Instruments: Transformative Policy Options', in *Land and Water Australia, Property Rights and Responsibilities, Current Australian Thinking*, 2002, 119 at 123.
- 96 The dominant model tends to conceive natural resources as 'commons' open to over-exploitation unless individual property rights provide an incentive for conservation and efficient use. However such a model rests on particular assumptions about human behaviour and relies heavily on a full 'internalisation' of costs. Such internalisation may often prove problematic. See Connor and Dovers *Ibid*.
- 97 For example, no new forms of real property have been created at common law since the mid 19th century yet our economies have not ground to a halt and economic exchange is still thriving. The proliferation of other legal constructs particularly through contract and statute has facilitated this process.
- 98 See Seddon, N. and M.Ellinghaus, *Cheshire & Fifoot's Law of Contract 7th Australian* (ed.) Butterworths, at 857- 878.
- 99 For example contractual licences are distinct from proprietary interests at common law yet a contractual licence is enforceable as a mechanism of legally enforceable exchange.
- 100 Neave, M., Rossiter, C., and M.Stone, *Sackville & Neave Property Law Cases and Materials 6th* (ed), Butterworths, 1999, at 3-5.
- 101 In the absence of judicial determination of this question, the analysis cannot be definitive.

102 Marsden J, 'Water Entitlements and Property Rights: an Economic Perspective', in Land and Water Australia, Property Rights and Responsibilities, Current Australian Thinking, 2002, 43.

103 More recently however there has been an increased focus on contractual or agreement based regulatory frameworks, see for example the regional forestry agreements and conservation agreements under the Environment Protection and Biodiversity Act 1999 (C'th).

104 The classic statement is that of Hohfeld in the early 20th century who drew upon the model proposed by Austin. For a critique of this model see Penner, J., 'The Bundle of Rights Picture of Property', (1996) 43 UCLA Law Review 711.

105 See the arguments by DuBois, cited in Gerus, M., 'Transferable Water Entitlements in Western Australia: Water Markets and Property Rights for the Mining Industry,' 2001, AMPLA Yearbook, 474 at 483.

106 In the USA the concept of property has been influenced by the US Constitution and its interpretation as well as by specific legal doctrines such as the 'takings doctrine'. For a discussion of the takings doctrine see *Lucas v South Carolina Coastal Council* 112 S. Ct. 2886 2899 (1992).

107 Fisher, D., 'Statutory Rights of Access', Australian Environmental Law, LBC, 2003, 151-152.

108 For example the basis of real property rights in Australia is the Crown's radical title that it acquires as a concomitant of sovereignty. For a discussion see *Mabo v Queensland [No 2]* (1992) 1 CLR per Brennan J at 48-49.

109 The issue whether such rights or entitlement equates to a common law property interest is of particular significance in relation to acquisitions of such interest by governments and whether compensation is payable. For an extensive discussion of Commonwealth and State government powers in relation to water and compensation questions see Dyson, M., 'Using Existing Legislation to Recover and Protect Environmental flows in the River Murray', Land & Water Australia, Property Rights and Responsibilities Current Australian Thinking, AGPS 2002, 73.

110 *Yanner v Eaton* (1999) 105 LGERA 71.

111 *Yanner v Eaton* at paras 17-18 per Gleeson CJ, Gaudron Kirby and Hayne JJ. (Footnotes omitted.)

112 Rose C., 'Property as Wealth, Property as Propriety', (1991) 33 Nomos, Journal of Am. Soc. for Legal and Political Philosophy 223.

113 *Mabo* above n 110 per Brennan J at 32.

114 Gray K., and S. Gray, 'Property in Common Law Systems', in H., Van Maanen and A. Van Der Walt (eds), *Property Law on the Threshold of the 21st Century* (1996) 235, at 244.

115 Rose, C., 'Given-ness and Gift: Property and the Quest for Environmental Ethics', (1994) 24 Environmental Law 1.

116 Examples include, Our Common Future 1987 Report to the UN General Assembly by the World Commission on Environment and Development (Brundtland Report), Intergovernmental Agreement on the Environment 1992 para 3.5.

117 Tan above n 24 at 22.

118 Fisher, above n 10 at 361.

119 Rose, C., above n 118 at 7.

120 s 41 Water Industry Act 1994 (Vic).

121 Nash, R., *The Rights of Nature: a History of Environmental Ethics*, University of Wisconsin Press, 1989. Stone, C., *Should Trees Have Standing? – Toward Legal Rights for Natural Objects*, William Kaufmann, 1974.

122 Cullen, P., et al, *Blueprint for a Living Continent: A Way Forward from the Wentworth Group of Concerned Scientists* (2002)
http://www.wwf.org.au/downloads/blueprint_for_a_living_continent.pdf

123 Water (Victorian Water Trust Advisory Council) Act 2003 (Vic) s 3; Water Act s 305CC.

124 Gordon, R., 'Paradoxical Property', in Brewer, J. and Staves, S. (eds.), *Early Modern Conceptions of Property*, Routledge, 1995, 95-110.

125 Evans M., *Principles of Environmental Heritage*, Prospect, 2000 at 52.

126 Evans, M., above n 128 at 50-52.

127 Evans, M., above n 128 at 53.

128 Evans, M., above n 128 at 51.

129 The current Victorian Government Green paper suggests, 'We need to build an ethic throughout the community of water conservation. We need to cut our water use wherever

can, recycle and re-use wherever possible, put our water to the highest value use where we do use it and restore our rivers and streams to safeguard our water systems in the future.', at 2.

130 The classic non human entity in this regard is the corporation. A range of common law, equitable and statutory regimes prescribe how this entity is to be represented and how its best interests are to be achieved.

131 The range of recent Commonwealth and State Government initiatives directed at restoring environmental flows and the overall health of riverine ecosystems is encouraging.

132 Connor, R., and S. Dovers, 'Property Rights Instruments: Transformative Policy Options', in *Land and Water Australia, Property Rights and Responsibilities, Current Australian Thinking*, 2002, 119 at 127.

133 *Ibid* at 128.

134 See the research conclusions reached in relation to water trading over the last 20 years in McKay, J and H Bjornlund, 'Recent Australia Market Mechanisms as a Component of an Environmental Policy', in *Land and Water Australia, Property Rights and Responsibilities, Current Australian Thinking*, 2002, 137 at 144.

135 McKay, J., and H. Bjornlund above n 73 at 146.

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Areas of Research Interest

I have a long-standing research interest in environmental perception and environmental management from an interdisciplinary perspective. This work is complemented by research into changing legal constructions of the natural world. These areas involve a comparison of various regulatory frameworks such as property, environmental law and native title. Current debates about water and its regulation raise issues of environmental perception and management and their reflection in legal regimes and regulatory frameworks. I have recently completed comparative research on water law in Australia and South Africa, which examines some of these issues.

Selected Publications

- 'The Environment', Chapter 15, *The Queensland Law Handbook*, 6th edition, 2000, Caxton Legal Centre, Brisbane.
- 'Tenure and Statute: Re-conceiving Land Law in Australia', (1999) 5 *Australian Journal of Legal History* 29 (with S Dorsett).
- 'Incorporating the Environment in the Utilitarian Ideal of the Greatest Good for the Greatest Number', *Green Paradigms and the Law*, Faculty of Law and Criminal Justice, Southern Cross University, 1998, pp. 65-80.
- 'Distributive Justice Questions in Australian and South African Water Law Reforms' (in progress).

The views expressed in the above article are those of the author(s) and do not necessarily represent the views of the Academy.

cxv. *Information Exchange for Municipalities in the Shepparton Irrigation Region*

cxvi. *Municipal Infex*

cxvii. *January 2007*

cxviii. *Edition 22*

cxix.

cxx. **Watertable Decline Continues**

cxxi. Despite a near record drought, almost 200,000 hectares (32%) in the Shepparton Irrigation Region remains at risk from high watertables.

cxxii. The latest map for 2006 shows 185,000 hectares with a watertable within three metres of the soil surface, 83,000 within the two metre root zone and 2,200 within one metre.

cxxiii. The decline in watertable levels is the result of many factors, including the drought and the subsequent decline in water-use and irrigation intensity, improved irrigation efficiency and the work done under the region's surface and sub-surface water management programs.

cxxiv. While the area at serious risk is 45% less than the 337,000 hectares measured in 1996, researchers say the problem is far from going away. They are certain the water level will rise again when wet conditions return. It is not possible to predict by how much.

Report puts value on Murray-Darling draft

7.30 By Peter McCutcheon

Updated April 05, 2012 07:32:34

<http://www.abc.net.au/news/2012-04-04/report-puts-value-on-murray-darling-draft/3933346>

VIDEO: Report flags successes and shortcomings of basin plan (7.30)

RELATED STORY: Weatherill says review rejects Murray water plan

RELATED STORY: Rising Murray ensures full supply for irrigators

MAP: [SA](#)

A long-awaited CSIRO report has found the proposed Murray-Darling Basin plan would provide between \$3 billion and \$8 billion worth of environmental benefits.

The process to set up a Murray-Darling Basin plan was hatched at the height of a record-breaking drought, and is drawing to a

conclusion as the river system is full to overflowing.

Farmers throughout the basin may now be complaining about too much water, but the CSIRO has found that over time, the river systems will benefit from additional flows.

But the 230-page study, released late on Wednesday afternoon, admits the plan will not fix all the basin's environmental problems.

In particular, it finds that the proposal to recover just under 2,800 gigalitres a year is unlikely to affect the higher elevations of the Murray floodplains, and some river red gum and black box communities will continue to be compromised.

The report is a vital source of information which has been put into the public sphere as the basin authority's 20-week consultation period draws to a close.

Dr Ian Prosser, the science director for the CSIRO's Water for a Healthy Country Flagship, and his team were asked by the basin authority to put a monetary value on returning 2,800 gigalitres a year to the Murray-Darling system as envisaged under the draft plan.

"There are some real benefits, things like red gum forests will definitely be in much better condition, the lower lakes will be in better condition, there will be less risk of acidification of the lower lakes," he said.

"The Coorong will be in better condition, the Murray mouth will be open more times, water quality will be in better condition, less algal blooms. There are definitely benefits to the basin plan."

And he says the environmental benefits will deliver a financial return.

"We estimate between \$3 billion and \$8 billion, largely coming from around the Murray and the lower lakes and Coorong, particularly around amenity values, carbon sequestration values, tourism, those sorts of things," he said.

'Huge economic boost'

Having better quality water means you don't need to have the same water treatment costs, so they're real cost savings, real savings to the economy.

Dr Ian Prosser

Jonathan La Nauze from Friends of the Earth welcomed the report.

"I think what this shows is that returning water is good for the economy, it's good for communities and it really shows that returning water to the Murray Darling will deliver a huge economic boost to regional Australia," he said.

But the National Irrigators Council does not believe that view stands up to scrutiny.

Council chief executive Tom Chesson says the methodology used is not very robust.

"It would not hold up in the real world," he said.

"Given that [it is] costing us \$10 billion to make \$3 billion plus, potentially a number of towns and communities have been identified in previous economic reports released by the MDBA as being at risk and at danger of being economically cruelled, it doesn't seem a particularly high figure."

The report finds people living in the basin will benefit from a healthier environment. Water quality will improve and tourism will increase.

"Having better quality water means you don't need to have the same water treatment costs, so they're real cost savings, real savings to the economy," Dr Prosser said.

Under the 2,800-gigalitre-a-year scenario, algal blooms will become less frequent, vegetated floodplains and wetlands will improve, particularly in the southern basin.

Remaining vulnerable

Basically the authors themselves have admitted that the methodology and actually coming up with a figure for cost benefit of the environment is next to impossible. And that's a point we've made from day one.

Tom Chesson

But the forest communities in the higher floodplain of the Murray are likely to remain vulnerable.

"The higher floodplains, the drier woodland parts of the floodplain - they are harder to supply water to," Dr Prosser said.

"There, it's not so much the water that is being provided to the

environment, but the constraints in the system."

That is something environment groups are likely to focus on in their push for more water to be returned to the environment.

Mr La Nauze says it is clear there is not actually enough water there to keep RAMSAR-listed wetlands healthy.

"There's not actually enough to give an iron clad guarantee that the lower lakes won't acidify," he said.

"It certainly improves the chances of those eco-services being delivered, but the CSIRO are quite clear. It's showing 2,800 gigalitres only gets us part of the way there."

The CSIRO was not asked to look at other scenarios returning considerably more or less water than the basin authority is proposing.

But it is this information environmentalists would like to see.

"Certainly incremental numbers above 2,800 seems to be what's called for," Mr La Nauze said.

"As another part of CSIRO, the Goyder Institute, said earlier this week, the 2,800 gigalitre scenario is not sufficient to maintain the South Australian floodplain."

But irrigators question the value of the whole exercise.

"We were first promised this report back in October last year and can see why it has been delayed for six months and it's been released just two weeks before the consultation period is over," Mr Chesson said.

"Basically the authors themselves have admitted that the methodology and actually coming up with a figure for cost-benefit of the environment is next to impossible.

"And that's a point we've made from day one."

Topics: murray-darling-basin, rivers, environment, water, water-management, sa, qld, nsw, vic

First posted April 04, 2012 22:16:48

Knowles chips SA over Murray plan reticence

Updated April 04, 2012 08:54:00

<http://www.abc.net.au/news/2012-04-04/murray-draft-plan-craig-knowles-tony-burke-sa/3931590>

VIDEO: [Murray plan court fight looms](#) (7pm TV News SA)

RELATED STORY: [SA rejected input offer on Murray plan](#)

RELATED STORY: [Rising Murray ensures full supply for irrigators](#)

RELATED STORY: [Irrigators want new allocations detail](#)

RELATED STORY: [SA concern over NSW irrigation plan](#)

MAP: [SA](#)

The Murray-Darling Basin Authority says its offer to pay for South Australian public servants to help write the draft Basin plan was a genuine one.

SA Water Minister Paul Caica recently questioned the motive of the offer after the SA Government refused the invitation.

Mr Caica said that having his staff help the Authority would give the SA Government less leverage to be able to oppose the water use plan.

But Basin Authority chairman Craig Knowles denied SA would have been compromised.

"It was a genuine offer in fairness to the states, including South Australia," he said.

"It was in addition to the very complex and high levels of collaboration that already exist at officer level. They made their own choices."

Bickering

Federal Water Minister Tony Burke says he is not interested in brokering any compromise between states which are bickering over the Murray-Darling Basin plan.

SA is threatening a High Court challenge because it says the plan would not deliver enough water for environmental needs downstream, while Victoria insists it would deliver too much.

Mr Burke has conceded some sort of legal action against the plan seems inevitable, but he says the final plan will not be based on particular states' interests.

"What I want to make sure is we don't end up simply repeating the charade that's gone on for the best part of a century now," he said.

SA Premier Jay Weatherill insists his legal threat is not motivated by state interests, but by the need for a healthy river.

"We will not be deflected from this course and we will ultimately succeed," he said.

There was a public consultation meeting in Adelaide on Tuesday and submissions about the draft plan's content close on April 16.

Topics: murray-darling-basin, rivers, water-supply, water-management, water, environment, federal---state-issues, federal-government, states-and-territories, government-and-politics, irrigation, rural, sa, adelaide-5000, goolwa-5214, renmark-5341

First posted April 04, 2012 08:05:39

Science rejects Murray water plan: SA Premier

Updated April 03, 2012 14:46:08

<http://www.abc.net.au/news/2012-04-02/goyder-review-murray-darling-basin-weatherill/3927830>

AUDIO: Proposed Murray Darling Basin plan draws fire from all sides (AM)

MAP: [SA](#)

The South Australian Government says a review of the Murray-Darling Basin draft water plan has found it would be inadequate to sustain the environment.

The review was done by the Goyder Institute for Water Research.

Institute official Dr Tony Minns said the Basin plan would deliver some improvements to river flows, but had ecological risks.

"The middle- and high-level floodplains, the floodplains which contain large extents of gum, river red gum, river red box and lignum, are most at risk from a potential contraction of the floodplain because there's just not enough water to keep the very large floodplain alive," he said.

SA Premier Jay Weatherill said it showed the draft plan was not even a good starting point to secure the basin's future.

Mr Weatherill said the review showed the plan would fail to ensure the downstream Murray in SA could withstand droughts and environmental demands.

"The State Government has always maintained that the Basin plan must be based on the best available science," he said.

"The Goyder Institute has found that while there could be some improvements with an extra 2,750 gigalitres, it is not enough to ensure we can withstand droughts and protect our Ramsar-listed sites.

"The river environment is already in a degraded condition following the recent drought. A return of only 2,750 GL puts us at risk of

further devastation during dry periods."

You can't send more than 60,000 megalitres of water a day down that stretch of the river without causing ... impact on potentially hundreds of shacks along that stretch of river

MDBA chairman Craig Knowles

At risk

The SA Government said the analysis made it evident the current plan was unlikely to maintain the ecological character of the Riverland, Chowilla floodplain and Coorong, lower lakes and Murray mouth regions.

It said the lower reaches of the Murray would continue to be at risk from low water levels and high salt levels.

AUDIO: [Murray-Darling Basin Authority chairman Craig Knowles and SA Premier Jay Weatherill on saving Murray](#) (ABC News)

The Goyder review will be used in the SA Government's submission on the draft plan.

Independent Senator Nick Xenophon says South Australian irrigators need to be recognised for their efficient water use.

I think what's been put against us is they won't even model additional water because they say these so-called constraints exist, but the truth is they're capable of being overcome

Premier Jay Weatherill

"If the politicians get it wrong then maybe we need the courts to get it right," he said.

Basin Authority chairman Craig Knowles is already warning there are constraints in SA that prevent more water being delivered into the state than the draft plan proposes.

He says the SA Water Department's own website says water flows

are restricted by a flooding risk.

"You can't send more than 60,000 megalitres of water a day down that stretch of the river without causing ... impact on potentially hundreds of shacks along that stretch of river," he said.

"Now those constraints are real, that's why you can't get more than that volume of water up onto the mid to high floodplains in the Riverland."

Mr Weatherill says the Authority needs to work with SA to find a way around the current constraints.

"I think it's an important concession by the Authority that they are happy to deliver more water subject to the constraints being overcome," he said.

"I mean I think what's been put against us is they won't even model additional water because they say these so-called constraints exist, but the truth is they're capable of being overcome."

There will be a final round of public consultation in South Australia on the Murray-Darling Basin draft plan when a meeting is held in Adelaide on Tuesday.

Greens Senator Sarah Hanson-Young is urging concerned South Australians to put their views to the Murray-Darling Basin Authority.

"South Australia has a huge sway in making sure that we get a plan that's fixed," she said.

"We've got a strong SA contingent in Parliament. I'd be urging South Australians to make sure that their MPs stand up and accept nothing less than what we need to save the river."

Mr Weatherill hopes people in Adelaide will make time to attend the public meeting.

"We're encouraging as many South Australians to get along if they can and maybe be able to take a bit of an early lunch if they can pop down to the Convention Centre and participate in the proceedings, because it's certainly important that South Australia's voice is heard," he said.

VIDEO: [Weatherill rejects Murray-Darling plan](#) (ABC News)

Topics: murray-darling-basin, rivers, environment, water-management, water, water-supply, federal---state-issues, states-and-territories, irrigation, rural, research-organisations, research, sa, adelaide-5000, goolwa-5214, renmark-5341, australia

First posted April 02, 2012 15:00:29

Murray-Darling Basin Authority chairman Craig Knowles and SA Premier Jay Weatherill on saving Murray

Updated April 03, 2012 09:11:29

Listen to Murray-Darling Basin Authority chairman Craig Knowles and SA Premier Jay Weatherill on 891 ABC about stemming the river system's decline.

ABC Radio

Source: ABC News | Duration: 11min 45sec

Topics: murray-darling-basin, rivers, environment, water-supply, water-management, water, federal---state-issues, states-and-territories, government-and-politics, irrigation, rural, sa, adelaide-5000, goolwa-5214, renmark-5341

<http://www.abc.net.au/news/2012-04-03/murray-darling-basin-authority-chairman-craig/3929190>

Weatherill rejects Murray-Darling plan

Updated April 03, 2012 07:53:58

South Australian Premier Jay Weatherill says a review proves the draft plan for the Murray-Darling Basin will not save the system.

Nick Harmsen

Source: ABC News | Duration: 1min 52sec

Topics: programs-and-initiatives, water-management, water-supply, murray-darling-basin, states-and-territories, irrigation, rural, water, rivers, environment, federal---state-issues, greens, adelaide-5000, sa, renmark-5341, australia

<http://www.abc.net.au/news/2012-04-03/weatherill-challenges-murray-darling-plan/3928944>

From a friend:

However what you have overlooked is the effects of the extractive industries on the water tables that feed into the aquifers of the Murray Darling as well as the Great Artesian Basin. I refer in particular to the Coal Seam Methane Industry. It is a procedure where aquifers are completely dewatered before extraction begins. Gasstar, (now purchased by Santos) is an American company that boasts on its website about extraction of 3,500 - 4000 barrels of water (a barrel being 159 litres) **every day** at the Bohena Site at Narrabri in north-west NSW. This is about 1/2Meg (500,000 litres) per day. Now think that in the Seurat Basin (part of MDB in Queensland) Santos is talking of putting down 5000 - 10000 holes. Think that major sites such as Narrabri and around my home on the Liverpool Plains is going to have probably the same amount of holes and we are talking major extractions of water. Furthermore, cross-contamination of aquifers due to the escape of drilling fluids, methane migration and varying qualities of salt water seeping into different strata levels - and

you realise that the CSM not only sucks the aquifers dry but contaminates what is left. The fracking process involves dropping explosives down gas well which automatically destroys the aquifers. All of this creates subsidence which further destroys waterways. And it is all happening in the Murray Darling Basin and Great Artesian Basin and NONE of this water can be re-used because of the saline and toxic nature of the water extracted. Nor do Santos have a environmentally friendly disposal of this water which in Queensland equates to the amount that it in Sydney Harbour. There is lots of information on our website www.ccag.org.au - please read it.

<http://www.theaustralian.news.com.au/story/0,25197,25770378-11949,00.html>

'Last undefiled waterway' threatened

Asa Wahlquist | *July 13, 2009*

Article from: [The Australian](#)

THE Queensland Government is considering a proposal to activate dormant water licences along Cooper Creek, one of the nation's last unblemished waterways.

The move, which would permit the extraction of 10,000 megalitres of water from the creek in southwest Queensland, has angered farmers and scientists, who argue that irrigation would "spell the beginning of the end" for the free-flowing system.

The licences to irrigate along the waterway were granted more than 30 years ago but have never been activated.

However, under national water agreements, if the licences were activated, the Queensland government would be obliged to separate the water licence from the land title and permit trading.

The Bligh government is developing a revised water resource plan for Cooper Creek, but the state's Natural Resources Minister, Stephen Robertson, said the use and possible trading of the licences in the creek was "yet to be determined".

Cattle farmer Bob Morrish, who lives near Windorah in southwest Queensland, has been chairman of the Cooper Creek Protection Group since 1996, "when we first had the threat of proposed cotton irrigation".

"A lot of people -- scientists, conservationists and the local community -- fought that very hard over two or three years," he said.

"There was a change of government, and the new government rejected those plans."

And while cotton has never been grown on Cooper Creek, the licences granted to extract 10,000ML of water from the waterway still exist.

"If trading is introduced, those licences have a high probability of being activated because there will be people upstream or somewhere who will want to use them."

Mr Morrish's group has been lobbying for more than a decade to have the licences cancelled. He said irrigation "would spell the beginning of the end of the Cooper being a natural and free-flowing system".

A huge area of land along the Cooper and in the channel country is classified as organic, giving Australia the largest area of organic farmland in the world.

"I am very keen that the whole of the channel country maintains its clean, green image," Mr Morrish said. "We have magnificent assets of the channel country that allow cattle to be raised without the use of chemicals, and I think we should capitalise on that."

Richard Kingsford, professor of environmental science at the University of NSW, said most Australian ecologists "regard the Cooper as one of the world's great desert river systems".

He knows of no other major desert river system that has not been affected by irrigation.

He worries that with the licences will come water harvesting, building channels across the floodplain "or even building levies that push water into storages".

MEDIA RELEASE: August 3rd 2009

PRIME MINISTER MISSING IN ACTION

In response to today's news that the Queensland government is considering activating sleeper licences to the Cooper Creek system, the coordinator of *Fair Water Use (Australia)*, Dr Ian Douglas, is today reported as saying: "The Rudd Government stands condemned for its failure to put an end to the dysfunctional and conflicting governance arrangements that have brought the Murray-Darling to its knees."

He went on to say that "State premiers and water-ministers show no interest in looking at the big-picture and addressing the ever-increasing threat to Australia's water future."

Dr Douglas indicated that the evidence of the chaos continues to build chronologically:

- The Victorian Government's imposition of a 4% cap on the trading of water licences out of the state
- Commencement of construction of the North-South Pipeline by the Brumby Government, a project described by the Senior Advisor on Water Issues to the

President of the United Nations General Assembly as “about the stupidest idea that has ever been conceived”

- The decision of the Rann Government in SA to pursue High Court action against the Victorian cap
- The declaration of an NSW embargo on trading of water licences to prevent further purchase of environmental water by the Federal Government
- The statement by NSW Premier Rees that his government may join its SA counterpart in the High Court challenge
- The announcement by Victorian Premier Brumby of a slow and partial phase-out of the 4% cap in return for a \$ 300 million cash pay-out from the Commonwealth
- Confirmation by SA Premier Rann that his government intends to persist with its High Court challenge
- The NSW government’s auction of water rights to the groundwater of the Great Artesian Basin, in direct conflict with the Federal Government’s Cap-and-Pipe initiative
- The environmental havoc being wreaked as a result of the Rann Government’s construction of water-regulators in the Lower Lakes
- The Queensland government’s reported intention to activating sleeper licences to the Cooper Creek system, which may have major environmental consequences and threaten the public water supply to the South Australian outback community of Innamincka

Dr Douglas’ statement concluded: “*Fair Water Use* will continue to lobby Mr Rudd until he supplies answers to vital questions that we and the senior water advisor to the United Nations have been asking him for many months; questions that all concerned Australians are entitled to pose”, namely:

1) Whether his Government is giving urgent consideration to the declaration of a State of Emergency to enable it to override the self interest of the States and allow meaningful action to be taken to address the multiple, non-drought, causes of the crisis?

2) Whether his Government is giving urgent consideration to the establishment of a Royal Commission of Enquiry into the management and governance of the Murray-Darling Basin: past, present and future?

3) If he is not contemplating the above actions, would he please detail the reasons why he believes that the crisis does not warrant such an approach?

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Wendy Lovell Member for Northern Victoria Region

MEDIA RELEASE

Thursday 27 March 2008

GOULBURN RIVER LEFT OUT OF BASIN PLAN

The Goulburn River will not be controlled by the new Murray-Darling Basin Authority (MDBA), opening the door for Premier John Brumby take what he wants from the already stressed river, Member for Northern Victoria Region Wendy Lovell said.

Ms Lovell said under the Liberal Federal Government's National Plan for Water Security the Goulburn River would have been the responsibility of the MDBA, but the plan had been altered by Labor so the Victorian Government would have control of the Goulburn's river flows.

"The Goulburn River, the very river the Brumby Government intends to remove 75 gigalitres (GL) of water from each year to send to Melbourne, will conveniently remain state-controlled," Ms Lovell said.

"This will give the Brumby Government the opportunity to suck the Goulburn dry as it pleases and flush more of our valuable irrigation water down Melbourne's toilets.

"Why else would the river be excluded from the MDBA's watch?"

Ms Lovell questioned how the Goulburn River could be excluded from the MDBA's control when it was one of the main feeder streams to the Murray River.

"Every other river in the Murray-Darling Basin, except the Goulburn and Murrumbidgee rivers, will be controlled by the new authority," Ms Lovell said.

"Now there's absolutely nothing to stop the Brumby Government from increasing its 75GL cap and taking more water from the Goulburn River to appease Melbourne and Geelong's thirst for water."

Media Release

40 Casey Street (PO Box 165) Tatura Victoria 3616
Telephone (03) 5833 5500 Facsimile (03) 5833 5501
Release Date: 3 August 2009

Seasonal Allocations Updated

The seasonal allocations for all regulated water systems in northern Victoria will remain at zero, the

Resource Manager, Goulburn-Murray Water (G-MW), announced today.

Graeme Hannan, Resource Manager with G-MW, said the shortfalls to meeting operating requirements in the systems remained significant. "All of the northern Victorian systems have enough water to meet essential needs for the year, but strong inflows are needed in the coming months to ensure the systems can operate continuously to deliver the water to customers. Inflows to storages remained well below average in July, which means that conditions are consistent with the dry inflow scenario previously advised by G-MW. Under this scenario the first allocations in the Goulburn and Murray systems are expected in mid September."

There is enough water in the Murray system to meet all river operating requirements, essential human needs and private carryover under a worst-case inflow scenario with some extraordinary contingency measures to supplement these volumes. Now that these needs have been met and a small volume has been allocated to each of the states, the next inflows will be assigned to retiring the reliance on the contingency measures. After this, allocations to the states will resume in accordance with the interstate water sharing arrangements.

"The operation of the River Murray and the Goulburn River throughout the season is assured, although water levels and flows are likely to be lower than in previous years. The continuous operation of the other river systems, the piped distribution systems and the channel networks for the whole season cannot be assured with the limited water available," said Mr Hannan. "Operating plans being prepared by the water corporations ahead of the traditional 15 August 2009 opening to the irrigation season will give customers more information about access to water for use under qualified rights and carryover."

Mr Hannan advised that the channel networks are unlikely to be operational by 15 August. "Channels will open when sufficient resources are available and there is strong demand for water. Customers with early season irrigation needs should confirm operating arrangements with their water corporation," he said.

The seasonal allocations for northern Victorian water systems on Monday 3 August 2009 are:

Water System High-Reliability Water Share Low-Reliability Water Share

Murray 0% 0%

Broken 0% 0%

Goulburn 0% 0%

Campaspe 0% 0%

Loddon 0% 0%

Bullarook 0% 0%

The next allocation announcement and seasonal outlook will be issued on Monday 17 August 2009.

- ENDS -

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Position: Executive Manager Water Resources

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Plug the Pipe's Letter to the AGE

In reference to David Downie's Age Letter Doesn't hold water on 26th July, Mr Downie says the 75 billion litres for Melbourne will come from 'various sources' and the current \$2 billion Victoria Irrigation Renewal Project (NVIRP). The various sources Mr Downie refers to are in fact water from pre-existing water savings projects destined for the environment totaling 95 billion litres. These savings will come from the irrigation districts as will the much promoted NVIRP 425 billion litres making the total water to be saved 520 billion litres, more water than has been lost every year in the past 3 years. Unless the government can perform a dividing of the loaves miracle the target savings can't mathematically be achieved.

Mr Downie goes on to speak about the average water lost over a 115-year period, which is a tacit denial of climate change. Even his department agrees that climate change and bushfire effects to the catchment will see substantially less catchment inflows in future. Further to this in the last 7 years over 20% of irrigator's have sold their water and it is expected the Federal \$3.1 billion Water Buy Back Program will remove a further 30%, halving the available water over the 115 year period that Mr Downie speaks of. With only half the amount of water and future climate change effects, the project is destined to massive failure, as half the water will result in half the possible savings.

This year the irrigation system lost half of its ten year average and just a third of its 115 year average. The El Nino has returned making a mockery of David Downie's 'when we get rain, it will be right' philosophy. The point is with no rain, there is little water to save which is a concern for irrigators, the environment and the people of Melbourne. The Irrigation catchments lie side by side to those of Melbourne, if the irrigation catchment fills so will those of Melbourne's. It makes no sense to link Melbourne to a similar catchment unless you need the connection to sell high priced desal water to the other parts of the state like Bendigo and Ballarat.

Andrew Leahy,

Chairman of Plug the Pipe, Mobile 0408 500875

This is important

Section 3 of the Water Act 2007 states:

Objects

The objects of this Act are:

(a) to enable the Commonwealth, in conjunction with the Basin States, to manage the Basin water resources in the national interest; and

(b) to give effect to relevant international agreements (to the extent to which those agreements are relevant to the use and management of the Basin water resources) and, in particular, to provide for special measures, in accordance with those agreements, to address the threats to the Basin water resources; and

(c) in giving effect to those agreements, to promote the use and management of the Basin water resources in a way that optimises economic, social and environmental outcomes; and

(d) without limiting paragraph (b) or (c):

(i) to ensure the return to environmentally sustainable levels of extraction for water resources that are overallocated or overused; and

(ii) to protect, restore and provide for the ecological values and ecosystem services of the Murray-Darling Basin (taking into account, in particular, the impact that the taking of water has on the watercourses, lakes, wetlands, ground water and water-dependent ecosystems that are part of the Basin water resources and on associated biodiversity); and so on.....

Now just look at how they define "Basin water resources":

"Basin water resources" means all water resources within, or beneath, the Murray-Darling Basin, but does not include:

(a) water resources within, or beneath, the Murray-Darling Basin that are prescribed by the regulations for the purposes of this paragraph; or

(b) ground water that forms part of the Great Artesian Basin.

Ramsar boss urged to see drought-hit lower Murray

Posted 13 minutes ago
Updated 15 minutes ago



Ramsar boss invited to see lower Murray problems first-hand (ABC News)

- [Map: Clayton 5256](#)
- [Related Story: Salt killing Coorong ecosystem, warn scientists](#)
- [Related Story: Coorong 'five times salty as sea'](#)

The secretary-general of the Ramsar convention on wetlands has been invited to visit the Coorong and lower lakes of the Murray in South Australia, to see the effects of severe drought.

The area has been listed since 1985 as wetlands of importance under an international treaty that aims to protect such regions.

Greens Senator Sarah Hanson-Young has invited Ramsar's secretary-general Anada Tiega to see at first-hand the degradation of the lower lakes in particular.

"A visit from the secretary-general of the Ramsar convention would be one way of not just highlighting the issue internationally but of course putting pressure on the Federal Government to act," she said.

"The Federal Government has a responsibility to act, to preserve, to protect and to save South Australia's iconic Coorong, iconic lower lakes and our Storm Boy country.

"It's important for us to get as much expert advice and recognition for the need for urgent action to save the lower lakes, to save the Coorong and recognition that this is not just important for South Australia, not just important for us nationally, but that these wetlands and this waterway is important internationally."

Mr Tiega will be in Australia in October.

Scientists find groundwater 'flaw' in Murray plan

Updated April 05, 2012 09:17:59

RELATED STORY: [Acidic drought scars easing along Murray](#)

RELATED STORY: [Report puts value on Murray-Darling draft](#)

MAP: [SA](#)

The Wentworth Group of Concerned Scientists says it has found more flaws in the Murray-Darling Basin draft plan.

It has made a detailed analysis of the plan's increased use of groundwater and says extracting an extra 2,600 gigalitres from the ground almost cancels out what will be put back into the river system as surface water.

Environmental engineer Tim Stubbs said that would be bad news for South Australia in particular on the Murray's lower reaches.

"That's water that will no longer be there to move through the ground and actually provide the base flow or the flow in dry times, through the rivers and the creeks," he said.

"If you're an irrigator or the environment or anyone that relies on that downstream flow, if it's taken before it reaches you then your not going to see it.

"There's a good chance you'll see the reliability of your entire entitlement grossly eroded away as this water's taken out of the system upstream."

Topics: [murray-darling-basin](#), [rivers](#), [water-supply](#), [water-management](#), [water](#), [environment](#), [federal---state-issues](#), [irrigation](#), [rural](#), [research-organisations](#), [research](#), [activism-and-lobbying](#), [government-and-politics](#), [sa](#), [adelaide-5000](#), [goolwa-5214](#), [renmark-5341](#), [australia](#)

First posted April 05, 2012 08:41:40

From Peter Smith.

“Managing the Murray Darling Basin from Lock Zero”

Advisory Group

- A navigable River from the Murray’s source to the sea –

“Plan for the Worse hope for the Best.”

that fails to plan intelligently for the development and protection

s waters will be condemned to wither because of short-sightedness.
Lessons of history are clear, written on the deserted sands and ruins
of great civilisations.” Lyndon B. Johnson, 36th President of the United

States of America.

(Boating Industry, Houseboat Industry, Lower Murray Irrigators, tourist reliant businesses & other private businesses, boat owners, private marine craft operators, Marina Operators, marine craft repairers and slipway operators, fisherpersons, Mannum Big River Fishing Competition and other various groups including councilors, ratepayers of river councils and many other groups and individuals).

Independent Spokesperson: Peter R. Smith OAM PO Box 126 MANNUM 5238 0418 822 342 08 8569 2086 lockzero@exemail.com.au www.psmithersmyriver.com.au

Whilst a freshwater solution is in the best interests of the Murray Darling Basin and of course the River Murray we feel the chances of this occurring naturally are becoming increasingly distant. □ For that reason we are advocating the Federal Government commission an „EIS” - “Environmental Impact Statement” into the construction of a permanent Lock (with Lock Chamber, Fish Passages/Ladders, Spillway and opening from the bottom – similar to Torrumbarry) and this be undertaken immediately.

We are not advocating the immediate construction of a Lock but are seeking as a matter of urgency a thorough scientific “Environmental Impact Statement” be undertaken to explore all options for the future and as an EIS for the Opening of the Barrage Network Separating Lake Alexandrina and the Coorong is being undertaken at the present time why could the two not be combined?

This could contribute to significant savings and each could compliment the other increasing their future value for not only Lakes Alexandrina, Lake Albert and the Coorong (the most important Ramsar – wetlands of International significance - site in Australia) but the entire Murray Darling Basin

At no time do we advocate invasive seawater being allowed to enter the Coorong, Lake Alexandrina or Lake Albert and if this were the advocated by an EIS we would

be totally opposed.

In seeking an EIS we are in no way at odds with the MDB Authority or are we attempting to in any way usurp their authority as we await the fruits of their deliberations with cautious anticipation.

“Service is the price you pay for the space you occupy on this earth”

2

The below information has been compiled by Peter R. Smith on behalf of the, “Managing the Murray Darling Basin from Lock Zero” Advisory Group and is information we believe supports our call for the Federal Government to commission an „Environmental Impact Statement“ into the construction of a permanent regulator/ flow restrictor/lock on the Lower River Murray near Wellington as our response from the South Australian Government has been completely negative.

So far,

On behalf of the above Advisory group I have met with Hon Paul Caica MP the South Australian Minister for the River Murray and I must disappointedly report that the South Australian Government’s view is that if a restriction to flow is to be constructed in the Lower River Murray it will be temporary and will not contemplate an EIS.

We see this as short sighted and the beginning of a slow death of not only the River Murray but the Basin as rivers don’t die from the source but their mouth.

The facts,

Whilst it is great to see a significant amount of water highlighted for South Australia we must not take our eyes off the overall problems facing the Murray Darling Basin, the River Murray and the Lakes Alexandrina and Albert and the Coorong as the proposed or believed flows into South Australia from the huge rains in the Eastern States will not be sufficient to allow the Murray’s Mouth to be opened or even restore, pool level, to the Lakes and the Coorong.

Flows and Entitlements,

The average flow into South Australia since 1950 has been 8,435-gigalitres and looking back to the nineties (90’s) the average flow into South Australia was 9,800-gigalitres and by early this century that had diminished to 4,800-gigalitres and for the last three or so years (No water has flowed out to the sea since late in 2006) that amount has been less than our entitlement of 1,850-gigalitres though this year we may receive our entitlement.

In 2003/4 when Professor Tim Flannery brought the Museum road show to Mannum and during conversations with Tim and some of his scientific staff a figure of 5,000-gigalitres was bandied about as the minimum flow needed into South Australia to

ensure total River health and enable the Murray Mouth to remained open (rivers die from the mouth up).

„Climate change“ the pending disaster,

If we look at the „climate change“ predictions for up to 2030, we are told/warned that the average mean temperature across the Basin will/could rise by 4-degrees and we are also told that for each 1-degree runoff into the Basin will be lessened by 15%.

As can be viewed „climate change“ predictions will lessen by significant amounts the inflows into the Murray Darling Basin meaning the amount of flow into South Australia (the end of the MDB) could be diminished by a catastrophic amount for the future of the River Murray below Lock 1 (at Blanchetown) Lakes Alexandrina and Albert and the Coorong (a Ramsar site).

Let's take a look at the ramifications of that change in temperature (plus 4-degrees) across the Murray-

Darling Basin.

“Help save the Murray Darling Basin use water wisely”

Temp increases predicted by 2030 in G's 1st degree (15%)

2nd degree (15%) 3rd degree (15%) 4th degree (15%)

A loss of %

9,800 1,470 8,330 1,250 7,080 1,062

6,018 902 5,116

767 4,349

56%

8,435 4,800 1,850 1,265 720 277 7,170 4,080 1,573 1,075 612 235 6,095 3,468 1,338

914 519 200 5,181 2,949 1,138 777 442 169 4,404 2,507 969 660 375 144 3,744
2,132 825

56% 56% 56%

3

Now looking at the figures

The average over the last decade of the 21st century, 9,800-Gigalitres, Our long (60-year average) term average has been 8,435-Gigalitres, The first 5-years of this century 4,800-Gigalitres, □ Then South Australia's entitlement flow 1850-Gigalitres.

Of course the above are only predictions due to „climate change“ and here I should say we hope the skeptics are correct so any improvements we make will be a bonus.

NOW let's look at the SA diversions and transmission flow requirement!

Whilst our irrigators (SA's) 2009/2010 entitlement is 650-Gigalitres (which includes carry-over) I will use as the figure of the average of all South Australian Surface Water Diversions from 1997/1998 to 2008/2009 that figure being 614-Gigalitres.

4,368 3,744 2,132 820 Less that 614-Gigalitres 614 614 614 614 3,754 3,130 1,518 206

The other gigalitre amount that we must also consider is that amount (at this time 693-Gigalitres) for transmission flow ensuring SA's water can be delivered to the mouth of the River Murray.

3,754 3,130 1,518 206 Less that 693-Gigalitres 693 693 693 693 3,061 2,437 825
minus 487

If the four average inflow amounts into South Australia are significantly reduced by the predictions/forecasts for „climate change“ SA will still require the South Australian Surface Water Diversions 614-Gigalitres and finally the 693-Gigalitres required for transmission flow to ensure the River Murray in SA is to survive.

It must be realised that those remaining predicted amounts are what remains for water to ensure the River Murray and the environment remains alive and sustainable and how much would flow over Lock 1 is anyone's guess.

If we take another look at our four (4) flow scenarios that we began with: -

- The 1,850-Gigalitres is now reduced to 820-Gigalitres flowing into South Australia from which we (SA) still need our diversion requirement though we are informed this is to be reduced in the MDB Authority Plan (Sustainable Diversion Limits). From that 820-Gigalitres which would all not be flowing over Lock 1, the Metro-Adelaide and Associated Country Areas – Average 122-Gigalitres – will still needed to be delivered from the pumping stations downstream of Blanchetown though that would be impossible without more than just transmission flow.

We would surmise the River Murray below Lock 1 would be no longer, therefore the removal of barrages and returning that section of the River Murray to as it was before the white man settled - tidal flow - may be the only option. □ If that were the case therefore all diversions would need to be accessed from above Lock 1 and that cost would be massive – (much more than constructing a Lock – “Lock Zero”) cheaper to ensure a sufficient flow over Lock 1.

cxxv. • □ The 4,800-Gigalitres is now reduced to 2,132-Gigalitres flowing into South Australia from which we (SA) still need our diversion requirement though we are informed this is to be reduced in the MDB Authority Plan (Sustainable Diversion Limits). From that 2,132-Gigalitres which would all not be flowing over Lock 1, the Metro-Adelaide and Associated Country Areas – Average 122-Gigalitres – will still needed to be delivered from the pumping stations downstream of Blanchetown. □ We doubt that would be enough to maintain the requirements for the required pumping from the River Murray and the environment needs of the River, Lake Alexandrina, Lake Albert and the Coorong and though it is far better than the above scenario one thing is for sure there would be no room for increased growth.

cxxvi. • □ The remaining two scenarios 9,800 and 8,435-Gigalitres are now 4,349-Gigalitres and 3,744- Gigalitres flowing into South Australia, if either of these amounts were to remain possible the entire Murray Darling Basin would be out of trouble and there would be no need for any actions but sadly these scenarios appear to be out of reach. □ We would conclude from the above figures/information and other information to hand that we must be vigilant and be prepared for the future with less water available from the Murray Darling Basin, so as to assure preparedness all options for saving the Murray Darling Basin must as a matter of urgency be explored. □ By the below chart it can be seen how the flows over Lock 1 have decreased since 1968 and especially since 1996 and there is nothing giving us hope this will improve.

4/5/09 4/5/08 4/5/07 4/5/06 4/5/05 4/5/04 4/5/03 4/5/02 4/5/01 4/5/00 4/5/99
 4/5/98 4/5/97 4/5/96 4/5/95 4/5/94 4/5/93 4/5/92 4/5/91 4/5/90 4/5/89 4/5/88
 4/5/87 4/5/86 4/5/85 4/5/84 4/5/83 4/5/82 4/5/81 4/5/80 4/5/79 4/5/78 4/5/77
 4/5/76 4/5/75 4/5/74 4/5/73 4/5/72 4/5/71 4/5/70 4/5/69 4/5/68

Flow Passing Lock 1 1968-2009

180000 170000 160000 150000 140000 130000 120000 110000 100000

90000 80000 70000 60000 50000 40000 30000 20000 10000

0 Date ML/day 5

Conclusion

We believe that a scientifically conducted EIS would/could investigate the many aspects of the advantages and any major disadvantages of a permanent construction, a Lock with a Lock Chamber, Fish Passages (Ladders), Opening from the Bottom with spillways to maintain/monitor the River's level and a constant flow into Lakes Alexandrina, Albert and the Coorong.

We at no time wish to separate permanently the River from the Rivers' Mouth but to be able to when possible pulse water into the Lakes and the Coorong and as much as possible allow water to flow out of the Mouth, through the Barrages.

Our belief is that if the River Murray Pool Level could be maintained at minimum of 0.4-metre above AHD this would ensure all irrigators could access their entitlement, ferries could resume normal operation, all boat ramps could revert to use and use by conventional two wheel drive vehicles, all adverse advertising could be turned around ensuring firstly all marine craft on the river could resume normal business including the large craft which are now in doubt for the coming tourist season as they cannot access any slips below Lock 1- and cannot travel through Lock 1 meaning they may soon have to cease operating, a \$126M loss of income.

There are massive amount of problems below Lock 1 and if the repairs are not done soon and the problems continues to occur repairs may become impossible.

Another problem (in many cases a hidden problem) are the socio-economic effects which in a number of case have not only culminated in family breakups but in a few severe case persons who have lost all hope have committed suicide. □ A recent survey in the Lower Murray showed a loss of tourist trade of as much as 35% with many businesses going to the wall which has had another massive flow on effect on communities.

We see an Environmental Impact Statement with the correct terms of reference being able to answer all the necessary questions as to management of the River Murray and therefore the Murray-Darling Basin all the way to the source, looking at all socio-economic advantages and dis-advantages, all effects on irrigation and the continuance of all irrigation and associated industries, the continuance of vital public and private services, the ability to maintain all tourism associated industries and one other over-riding important facet of management the continued management of South Australia's storages Dartmouth Dam the Hume Weir and Lake Victoria. □ In seeking an EIS we are ultimately seeking the umpire's ability to arrive at a decision and we will be compelled (if the correct terms of reference are set) to abide by that decision as will those who are not only opposed to any construction in the Lower River Murray below Tailem Bend but also an EIS – what are they afraid of? □ We realize that the Murray Darling Basin and the River Murray are listed in the most ten degraded river systems in the World and also in the ten most regulated rivers in the World but fervently believe that if the River Murray is not managed from the Lower River Murray with some water passing through the Murray Mouth the death of the river is imminent.

Finally if the planned growth in the Australian population is to occur we MUST be able to ensure adequate water is available.

Looking at some of hundreds of recent headlines we believe supports our call.

<http://www.smh.com.au/environment/water-issues/deliverance-from-queensland-floods-was-too-optimistic-20100518-vc4h.html> □ Deliverance from Queensland floods was too optimistic

The record-breaking March floods in Queensland will deliver less water than first thought to the lower part of the Murray-Darling Basin, the NSW Office of Water has

warned. Downstream basin states NSW, Victoria and South Australia have been hoping for a boon after the massive floods in south-east Queensland this year. While the states will still get substantial flows, it will be less than first expected. In a report released late last week the NSW Office of Water finds the Menindee Lakes in western NSW - which holds water that will be later sent downstream to Victoria and South Australia - is three-quarters full. Initial estimates of the effect of the March floods suggested the lakes, which hold up to 1800 billion litres, could fill and even overflow.

6

<http://www.smh.com.au/environment/water-issues/water-reforms-will-mean-pain-wong-20100520-vhpa.html>

Water reforms will mean pain: Wong

Water reforms will mean some pain for Australians, Water Minister Penny Wong says. "And you can expect that everyone is going to feel some pain," she said.

<http://www.abc.net.au/rural/news/content/201005/s2904675.htm>

Slight worsening of drought in NSW

There's been a slight increase in the area of NSW affected by drought. The latest figures show 9.4 per cent of the state is drought declared. That's up from 7.3 per cent last month. Parts of the Central West, Tablelands and New England regions have moved from being marginal to satisfactory.

The Australian

Its official: the drought is finally over

The drought is officially over, and farmers in southeast Australia can afford a wry smile. But the Bureau of Meteorology has warned that despite above-average rains last month, on top of the big wet earlier in the year, there is still a long-term rainfall deficiency and more is needed to fill dams and run the rivers of the Murray Basin. The Murray-Darling Basin Authority reports the active storage in its dams is now at 30 per cent capacity, nearly half the long-term average.

<http://sj.farmonline.com.au/news/nationalrural/agribusiness-and-general/political/big-water-cuts-coming/1836390.aspx?src=enews> Big water cuts coming

Irrigators will be forced to take cuts to their water use under changes to how the Murray-Darling Basin is managed, Water Minister Penny Wong has foreshadowed. Senator Wong told a water conference that the Murray-Darling Basin plan, under development, would be tough and "one of the largest adjustments Australia has ever seen." A draft version of the plan will set out caps on how much water can be taken from the Murray-Darling river system by irrigators. "... It is only reasonable to expect that irrigators will face significant cuts in their water use," Senator Wong said. "And you can expect that everyone is going to feel some pain."

We are undergoing a major change in how we use water ..." Opposition water

spokesman Barnaby Joyce, the National Farmers Federation and the Productivity Commission have claimed that the targets unfairly favour the environment and do not take into account the needs of rural communities and farmers.

<http://news.smh.com.au/breaking-news-national/floods-a-let-down-for-murraydarling-20100526-wedu.html>

Floods a let down for Murray-Darling

Authorities have confirmed this year's record-breaking Queensland floods won't meet expectations, with only a small part of the deluge to reach the bottom of the Murray-Darling Basin. From December last year to March, 6700 gigalitres of water passed through the north's major rivers, and of that, about 2100 gigalitres was set to reach the Menindee Lakes, a budget estimates committee was told on Wednesday.

The Menindee Lakes in NSW are on the Darling River, about 200 kilometres upstream of the Darling and Murray River junction.

<http://www.abc.net.au/rural/news/content/201005/s2911964.htm>

Queensland floodwaters won't reach Murray mouth

The Murray Darling Basin Authority says none of the water from the Queensland floods will reach the mouth of the Murray.

<http://www.theaustralian.com.au/news/nation/murray-mouth-needs-flood-in-southern-basin/story-e6frg6nf-1225872740609>

Murray mouth needs flood in southern basin

It would take a flood along the Murray River to rescue South Australia's Lower Lakes and finally restore a natural flow out to the ocean.

<http://www.adelaidenow.com.au/news/opinion/editorial-elitist-school-system-threat-to-education/story-e6freabl-1225876208305> □ A line choking Lower Murray

The national takeover of the Murray-Darling Basin by the Federal Government began as a noble ideal, but one that has been undermined ever since. In the months since states signed away their rights to individual control of the river system, Queensland has activated dormant water entitlements and turned them into licences, NSW has watered down a commitment to stop so-called floodplain "harvesting" and Victoria's extraction of \$1 billion from the Federal Government to improve water efficiency has been exposed as a sham.

Today The Advertiser reveals yet another hurdle the once-healthy river faces. Hard as it may be to believe, the Murray-Darling Basin Authority doesn't actually control all the water in the river system. □ The health of the river is now being undermined by nothing more significant than a line on a map. Because of this boundary the authority says it cannot be responsible for guaranteeing flows to the Lower Lakes and the Coorong.

7

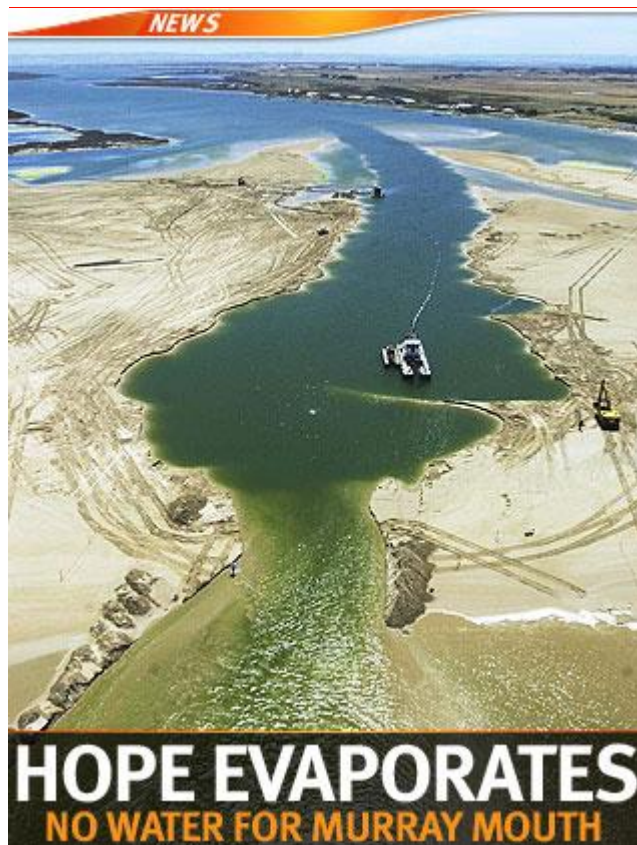
Surely this could, and should, be changed with the stroke of a pen as one more essential step towards national control of such a significant natural asset. □ That means guaranteeing the flow over Lock 1 as that is the only way water can be guaranteed for Lakes Albert, Alexandrina and the Coorong.

If there were ever a better reason for an EIS as we are requesting could someone please explain.

THIS IS A NATIONAL DISGRACE!

A sad and sorry state!

The END of the River Murray that we have grown to know our once mighty River Murray!



8

snapshots in time

1978



1989



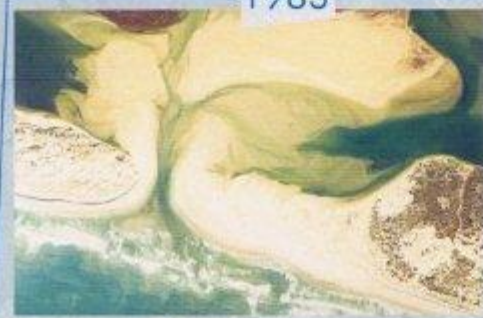
In 1981 the Murray Mouth closed for the first time in recorded history. It was closed for 3 months before being opened by dredging.



1981



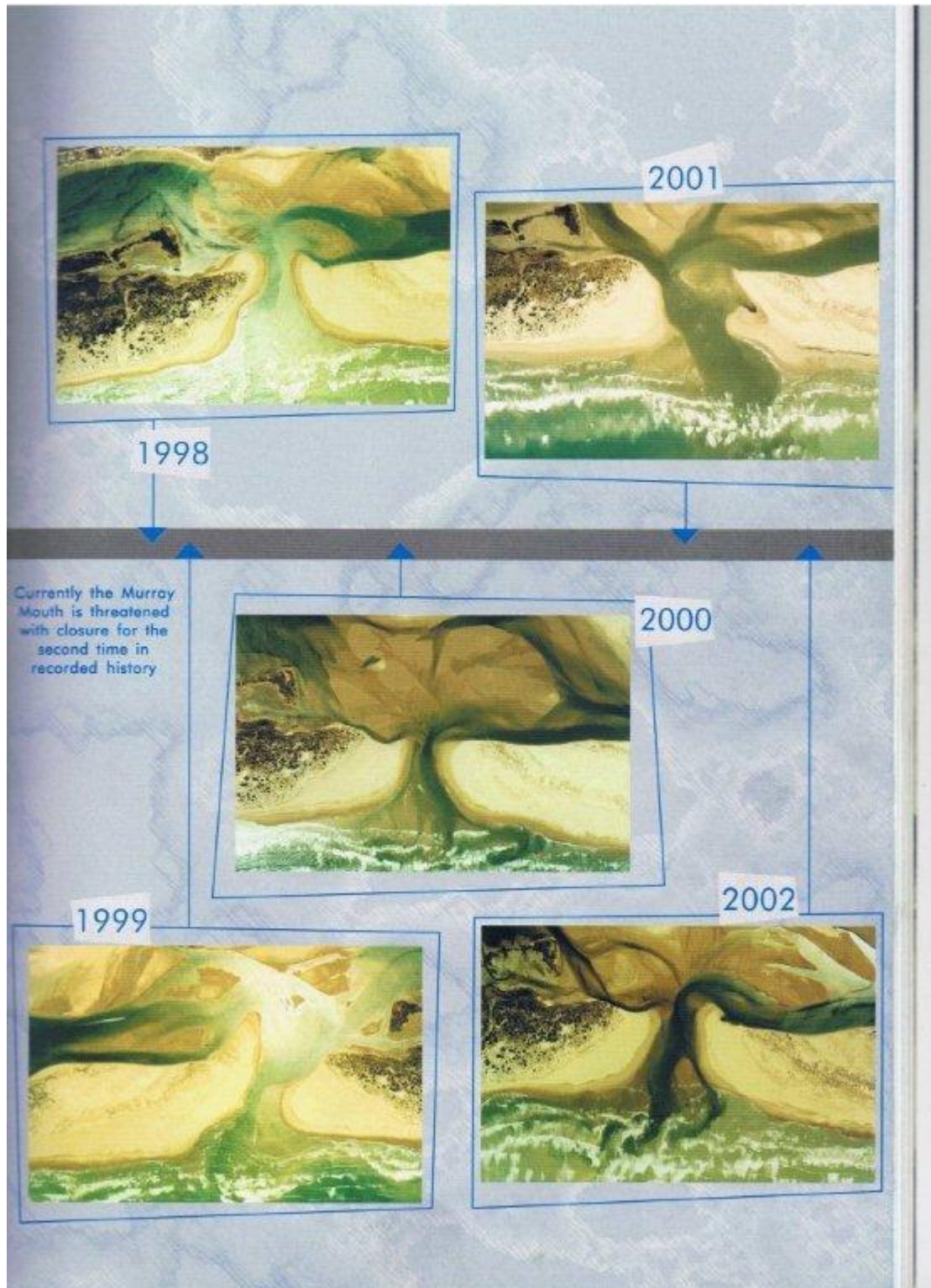
1995



1983



1997



10

The Colorado prior to the Hoover Dam.

Since the building of the Hoover Dam the Colorado much like our once Mighty River Murray has been decimated by over extraction (photo on right hand side) upstream, excess irrigation has not only destroyed the Colorado but thousands of square miles of once irrigated primary production land.

When the water runs out so does the ability to produce the result “a wasteland”. The Colorado only occasionally reaches the sea, dying from the mouth.

Is this what we want for our once iconic River?

On behalf of, ““Managing the Murray Darling Basin from Lock Zero” Advisory Group, Independent Spokesperson: □ Peter R. Smith OAM

Immediate Past South Australian Vice-President Murray Darling Association, Member; Lower River Murray Drought Reference Group, □ Vice-President Murray Watch SA, □ Ex-elected Member Mid-Murray Council,

Volunteer „Climate Change” Presenter; □ Trained by Australian Conservation Foundation and Al Gore.

Photographic evidence supporting out call for an Environmental Impact Statement can be viewed by accessing the link below.

The below link should be finalized and accessible by 5th July 2010

www.psmithersmyriver.com/lockzero





NATURAL RESOURCE MANAGEMENT – A REGIONAL PERSPECTIVE

By Cr Lyn Gunter,

Presentation General Assembly, Australian Local Government November '05 □ Thank you for the opportunity to speak to you about the Regional Aspects of Natural Resource Management □ I would like to acknowledge the assistance of CEO Bill O'Kane from the Goulburn Broken Catchment Management Authority, staff of the Murrindindi Shire Council, Sylvia Boyle and Bill Bak who helped me prepare this presentation.

I would like to provide a brief overview of the North East Local Government and Goulburn Broken Catchment Region which includes the achievements identifies some gaps and some actions required to achieve best environmental outcomes for the Region. I believe if each Region works cooperatively then the environmental benefits will not only be seen at a local level but also at a State and national level.

The Goulburn Broken Region covers from the Great Dividing Range in the south to the Murray River on the border. The upper regions rural base is dry land farming with the lower region reliant on irrigation for production. There has been a definite shift in both the upper and lower regions to best practice water saving systems to be able to continue their business activities.

The communities are diverse with businesses ranging from traditional farming,

horticulture, viticulture, the dairy industry and tourism along with a number of regional and rural towns. A number of new intensive agricultural and horticultural industries have been introduced into the region these include lavender farms, berries and nuts. □ Along with these influences we have climate change, drought, population growth in major towns and lifestyle living in the rural sector which has placed an increased demand on water supply.

Over time certain waterway practices have changed. **Rivers that were once straightened are being returned to natural flows. In past times introduced species such as willows were planted along streams for aesthetic purposes. It has now been shown that species such as willows have inhibited growth of our native vegetation and clog up our waterways. Native vegetation should be used to stabilize banks and rather than introduced species.**

Water supply is not enough in it self enough. **Water Quality is important** if we are to improve and sustain our natural environment, aquatic habitats and domestic supplies. A number of volunteers through Waterwatch monitor many streams and rivers throughout the catchment. **This monitoring has identified the need to lower Phosphorus, Turbidity and Salinity in a number of streams.**

Stormwater management plans are assisting by reducing sediment and waste flows into our streams. The addition of baskets at drainage collection points and ongoing maintenance of these has improved our waterways.

In a many of our river systems native fish and aquatic life are being protected. "Fish Ladders" have and are being installed in a number of streams allowing fish movements up and downstream giving access to natural spawning areas.

Wetlands have become of particular interest to environmentalists and tourists. The "Barmah wetlands hold a special place in the northern GBCMA region. The magnificent natural environment is the home of numerous native wildlife species, flora and fauna. It has been stated that the "Barmah" wetlands is the Kakadu of the south.

A new project, called River Connect, was launched last week along the Goulburn River in the Shepparton-Mooroopna area. The grand plan is to encourage and draw community into projects along the Goulburn River. This project will see floodplain management and improvements to the river as a shared vision by all stakeholders along the river. The model that has been developed for River Connect is transferable and the blue-print could be rolled out in any urban environment in Australia.

The North East Regional Wastewater Management Project is well underway and will assist each council to identify common elements with actions that can be put into place across the region. This approach will provide advantages such as resource sharing, joint projects and cost efficiencies.

The Regional Waster Management forum has achieved a number of objectives for recycling and moving towards Zero Waste. These achievements include - introduction of 230 litre recycle bins, extension of services to recycling for schools and community events, education programs at schools and generally continuing the momentum on minimizing waste.

Both rural and urban communities recognize the need to protect and enhance the natural environment in which they live. This is a more recent phenomenon as 20 years ago we concentrated more on production whereas we are now becoming stewards of the land. Landcare groups have formed over much of the area and volunteers are doing fantastic job in revegetation soil stabilization and clearing of weeds. These groups along with Catchment Authority officers identify work that is required on the ground. Many erosion and salinity affected areas have received new life due to these programs, but there is still much more to be achieved.

Revegetation in traditional farming areas where vegetation clearing has taken place has proven to be not only beneficial for the environment but also for livestock. Those farmers who have taken up this initiative have received economic benefits for this investment in their land.

We need to be aware that there are differing communities with different drivers. This must be taken into account in land use practice. What may be right for one area is not necessarily right for all areas. Neil Barr, from the Department of Primary Industry, in Bendigo, Victoria, is a rural sociologist. Neil has undertaken a study which identifies the difference between agricultural demand and lifestyle growth in Victoria. The Western regions of the state show a mainly agricultural base whilst the eastern region shows rural lifestyle change. Neil's example provides the basis for the need to approach land use planning with the inclusion of environmental outcomes at local and regional levels. Planning and environmental outcomes need to be developed for individual areas taking into account the regional catchment strategy.

In March 2004, Murrindindi Shire Council in conjunction with the Goulburn Broken Catchment Management Authority developed Rural Living Guidelines. These guidelines were prepared to assist with rural land planning and are intended to guide 'landscape change' while taking into consideration existing land uses, farmers rights, catchments management principles and net environmental gains. The Goals are based on a balanced Triple Bottom Line approach to land development. They cover areas such as Whole Farm Plans, Biodiversity, Water Quality, Erosion and Soil, Pest Plants and Animals, and Agriculture and Rural Land Conflict. Objectives, performance measures and decision guidelines are included for monitoring and reviewing purposes.

As a Region we have certainly come a long way in recent years but there is still a way to go. We now have a number of plans and strategic directions to lead us through the maize of managing our environment. Grants are available via the CMA which will assist rural owners to fence off streams, revegetate, improve erosion and provide off stream water supply for stock. We need to be aware and take into account community expectations through consultative processes. This process will include social and economic outcomes as well as environmental benefits.

Work is still required in the area of communication and education. We need to ensure that there is community ownership of any plan. Our communities play a major role in work on the ground. Partnerships and relationships must be built that will endure through the challenges we face in providing benefits to all stakeholders as well as the environment. We need to build relationships with departments and authorities at both state and federal levels. There is a need for state and federal governments to work collaboratively and build relationships to obtain the required environmental outcomes.

Some Future Actions

Funds are required for –

- χξξωυ. The acceleration of the salinity management plan and river health programs
- χξξωυυ. Water use efficiency on farms and within the irrigation system – good irrigation (management, reduction of losses within the system such as channel loss and (evaporation, and poorly placed catchment like Lake Mokoan.
- χξξιξ. Greater investment in irrigation efficiency and system efficiency to return more (water for the environment
- χξξξξ. Natural Heritage Trust and National Action Plan funding as they are coming to (an end and we need to know if replacement grants will be provided
- χξξξι. Increased Stormwater management strategies (Volunteerism - pressure on families with landcare and farming community.

Improved relationship between State and Federal Government at an operational level, i.e. NHT NAP.□Define the roles – there is still confusion about who is responsible□Develop a Statewide template.

Consistency in Interpreting the Regional Catchment Strategies.

By building on partnerships with community, authorities, departments and the 3 tiers of government, Local, State and Federal there is plenty to be achieved. We must consider not just the environmental aspects but take into account the economic and social values for the community. There needs to be an understanding of the good to all and the rewards that will be returned not just now but to future generations. It is evident that we do not need to reinvent the wheel. For any plan to work it must be done through cooperative partnerships underpinned with consultation and implemented collaboratively. We must learn to act locally think regionally keeping in mind the benefits at a national level.

Thank you

Reference Information

There are a number Regional Plans at various levels available that could be of assistance to you on this topic. –

North East Regional Plan – prepared for the NE Local Gov Forum December 2003
Contact MacroPlan Australia email info@macroplan.com.au Tel 03 9663 6826□North East Regional Waste Management Group Plan – Cr Yvonne Davies, Moira Shire Victoria 03 57 64 4323

Murrindindi Shire Rural Living Study – www.murrindindi.gov.au□The Waterwatcher – Goulburn Broken area – contact David Hodgkins 03 5832 0460 The following documents can be obtained from the Goulburn Broken Catchments Management

Authority – □ Goulburn Broken Regional River Health Strategy 2005-2015 □ Regional Catchment Investment Plan □ Catchment Partners Celebration Day 2005 – Making the links between Environment and Water in the Shepparton Irrigation Region. □ Salinity West Goulburn: Tree Cover Salinity Management □ Community Landcare Support Strategy 2005 □ Goulburn Broken Regional Floodplain Management Strategy □ Goulburn Broken Regional Catchment Strategy □ From the Fringe to Melbourne - Strategic Plan for Integrating Native Biodiversity Contact details website www.gbcma.vic.gov.au □ The Victorian Government's White Paper on Securing Our Water for Our Future Together. Contact 136 186 or visit www.dse.vic.gov.au/waterfuture

I have brought with me a few booklets on Murrindindi Shire Council's Sustainable Land Management Directory, some brochures about the Goulburn Broken Catchment Management Authority and leaflets on the River Connect project. □ –

The following is taken from the: Hansard 3 September 2008

MATTERS OF PUBLIC IMPORTANCE

Murray-Darling Basin

This is history, only 4 years ago, and it is important to note that there are arguments during this parliamentary discussion about whether climate change has been influenced by human actions and that there is evidence of very real fears about South Australia running out of water for critical human needs. The MDBA has basically ignored this evidence because we have had substantial rain and they do not see a need to commit political death by instituting a Basin Plan that would deliver the water needed to achieve the objects of the Commonwealth Water Act 2007. To say that this Authority is independent is not admitting the truth that since the last Authority resigned the present Authority has listened to the present government and has wavered from its legal obligations to produce a Basin Plan whose 'objectives and outcomes are consistent with purposes set out in section 20. The objectives and outcomes must address:

- a) Environmental outcomes; and
- b) Water quality and salinity; and
- c) Long-term average sustainable diversion limits and temporary diversion limits; and trading in water access rights.

The DEPUTY PRESIDENT—The President has received a letter from Senator Bernardi proposing that a definite matter of public importance be submitted to the Senate for discussion, namely:

- (1) The current dire state of the Murray Darling Basin and in particular the challenges facing the Lower Lakes communities
- (2) The failure of the Government to deliver immediate short term relief to communities reliant on the Murray Darling Basin and
- (3) The need for the Government to support the immediate provision of \$50 million to assist the communities in the Lower Lakes and Corong region of South Australia. I call upon those senators who approve of the proposed discussion to rise in their places.

More than the number of senators required by the standing orders having risen in their places—

The DEPUTY PRESIDENT—I understand that informal arrangements have been made to allocate specific times to each of the speakers in today's debate. With the concurrence of the Senate, I shall ask the clerks to set the clock accordingly.

Senator FISHER (South Australia) (4.15 pm)—I rise to speak on this matter of utmost public importance about the dire situation facing Australia, the Murray-Darling Basin, the communities who rely upon and live along the Murray-Darling Basin and, in particular, the people of my home state of South Australia who live on or near the Coorong and the Lower Lakes. We know that the situation facing these communities and the country is dire and, sadly, it becomes direr daily.

Yesterday we learned that this past winter had been the fifth-driest in the last 155 years and that the situation facing the lower basin was the worst since records began in 1892.

The Murray-Darling Basin Commission's Chief Executive, Wendy Craik, was very frank when she said: We're continuing to establish new records that we don't particularly wish to establish. Yesterday we learned that monthly inflows for August were less than one-fifth of long-term averages for the system. Yesterday we also got Minister Wong's departmental submission to the Senate rural and regional affairs committee in relation to the reference inquiring into the situation in the Coorong and the Lower Lakes.

That submission played down the options of lifting fresh water to save the Lower Lakes and the Coorong. That submission indicated that any release of water from either the Menindee Lakes or the Snowy system could take water that may be needed, apparently, for critical human needs next year. That submission indicated that the volume of fresh water needed to replenish the Lower Lakes is simply not available at this time—dire indeed. I have seen first-hand the dire circumstances facing the people of the Lower Lakes and the Coorong. I have travelled and visited with members of the communities in Goolwa, Milang, Narrung and Meningie—I have seen some of their circumstances first-hand and I have heard just some of their stories—to see what the lack of water is doing to the people and the communities. I visited with Brendan Nelson, the Leader of the Opposition, as he too wanted to listen and to hear from the members of the community about the impact that the lack of water is having on their daily lives—or what used to be their daily lives—and the sorts of things that they think could be done to help them through. In that context, I have met with community members, tourism operators, farmers and irrigators and discussed what they think could be part of the next step. I have heard stories of people paying thousands of dollars to truck water in to water their stock and to keep their stock alive. I have seen elderly people, people like our mums and dads and our grandparents, struggling to pipe water across dry flats, struggling with pipes across muddy flats to get drinking water. I have seen tourism operators who cannot operate with such low flows and I have heard from third, fourth and fifth generation farmers who are in many cases likely to be forced off their land unless something is done. This is a crisis that not only affects those who should be at what should be the water's edge but today is not; it is a crisis that extends beyond those immediate communities to the communities who feed and service those who should be at the water's edge. If the farmers leave the land, then ultimately so do those who help farmers—for example, vets in the case of dairy farmers. If tourism operators leave, what happens to those who service the tourism operators' operations? Without support, it is very clear that the people of the Lower Lakes and the Coorong are likely to survive what could well be the departure of swathes of their population. Part of what is needed for the Lower Lakes was reflected on by opposition leader Brendan Nelson in April this year. He talked about help for the communities of the Lower Lakes, help for local people, help for local businesses and local communities in consultation with those local people and local communities: local help, local self-help, driven by local people. Help for local people, driven by local people. What do we have instead? On a national level we have this thing called a COAG agreement, which of course is not an agreement. It is an agreement in name only because any premier can walk out at any time. It is an agreement, presided over by the Rudd government, which does not deliver a national plan or national management of the Murray-Darling Basin in any sustainable way. It does not involve a referral of powers. It leaves the Murray-Darling Basin states beholden to the whims of the states. And it does not deliver any water; it stagnates water and takes it out. It stagnates water because nothing will happen until 2011—2009 is likely to be too late, let alone 2010 or 2011. And, worse than that, it allows the taking out of water that was not being taken out of the system before the COAG agreement was struck.

For example, the Goulburn to Melbourne pipeline effectively sees upwards of 100 gigalitres of water [should be 75gl] a year being flushed down Melbourne's toilets at the expense of others.

On a broader level we have Rudd government inaction. We have a Rudd government watching water. We have a Rudd government failing to act on the three key stages of moving the Murray-Darling Basin system forward—that is, failure to bring water back in in an organised and strategic way, failure to plan to reallocate that water once it is brought back into the system and failure to force their Labor colleagues, as part of ending the blame game, to better collect—(*Time expired*)

Senator WONG (South Australia—Minister for Climate Change and Water) (4.22 pm)—I welcome the opportunity to debate this MPI today and I welcome the opposition coming out of the shadows where they have been hiding since the submission options on the lower lakes were provided to the Senate yesterday. For those of you on the other side who have read the submission to the committee, which outlines the options that are being considered by the department and by the MDBC, it certainly makes for very sobering reading. It outlines the serious situation in the lower lakes and outlines the short-term options for managing the situation that had been provided to government. It is interesting to note what has happened since it was provided. We have not heard a peep from the opposition somehow on which option they would choose. I am sure if you did a straw poll over there we would certainly not have a single position from the opposition because we know how divided they are on this.

Can I say this: given how serious the situation in the lower Murray is, I am shocked that we have the Leader of the Opposition trying to play it down. Today on Adelaide radio we had an astonishing distortion of the facts by the Leader of the Opposition, who misrepresented a report by the Bureau of Meteorology. He said, 'Annual mean rainfall has been slightly more than average recently, 25 millimetres, but also we have had an annual mean maximum temperature for 2007 of 0.73 degrees.' Dr Nelson was referring to the annual Australian climate statement for 2007. It is a statement that showed that 2007 was the sixth hottest year on record and it also showed that, whilst there was slight increase in annual mean rainfall attributed to La Nina, that was in Australia overall including the tropical north. But that very statement also showed that the Murray-

Darling Basin remained dry. What is Dr Nelson's message to Adelaide? His message to Adelaide is this: there is no shortage of water; just move to Darwin. Dr Nelson says: 'Never mind if you are in the lower lakes because in the Kimberley it is bucketing down. Never mind if you are the member for Riverina and there is no water in Deniliquin.'

Opposition senators interjecting—

Senator WONG—Why not go and talk to the member there, Senator, because it is raining cats and dogs in Broome. And to Senator Joyce is effectively saying, 'Don't worry about St George, Senator Joyce, because the Daintree is fine.' While I am on the subject of the relationship between the Murray and climate change, it is indeed interesting to note that this motion was moved by Senator Bernardi, who is one of the diehard climate change sceptics of the opposition just like his mentor, Senator Minchin.

Senator Bernardi—Hear, hear! Because he is my mentor!

Senator WONG—I will take that interjection, Senator Bernardi. He says, 'Hear, hear!' because these are people who just cannot let go of their scepticism on climate change and you are why the coalition has absolutely no credibility on climate change. Because you do not believe it is happening. So why do you not front up to the Australian people and say that what you took the last election was only because you thought you had to pretend to care, which is what one of your colleagues said—that you had to pretend to care about climate change. That was the only reason you moved before the election. I return to Senator Bernardi, who said just one year ago: I have come to believe we're seeing a distortion of a whole area of science that is being manipulated to present a certain point of view to the global public, that is that the actions of man— clearly, only men— are the cause of climate change. Perhaps it would be a good time now for Senator Bernardi to admit and recognise that an important part of helping the Murray is to tackle climate change. I want make a comment about the submission that those on that side clamoured long and loud to see, because before the

submission was released the opposition were demanding to see it, and now it has been released they cannot face the facts. They have gone to ground. They have ducked for cover. If you consider yourselves to be the alternative government, it is not that easy. You have the facts now. Why do you not take some responsibility, Senator Bernardi. Why do you not take some responsibility? You made all that hot air and noise about releasing the submission and once you got the information, where were you? You ducked for cover.

Opposition senators interjecting—

The ACTING DEPUTY PRESIDENT (Senator Humphries)—Order! The chamber will come to order.

Senator WONG—While we are on the issue of transparency and accountability, which is what the opposition demands from government, it is very interesting to note that the relevant shadow minister appears to be hiding documents about the availability of water in the basin. Because I had a look at a transcript of an interview that Mr Hunt gave earlier this week. He says that he has his own figures on water availability for the lower lakes. He says, 'The advice we have is that a higher percentage of the water than would previously be will now arrive in South Australia.' This is what Mr Hunt says: 'This is water that's available. It's available now. It could make a real and significant difference.' Senator Bernardi is speaking after me, and I say to him: why does he not get up and tell us where Mr Hunt's water is? Why do you not get up, Senator Bernardi, and tell us where Mr Hunt's water is? Because the fact is, you keep making these claims which— frankly, now that you have the information—you ought to know not to be true. You ought to take more responsibility as the alternative government for the way in which you enter this debate. I would like to know from Senator Bernardi, Senator Minchin or Senator Fisher where Mr Hunt's water is going to come from. I am sure Senator Joyce would like to know that. I am sure Senator Nash would like to know that. And I am sure Senator Boswell would like to know that. But, instead of being transparent, what we see from the opposition, having spent 12 years in government doing absolutely nothing on this issue, is that they are now cynical enough to walk both sides of the street. There is a consistent theme when it comes to the way in which the opposition approaches the politics of water. And it is politics, because they did not have an approach on the policy. It is this. It is very simple. It is called telling people what you think they want to hear. So when you are down in South Australia, you send backbench senators down to tell those communities what you think they want to hear. Meanwhile, you have frontbenchers up in New South Wales and Victoria telling their communities what they think they want to hear. So when you are downstream in South Australia, you express outrage at the state of the lower lakes and you call for emergency action, although you actually have no solution, no option that you have put forward on this. And when you are upstream in Victoria they tell their constituents that the lakes cannot be saved, should not be saved and the government should not stop purchasing water entitlements. What the document that has been presented to the Senate shows, **what the Murray-Darling Basin Commission information, which was also released yesterday, shows is that there is no room for political opportunism when it comes to the Murray-Darling Basin.**

There are no easy options; there are only hard choices. We have significantly less water in the southern basin than we need. The document that was provided shows that currently there are around 3,949 giganalitres in storage, and 4,292 giganalitres have been committed. The fact is: if it does not rain, unfortunately something has to give. What I said previously in this chamber in question time remains the case. My first priority is securing Adelaide's water supply and the supply for the towns that rely on the river. We on this side will not be part of any approach which threatens the critical needs of communities that rely on the Murray-Darling for drinking water. Again, I ask this question: can other senators say the same? At the moment what we have is a whole heap of noise from the opposition when it comes to the problem and deathly silence when it comes to a solution. You run away from the options and you run away from the difficult policy decisions, just as you did for 12 years in government. Where were you, Senator Bernardi?

Senator Minchin was in cabinet. Where were you, Senator Fisher, when the previous government did not spend one cent on buying one drop of water to return to the Murray? Did I hear coalition backbenchers or Senator Minchin in the cabinet demanding that the

government purchase water for the Murray River? I do not think so. You delivered absolutely nothing and now, in the face of the Mayo by-election, you want to whip up this issue, an issue on which you never delivered. Let me be absolutely clear about the lower lakes. As the Senate knows, the Prime Minister has visited there. I have visited on a number of occasions and I have met with the communities down there. We do need to do everything we can to avoid the acidification of the lower lakes. And while the situation is serious and urgent, when the options before us have such serious consequences, we also need to avoid a precipitous decision, and that is the approach the government has taken. We are proceeding with a course of action that was outlined in the submission—that is, to continue the pumping arrangements which we have in place—but we also have to ensure that we find a longer term solution. One of the things the government has already committed is \$200 million to the South Australian government to find an enduring solution, a lasting solution to the problems facing the lower lakes and the Coorong, and we have indicated we would make \$10 million of that immediately available to accelerate projects to the lower lakes in the Coorong. That is why the government has already committed \$120 million for piping works to connect towns, communities and irrigators who currently rely on the lower lakes to a higher point along the Murray. Senators may recall that that announcement was made jointly between the Prime Minister and the Premier. Also, I was there when we visited the lower lakes and when we visited Langhorne Creek and spoke to the community there. Let us understand this: we actually responded directly to one of the options that were put to us by those communities. One of the things that were put to me and to the South Australian Premier was that we need to look at infrastructure works to secure the supply, particularly for the irrigators on the Langhorne Creek site. What did the government do? We listened to that and we provided \$120 million to deal with that issue. It is the case that we do face a great deal of difficulty on current inflows in the southern part of the Murray-Darling Basin, in particular. We do have to take an approach that avoids having a situation where you see a repeat of what is occurring in the lower lakes in other parts of the basin, and we do need to do what we can to ensure that all communities in the basin have the water they need. As the Senate would be aware, the government has a \$12.9 billion plan, Water for the Future, which is fundamentally about preparing Australia for a future where we are likely to see less rainfall. But the reality is that we are prepared to recognise the reality of overallocation and climate change on this basin, and we are prepared to do the hard yards when it comes to delivering on water for the future. It appears that those on the other side are back to the old game of playing politics on water, pointing the finger and saying one thing upstream and one thing downstream. The reality is that those opposite continue to deny that climate change is real. They continue to deny that climate change is having an effect on Australia. They continue to deny that climate change is having an effect on the Murray-Darling Basin, and what we know is that they are deeply divided on what they want to do. All they have done, as I have said, is to tell people what they want to hear. Let us remember what Mr Hunt said in terms of the lower lakes. He said: There are real things that can be done in terms of physical work. What did Dr Stone, shadow minister for the environment, say? She said: ... no amount of strident demand for more water and flow from upstream would change the fact that there simply was not the fresh water available for these lakes ... Is that the position? Dr Stone also said that we should open the barrages to the lower lakes and flood them with sea water. She obviously has not been listening to Senator Minchin, who went back downstream to South Australia and said: .. the coalition is totally opposed to the flooding of the lower lakes with sea water. Who are the public supposed to believe—the shadow minister for the environment, Senator Minchin, Mr Hunt or Senator Birmingham?

Let us also talk about one of the ways in which we know we can return water to the river, which is by purchasing water, one of the fastest and fairest ways in a difficult circumstance to return water to the river. What does the opposition think about that? Firstly, we know that they did nothing for 12 years in government on that. They were 12 years in government and there was not one drop of water. But we also do not know what they think about it, because guess how many positions they have had on purchasing water? We have counted them. We think it is about seven, to date. In relation to water purchase, Mr Hunt says that he is pleased we are doing it but then he says that it will not work. Mr Cobb says that

purchasing water is meaningless. That was after he said that it would cause a new drought. Mr Truss, Leader of the Nationals, says it will increase grocery prices. Mr Pyne, member for Sturt, says we should be doing more. Dr Stone says it is okay as long as it is not in her electorate. And Dr Nelson says, 'Why purchase water? Why not just compulsorily acquire it?' So who is speaking for the opposition and what is their position? Or are they too divided to have a position? Or is their position simply yet again, 'Let's tell people what we think they want to hear'? What we ought to do when it comes to the Murray- Darling Basin is deal with the facts.

This basin has suffered for too long from politicians and governments that have done nothing or have told people simply what they think people want to hear. We need to confront the reality of climate change, we need to confront the reality of overallocation, and we need to confront the facts. Those on the other side are simply playing politics.

(Time expired)

Senator SIEWERT (Western Australia) (4.37 pm)—It is interesting to note that I am the only non- South Australian speaking in this debate. I hate to tell the South Australians that this is not just about them— and that comes from somebody who is deeply concerned about the lower lakes and the Coorong. We need to be looking at a whole-of-basin approach to this. I heard Senator Wong talking about the hard choices. No-one has been making these hard choices for a century. We have had state versus state, we have had states versus the Commonwealth and the Commonwealth versus the states, and unfortunately that is still happening. Hard choices! How about the states and the Commonwealth agreeing that the water sharing plans will come into place in 2011 when the cap comes into place? The New South Wales water sharing plans will stay in place until 2014 and the Victorian water sharing plans will stay in place until 2019. How is that going to save the Murray? Where is the sense of urgency? Where are the hard decisions about investing money where it is going to best pay off for the Murray? Unfortunately, we are still not facing the hard decisions around land capability, around where we are going into the future in a system that is facing crisis—and not just in the Coorong. The Coorong is facing the most immediate crisis and that is where the alarm bell is ringing loudest at the moment; it is also ringing all across the basin. Are the other states pinging Queensland for allowing the Paroo to be developed and for breaking their agreement not to allow development of the Paroo? Is New South Wales looking at where water is being stolen in the Northern Rivers? There is plenty of satellite evidence that shows unregulated use—it is not illegal because New South Wales will not act to make it illegal. Is work being done by New South Wales to start bringing some regulation to the Northern Rivers? Is Victoria dealing with the four per cent cap now that the report that has been leaked shows the economic impact of not raising the four per cent cap? Where are the hard decisions there? Where is the pressure on these states from the Commonwealth to make them reform? What about the actions that the states have agreed to take under the National Water Initiative? The states are not meeting their agreements under the National Water Initiative—and that has been going for years—let alone coming anywhere close to dealing with the commitments that they made under the COAG agreement. None of that is being delivered. We are not seeing actions from the state governments. We are not seeing enough pressure on the states from the Commonwealth. I would hate to see it if we were acting when there was not a crisis. This is action at a snail's pace and it has been going on for too long. *(Time expired)*

Senator BERNARDI (South Australia) (4.40 pm)—I thank Senator Siewert for injecting a bit of reason into this debate after the 15-minute outburst from Senator Wong. It was quite an extraordinary decision by Senator Wong to come in here and defend the inaction of the government, because earlier this week, when we attempted to discuss this in taking note of answers, the government could not put up a South Australian to do it; they trotted out a Western Australian and someone from the ACT on the government side to talk about the crisis facing the lower lakes. The motivation for me in having an input into this matter of public importance is simply to identify and highlight the inaction from this government in

the crisis that is facing the lower lakes and the communities. We are facing two crises here. One of them is simply an environmental disaster in the making. We accept that there are many challenges in solving this, but the one particular challenge, the crisis that the government could do something about and has failed to do anything about, is to offer relief to the human component of this suffering—the communities, the farmers and those who depend upon the lower lakes for their livelihoods— rather than simply to the environmental component. Whilst Senator Wong and the government say that they cannot do anything about supplying more water, they can do a whole lot more to ease the burden on these communities. Even though the coalition are not in government, we still want to see people do better. What we have asked the government to do is to support a \$50 million injection of funds to offer immediate relief to the communities, and the government is silent on it. It says that it does not accept that any relief is needed, despite the rhetoric, the spin and the insubstantial statements that Mr Rudd and his ministers have made. Mr Rudd was elected in November of last year. In July of this year he made his first visit to the area that is facing the most pressing environmental issue in this country. He said, ‘It will be tough, it will be difficult, it will be expensive, but we intend to take on this challenge.’ They were his words, yet in mid-August—just last month—he said, ‘What we’ve done is to take every possible measure available to us in the last six months to try to turn this disaster around and it is a real problem.’ He has not turned around the disaster. He has not taken the measures and the steps that are necessary to ease the burden on people who have to truck in their own drinking water, who have to reduce their herd of dairy cattle from 800 to 250 and who struggle to send their kids to school and to put food on the table.

This is the human impact, Senator Wong. It is the human impact that your government is absolutely ignoring and you should be very ashamed. There is an absolute dire need for urgent government assistance. If the government were prepared to ignore the people of the lower lakes and the good people of South Australia, let me tell you that the opposition, the coalition, are not prepared to do it. We will continue to raise this issue. We will continue to advocate for relief for the people who are doing it really tough, no matter how much Senator Wong and all the expert reports that she is relying on say that nothing more can be done. You cannot give up. You cannot wash your hands of these sorts of things. Minister Wong has shown absolutely no interest in relieving the immediate plight that is facing so many South Australian communities. It is embarrassing. This is what is written in the papers. This is what I am reading every day. These are commentators, these are journalists and these are people who actually are interested in these communities. These are the local papers. They are throwing their hands up and going: ‘What do we have to do? How much more do we have to struggle in order to get some relief and some compassion from what is a very heartless government?’ In the context of what governments do, if there is a disaster in another country we step in and help out straightaway. But when the biggest environmental disaster and the catastrophe that is facing the communities of the lower lakes happen in our very own backyard this government does nothing about it. As a South Australian senator, I say to Senator Wong: stand up for South Australia. Do not fall into the ‘let’s support Queensland’ routine which is coming out of Mr Rudd’s office, with the Treasurer and all the powerbrokers up there. Fight for South Australia. I urge every South Australian senator to do the same thing. It is absolutely embarrassing that we have a cabinet minister who is prepared to let communities suffer. *(Time expired)*

Senator HANSON-YOUNG (South Australia) (4.45 pm)—The crisis that we see in the lower lakes and the Coorong is something that we need to be tackling immediately. The Greens have been campaigning on the plight of the Murray for years. We have been speaking to the local communities from Goolwa right up to Queensland. We have moved parliamentary motions of urgent action. We have put forward necessary amendments to the federal government’s water bill. But it is now crunch time. We need to find new sources of water as soon as possible for the lower lakes and the Coorong, and fresh water flows must be restored before summer if we are to have any chance of trying to rescue the dying Coorong and the lower lakes. This is why the Greens moved the urgent Senate inquiry into what we need to do. We need to figure out how we can get water down there not in 2019 or 2018 but now. The multiparty support for the inquiry into the water management of the lower lakes

and the Coorong indicated the scope of this environmental crisis. It shows acceptance by all sides of politics that we need to act now. The Greens indeed welcome the support for a big inquiry from the coalition, although it is disappointing to hear the dirty smear campaign around the Greens that is being perpetrated in the Mayo electorate by the Liberals even today. Isn't it interesting that Senator Minchin expressed such concern about the impact of the Greens policy on the people of South Australia, particularly those in the electorate of Mayo, when the former Liberal member, who was there for 24 years, did little to address the crisis and little to address the continued mismanagement of the Murray and the devastating effects that was having on his constituents. While the Greens do not oppose government support for these communities in the lower lakes and the Coorong—in fact we welcome it—after 12 years of inaction by the previous government I am interested by the opposition's timing on this, suddenly accepting that this is an emergency and needs an emergency assistance plan, given the significance of the Mayo by-election this coming Saturday.

It is that type of dirty politics and the smear campaign that is being run by the Liberals that is misleading, and insulting to, the people of Mayo. It leads me to think that perhaps it is the Liberal Party who are in panic in Mayo. Perhaps it is because the local communities are talking about what is going on in the lower lakes and the Coorong and they want to see action. They have not seen action for 12 years. We cannot wait another 12 years; we need action now. Let's get the support for the communities that we need and get the water down to the lower lakes and the Coorong, but let's not make this about politics because we have by-election happening in Mayo. The Greens have been consistently calling for action on the Murray. I urge the government to act on the findings of the Senate inquiry when it reports at the end of this month. We need to be looking after our communities in the lower lakes and the Coorong and we need to be ensuring that we save our *Storm Boy* country, but let's get the dirty politics out of it.

Senator MINCHIN (South Australia) (4.48 pm)—I start off on a bipartisan note by observing that I think this is a common cause—that everyone agrees the situation in the Murray-Darling Basin is quite horrendous and that we do have a crisis in the lower lakes. This is a tragedy of environmental, economic and social proportions that we have never seen before in the lower lakes. I think it is at least a common belief that primarily this crisis is caused by the prolonged drought that Australia has suffered and the decades of mismanagement and overallocation in the Murray-Darling Basin. I say with great respect to Senator Wong, having been down to the lower lakes and talked to the communities down there, that they actually feel insulted by the proposition advanced by Mr Rudd and her on their visits down there, which in a sense dismisses all this as the result of climate change. The communities regard that as a massive cop-out, because it suggests to the people suffering down there that signing the Kyoto protocol and having the so-called Carbon Pollution Reduction Scheme is going to solve all of the problems. Whatever the merits of Labor's approach to climate change, no-one, surely not even the Labor Party, believes that Australia bringing in a 'Carbon Pollution Reduction Scheme' in 2010 is going to make any difference to the situation in the Murray-Darling Basin or indeed to the lower lakes. With respect, I urge Senator Wong to stop insulting the people of these communities by that sort of reflection. It is only damaging the Labor Party and her own credibility. In relation to these communities, we have been calling for months for assistance on this. It is insulting to us and to these communities to say that this is Mayo related but, given the focus on the lower lakes in this electorate, we urge this government to adopt the coalition's position of immediately providing \$50 million in emergency assistance to this lower lakes community. It is all very well for Senator Wong to say: 'We've provided Mr Rann with \$200 million to deal with environmental issues'—in other words—'We are going to just let the acidification happen or let these communities collapse and then Mr Rann can have a slush fund of \$200 million.' These communities need this assistance now because their businesses and their livelihoods are suffering enormously. We will introduce our bill for immediate emergency relief assistance of \$50 million into the Senate tomorrow. Frankly, the government is showing absolute contempt for these lower lakes communities by dismissing our proposal in the way that they have. That contemptuous dismissal of our proposal is doing the Labor Party no good whatsoever in the lower lakes community, and of course that simply compounds the contempt which the

Labor Party is showing for the lower lakes communities by its extraordinary refusal to even put up a candidate in the Mayo by-election. Nothing could be more contemptuous of the lower lakes community than that. It shows that the Labor Party is indeed frightened of what the lower lakes community might say to the Labor Party were it to run a candidate. Can I also make the point that the economic life and community cohesion of the lower lakes are built on there being a freshwater ecology. Some are arguing that we should solve this problem by simply flooding these lakes with seawater. Indeed, that is no less than option 3 in the paper issued by the minister's department, which is really quite disturbing. The paper says in relation to option 3 that historical modelling indicates that saline water would have likely flowed into Lake Alexandrina in past times of very low Murray River flows. **If you turn to a very good document produced by the River Murray Catchment Water Management Board, it makes clear: Prior to European settlement, Lakes Alexandrina and Albert at the terminus of the River Murray were predominantly fresh, with river water discharging to sea and keeping the Mouth clear. Contrary to what many believe today, saltwater intrusions into the Lake environment were not common until after 1900 when significant water resource development had occurred in the River Murray system. Before large-scale extractions of water, the Lakes and lower Murray were rarely subjected to seawater invasions.** That is very important historical data. What is worrying me and our side of politics—and, indeed, the lower lakes communities—and is regrettably reinforced by this options paper is that the Rudd and Rann governments seem hell-bent on this seawater option. Indeed, they seem to be on what you might describe as 'lower lakes watch'. They are sitting by, twiddling their thumbs and waiting for the point at which they can simply flood the lower lakes with seawater. Our criticism of this government is this: they have now had nine months, they are not doing anything and they are simply waiting and watching to see what will happen. **They are now striking fear into the hearts of all those in the lower lakes by suggesting—I think quite unequivocally—that they are going to simply build a weir and flood the lower lakes with seawater.** As I say, this is quite contrary to all the historic evidence about this. This will destroy the freshwater ecology of the lower lakes. Can I in my concluding remarks make the point that I think the government has got a very big problem here. A big part of this problem is that the government made a very big mistake in combining in one portfolio the huge responsibility for water in this nation with the responsibility for climate change. It is our assertion that the minister who has this giant portfolio is clearly spending almost all her time running around and striking fear into the hearts of Australian business that she is going to introduce this so-called Carbon Pollution Reduction Scheme. That will strike fear into the hearts of all workers in Australian industry. It will be one of the most job destructive experiments that a Labor government has ever inflicted upon this country. Indeed, she is spending all her time devising this scheme to destroy jobs and destroy Australian industry and not spending any time on the crisis that we face now—that is, the crisis in the Murray-Darling Basin and, more particularly, the crisis in the lower lakes. She should be spending 100 per cent of her time on her responsibility for water. Instead, we see her running around and devising this Carbon Pollution Reduction Scheme so that she can suck up to the greenies around the world, while destroying jobs and destroying Australian industry. Her responsibility is water. She should be stripped of the water responsibility, and it should be given to someone who can apply their time full time to the crisis that is gripping the country.

Senator WORTLEY (South Australia) (4.55 pm)— I welcome the opportunity to debate this matter of public importance today—that is, the state of the Murray- Darling Basin and, in particular, the challenges facing the lower lakes communities. The submission of options for the lower lakes provided to the Senate yesterday—

Senator Bernardi—What are they?

Senator WORTLEY—It is all right, Senator Bernadi. You are a climate change sceptic. We have that on record, and I will get to that in due course. The submission outlines a serious situation in the lower lakes and it outlines the short-term options for managing the situation. The annual Australian climate statement showed that 2007 was the sixth-hottest year on record. It also showed that the Murray-Darling Basin remained dry. It came as no surprise.

Senator Bernardi—What's that got to do with the communities of the lower lakes?

Senator WORTLEY—Yes, Senator Bernardi, I am happy to talk about that. While we are on the subject of the relationship between the Murray and climate change, let us look at a statement made by Senator

Bernadi 12 months ago. He said: I have come to believe we're seeing a distortion of a whole area of science that is being manipulated— manipulated— to present a certain point of view to the global public, that is that the actions of man are the cause of climate change.

Before the submission was released, the opposition were demanding to see it. But now they are nowhere to be seen. Take a look around the chamber. They have gone to ground. We have had from those sitting opposite so many different positions. What their position is depends on which state they live in. When you are downstream in South Australia, you express outrage at the state of the lower lakes and you call for emergency action. We know that. When they are upstream in Victoria, they tell their constituents that the lakes cannot be saved and should not be saved and that the government should stop purchasing water entitlements. We know there are no easy options. We know that there are hard choices that have to be made.

Senator Bernardi—Are you standing up for South Australia?

Senator WORTLEY—What this document shows is that we have significantly less water in the southern basin than we need. If it does not rain, something will have to give. In the short term, the needs of people reliant on the Murray for critical drinking water must come first. This includes the one million residents of Adelaide. Yes, Senator Bernardi, I am a South Australian senator. We must be absolutely clear about the lower lakes. We need to do everything we can. That is why the government is proceeding with the course of action endorsed in this submission—that is, to continue the pumping arrangements we have in place. The Rudd government has committed \$200 million to the South

Australian government to address problems facing the lower lakes—\$200 million to the South Australian government and the Coorong—\$10 million of which will be available immediately to accelerate projects for the lower lakes and the Coorong. That is why the government has committed \$120 million for piping works to connect to a higher point on the Murray towns, communities and irrigators currently relying on the lower lakes. We also want to avoid the situation that is occurring in the lower lakes spreading to other parts of the basin and ensure that all Australians have the water they need. So what are we doing about it? The Rudd government has a \$12.9 billion long-term plan—Water for the Future—which is about preparing Australia for a future with less rainfall as a result of climate change. We are sitting here today and we are debating this issue that is affecting the Murray-Darling Basin and the lower lakes with those on the other side, who have been sceptics for nearly 12 years. What did they do? What did you contribute, Senator Bernardi, from your side? Absolutely nothing. That is one of the reasons we are in our current situation. You know that. You can sit there and you can say what you like, but you know that, and those opposite who were in government for 12 years—(*Time expired*)

Ian H. Douglas on water use in the Murray

Posted on the campaign blog , September 19th, 2008

Ian H. Douglas is the National Coordinator of *Fair Water Use Australia*.

The pressures of ongoing drought have clearly demonstrated that the administrative and governance mechanisms currently in place to oversee the Murray-Darling Basin are dysfunctional and frequently self-defeating. Concerns have even been raised regarding the validity of current arrangements under Section 10 of the Australian Constitution insofar as it applies to the "reasonable use" of water by the States. Frustrations are escalating throughout the region: from the headwaters of the Darling, where farmers accuse their neighbours of water-theft, to the Goulburn, where opponents of Premier Brumby's pipeline are threatening militant action, and in the Lower Murray, where, while large sections of the local community maintain

their strident insistence that fresh water must be injected into Lakes Alexandrina and Albert, other residents are equally-strongly advocating the opening of the barrages to allow ingress of sea-water. Calls to direct "more water here" and "less water there" are symptomatic of the underlying problem of endemic mismanagement and State driven over-allocation.

Water-wars, as feared by some overseas commentators, are surely not on the cards in this country; but the rumblings are unsettling and must be heeded. Proponents of the current water reform process largely adhere to the mantra that a consumption-based pricing policy, monitored by an "independent" body, is the mainstay of efficient water management; trusting the market to take care of the precious resource that is Murray-Darling water. However, by definition, an open (privatised) water market leads to decisions directly affecting its price and availability being made increasingly by those whose sole credential is financial clout. This is already the case in Australia. It is not entirely unlikely that, in the near future, some water-rich farming enterprises will list agriculture as a non-core activity, their primary income being derived from water-trading.

Regrettably, neither Mother Nature nor the majority of the farming community have the credit-rating required for membership of this club. Meanwhile overseas interests become increasingly invested in this country's water-based commodity market, the abuse and unfettered export of our dwindling water resources continues and the river-system continues to degrade. Fair Water Use is a longstanding advocate of the policy which determines the availability of Murray-Darling water for commercial purposes on the following basis: Available commercial water allocation = 3D Total inflows minus Environmental flow requirements minus Critical public needs of those communities directly dependent on river water. Commercial water would be allocated to businesses supplying produce for the domestic market in preference to those focused on export. This is an oversimplification: the balancing of this equation will be a major task, but one that Australia must undertake with the highest priority if the Murray-Darling is to avoid ecological collapse. National Water Plans and Senate Inquiries offer little hope of prescribing the empirical rethink that is manifestly required. The implications of "getting it wrong" are quite simply too momentous to leave the task in the hands of those who happen to be charged with governmental responsibility at this time. Australians should be grateful to those who drafted our Constitution, defining the processes to be invoked in response to national crises: a State of Emergency must be declared, to enable application of the necessary treatments to address the acute aspects of the malaise affecting the Murray-Darling Basin.

A Royal Commission of Inquiry should also be established, to carry out an all-encompassing and independent review of the past, present and future of this ecologically profound and vital natural resource.

Report criticises Aussie water buyback scheme

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The Australian government's approach to saving the Murray-Darling Basin has been questioned in a new independent report. Max Borchardt asks whether the whole thing was simply a piece of early electioneering.

In a report published in March, independent Australian think-tank the Productivity Commission has questioned the effectiveness of the federal government's buyback of water entitlements in the Murray-Darling Basin.

The document, entitled 'Market Mechanisms for Recovering Water in the Murray-Darling Basin', recommends that the government wait for the Murray-Darling Basin Plan to be finalised before proceeding further with its buyback policy.

Central to the government's strategy is a A\$3.1 billion (US\$2.9 billion) buyback programme of water entitlements from the over-allocated river basin. The government has also committed to invest A\$5.8 billion (US\$5.4 billion) in water-saving irrigation infrastructure, which water minister Penny Wong claims "will help in smoothing the transition for irrigation communities in anticipation of new, lower limits on water use under the Basin Plan".

While the PC's report acknowledges that "purchasing water products from willing sellers is generally the most effective and efficient means of acquiring water," it observes that "funding irrigation infrastructure upgrades is generally not a cost-effective way for governments to recover water for the environment".

Rather than having a programme focused on infrastructure upgrades, the commission argues that it would have been more effective – and efficient – to use the sustainable diversion limits (SDLs) from the Basin Plan to determine reallocation targets, while using the buyback scheme to ease the transition towards those targets.

Critics of the buyback – including the Productivity Commission – argue that the scheme artificially inflated market prices. According to Tom Rooney of WaterFind, "The water markets could have done the buybacks more efficiently. From a market perspective, the government is only forcing the price up."

Judith Sloan, who co-authored the PC report, suggested that the government had been premature in implementing the buyback scheme and the irrigation investment initiative. "The water reforms that will affect the Murray-Darling Basin stem from protracted and intense negotiations between the states. The plan can only work if it is carefully negotiated and strictly adhered to," she told GWI.

The Basin Plan – which will allocate water between consumptive and environmental uses in each catchment – is intended to be implemented from 2011 onwards, by which time all basin authorities will have determined their SDLs.

Wong has defended the government's position, arguing that "water purchase is the fastest way to improve the health of our rivers; that's why we continue to purchase water prior to the finalisation of the Basin Plan." The reality is that the government wants the Murray buyback to stand as some sort of performance record with which it can go to the polls later this year.

A hundred years of negotiations with no end in sight: Where is the Murray Darling Basin Initiative leading us?

John Scanlon*

There have been many worthwhile developments over the past century in how the shared water resources of the Murray Darling Basin are managed. This stands as testament to the ability of governments and people with a vested interest in the Murray Darling to peacefully negotiate in a pragmatic and cooperative manner, even though, with the benefit of hindsight, some things might have been done differently. Today regulators are confronting many new water resource management challenges, resulting in federal and State governments agreeing to a bold new water reform agenda through the National Water Initiative. Fortunately, there is also a significant knowledge base, which now provides the foresight to better understand the consequences of both current and future actions. The inescapable conclusion from the knowledge available is that changes are required to the Murray Darling Basin Agreement and how it is administered if the system is to be restored to good health and maintain productivity.

PRAGMATIC ECOSYSTEM APPROACH: MURRAY DARLING BASIN INITIATIVE

In the late 1890s, a fierce debate raged over how the proposed Australian Constitution should address the sharing of the waters of the River Murray between the colonies of New South Wales, Victoria and South Australia – a debate that threatened to derail the process of Federation itself.¹

The upstream colonies of New South Wales and Victoria had claimed the sovereign right to divert the whole of the water in their tributaries and the River Murray, with some slight concession to South Australia in the form of compensation water. Not surprisingly, during the pre-Federation convention debates, the downstream colony of South Australia argued that the Commonwealth be given the power to manage the waters of the River Murray; this was fiercely resisted by New South Wales and Victoria. A last minute compromise was negotiated between the colonies which cleared the path for the finalisation of the *Constitution* and the creation of Australia as a nation state.

The history of the creation of the Commonwealth and the constitutional sharing of

powers between the States and the Commonwealth has had a significant influence on the measures that have been taken over the past 100 years to manage the shared resources of the Murray Darling Basin. The past century has seen ongoing negotiation between all parties, which has resulted in a cooperative,

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¹ See generally, Report of the Commissioners, *Report of the Interstate Royal Commission on the River Murray* (Sands and McDougall Ltd, 1902); River Murray Commission, *A Short History of the River Murray Works* (Eaton, 1945); Crabb P, *Murray Darling Basin Resources* (MDBC, 1997); Fullerton T, *Watershed* (ABC Books, 2001); Connell D (Ed), *Unchartered Waters* (MDBC, 2002); Blomquist W, Haisman B, Dinar A, Bhat A, “Institutional and Policy Analysis of River Basin Management” (2005) World Bank Policy Research Working Paper 3527; Connell D, *Water and Politics in the Murray Darling Basin* (Federation Press, forthcoming publication) .

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pragmatic, and increasingly ecosystem-based approach² being adopted by governments and the community to managing the shared resources of the Basin.

The collective efforts of the Commonwealth, New South Wales, Victoria, South Australia, Queensland, and the Australian Capital Territory, together with the community, are known as the Murray Darling Basin Initiative (the Initiative). The Initiative is an interjurisdictional compact that provides an institutionalised means for dealing with matters of common interest.

CONFRONTING THE CHALLENGES OF A STRESSED SYSTEM: MAJOR ISSUES IN THE MURRAY DARLING BASIN

The Australian Aboriginals were the first to discover the bountiful resources of the Basin more than 40,000 years ago.³ The Basin and its floodplains shaped, and are still part of, the belief system and daily lives of the indigenous inhabitants of the area. The

Basin has also shaped important elements of modern Australian history, and as the nation's first great transport network, it fostered the development of towns and agricultural industry.⁴

The Basin spans five State and Territory jurisdictions, is over one million sq km in area (covering 14% of Australia), is home to two million people and is Australia's most productive region for irrigated agriculture (70% of the national total occurs within the Basin). The Basin produces at least 40% of Australia's agricultural output and the city of Adelaide, which lies outside the Basin and has a population of over one million, relies on the River Murray for up to 90% of its water supply in drought years.

Today the Basin enriches Australia by an estimated \$23 billion per year. This does not include the economic value of the City of Adelaide and the Iron Triangle in South Australia,⁵ which rely upon 1% of the Basin's water and have an economic value of over \$16 billion per year.⁶ Agricultural produce now exceeds \$10 billion (recent figures say \$13.6 billion), mining \$3 billion, tourism and leisure around \$6.5 billion, hydro-electricity generation \$0.3 billion and commercial fishing and other industries \$2.5 billion.⁷

But economic gain has taken its toll on the environment, resulting in significant ecosystem degradation throughout much of the Basin, which is threatening both ongoing productivity and environmental health. The key issue is that too much water is being extracted from the Basin. The impact is most severe in the lower third of the 2,530km-long River Murray. The challenges confronting the governments and the Basin community include irrigation-induced and dryland salinity, the overallocation of water, a decline in water quality and ecological health, and the underpricing and inefficient use of water, all of which are being addressed in one way or another.

Dealing with these challenges comes at a price. Who pays (and when and how) has involved a series of separate but related negotiations based upon constitutional roles and responsibilities, political and social imperatives, a shared knowledge base and intensive interaction with the Basin community. Within this context governments have negotiated extensive and detailed market-based measures to share the cost of ecosystem degradation in order to enhance the productivity of the Basin and restore its ecological health; these are seen as being inter-twined.

GOVERNANCE OF THE INITIATIVE – STILL EVOLVING TO MEET NEW CHALLENGES

In its broadest sense the Initiative involves two separate but related issues:

² While the Initiative institutionalised a basin management approach in 1987, the water sharing rules are still based on the *River Murray Waters Agreement 1914*.

³ See Crabb, n 1, p 258.

⁴ See *The Living Murray Discussion Paper* (MDBC, 2002) p 13. Full text available online at www.thelivingmurray.mdbc.gov.au/ (viewed 25 September 2006).

⁵ Both lie within the State of South Australia but outside the Basin. ⁶ See Blackmore D, “Protecting the Future”, in Connell D (ed), *Unchartered Waters* (MDBC, 2002) p 7. ⁷ See Crabb, n 1.

A hundred years of negotiations with no end in sight: Where is the Murray Darling Basin Initiative leading us?

χξξξιι. the sharing and distribution of the waters of the River Murray between New South Wales, Victoria and South Australia in accordance with the *Murray Darling Basin Agreement 1992* (the Agreement); and

χξξξιιιι. the development of policies and programs to promote the integrated catchment management of the Basin. (The Agreement requires the Murray Darling Basin Commission (the Commission) to examine the possible effects that the exercising of its powers or functions, and the implementation of works or measures is having on the water, land, and other environmental resources of the Basin. In doing so it may need to give directions that will improve water management and environmental objectives consistent with the overall framework established for the distribution of waters.⁸ (The Commission does not own any infrastructure or any land;⁹ they are owned by the contracting governments, normally through the constructing authorities.¹⁰ The constructing authorities build, own, and operate the joint works and measures that have either been included in, or subsequently agreed upon under the Agreement, for and on behalf of the Commission.¹¹ The Murray Darling Basin Ministerial Council (the Ministerial Council) or the Commission authorise the joint works and measures¹² but are not responsible for their implementation, which is carried out by a nominated contracting government.¹³ (The institutional arrangements for the Initiative, which are set out in the Agreement, are: (**The Ministerial Council** (The Ministerial Council was established in 1985 as the peak policy-making body under the Agreement and it is responsible for considering and determining major policy issues of common interest. (The Ministerial Council consists of up to three ministers from each State and the Commonwealth and one from the Australian Capital Territory (recently admitted as a full member). Members are drawn from ministers who have “prime responsibility for matters relating to water, land and environment”.¹⁴ The Commonwealth chairs the Ministerial Council, traditionally through the minister responsible for agriculture.¹⁵ (The Initiative requires high-level political engagement and the establishment of the Ministerial Council in 1985 represented a significant step forward in managing the Basin as it provided a regular forum for this to occur. The Ministerial Council has been described as “almost, but not quite, a natural resources parliament for the Basin”.¹⁶ (**The Commission** (The origins of the Commission can be traced back to 1917. Until 1985, the Commission was the peak body under the various agreements. Since then it has

answered to the Ministerial Council. The⁸ See cl 47 of the Agreement. ⁹ Nor does the Commission own the water resource or issue licences for its use; rather it has responsibility for controlling the bulk distribution of water in accordance with the Agreement. ¹⁰ See definition of Contracting Government and Constructing Authority in cl 2 of the Agreement. See also *Murray Darling Basin Commission Annual Report 2004-2005* (MDBC, 2005) p 34. ¹¹ The constructing authorities are responsible for the actual release of water from the various storages as directed by the Commission and each jurisdiction is ultimately responsible for the delivery of water to users. ¹² And the Commission subsequently declares them to be “effective” and monitors their ongoing operation. ¹³ This may become important in the context of the application of the *Environment Protection and Biodiversity Conservation (Act 1999* (Cth). ¹⁴ See cl 8(3) of the Agreement. ¹⁵ The current chair is the Federal Minister for Agriculture, Fisheries and Forestry. ¹⁶ Blackmore D, “Water, Salinity and the Politics of Mutual Obligation” (2001) Alfred Deakin Lecture. Full speech available at www.2b.abc.net.au/rn/deakin/disc/lforum/default.htm (viewed 26 September 2006).

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Commission is responsible for administering the Agreement and providing advice to the Ministerial Council.

The current Commission was established under the 1992 Agreement and it requires each government to appoint two commissioners who between them represent “water, land and environmental resource management”.¹⁷ Two deputy commissioners are also appointed by each government. An independent president, appointed by unanimous vote of the Ministerial Council, chairs the Commission.¹⁸

Traditionally, State commissioners have been the heads of relevant State government departments, and Commonwealth commissioners have been secretary or deputy secretary of the relevant Commonwealth departments.¹⁹ The first departure from this convention was through the author’s appointment as an independent²⁰ commissioner in January 2005.²¹

The Community Advisory Committee

The Ministerial Council established the Community Advisory Committee (the CAC) in 1986.²² It is responsible for providing advice directly to the Ministerial Council on matters referred to it by the Ministerial Council and the Commission, and for providing advice on the views of the Basin’s communities. Members also actively

participate in Commission working groups and committees.

The CAC comprises an independent chair and 28 members, 21 of whom are chosen on a catchment or regional basis. Of the remaining seven members, six are drawn from four peak non- government groups and there is an appointee to provide an individual Aboriginal perspective.

The CAC has at times been an active, independent, and powerful community voice providing an alternative source of advice to the Ministerial Council.²³

The Office of the Commission

The Office of the Commission (the Office) is not specifically recognised by the Agreement, but the Commission has the power to employ staff, which it does through its Canberra based secretariat.

This office of over 100 highly skilled staff has been a key driving force of the Initiative and has played a vital role in helping the Initiative get through some difficult challenges. The Office holds a wide array of delegated authority and provides support to the Ministerial Council, the Commission and the CAC.

The work of the Office is separated into River Murray Water, an internal ring fenced business unit to manage the sharing and distribution of water in accordance with the Agreement,²⁴ and Natural Resource Management. Since 2001, an environmental manager has been appointed to the Office to closely monitor the environmental aspects of water options for the River Murray and its tributaries, and to provide the Commission with advice on how arrangements could be better coordinated.

SOME REAL PROGRESS – THE EVOLUTION OF AGREED WORKS AND MEASURES

¹⁷ See cl 20(2) of the Agreement. ¹⁸ The current president is the Rt Hon Ian Sinclair AC.

¹⁹ Current Commonwealth commissioners are secretary-level appointments reflecting the Commonwealth Government's increasing interest in the Initiative.

²⁰ For instance, not employed as a public servant by any government.

²¹ See www.mdbc.gov.au/about/murraydarling_basin_commission/the_commissioners (viewed 26 September 2006). Prior to this appointment no non public servant had been appointed to the Commission, other than the heads of corporate bodies such as Goulburn-Murray Water and SA Water. This has been as a result of tradition not because it was a requirement of the Agreement.

²² The CAC is now recognised in the Agreement. See cl 14(1)(a).

²³ Given the changes to the operating environment of the Initiative, it is time to revisit the composition and role of the CAC, particularly given the emergence of

statutory catchment management authorities throughout the Basin. See “Walking the talk – some equally real challenges” below.

²⁴ Established by the Ministerial Council in response to the Council of Australian Governments’ Water Related Reforms (1994).

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A hundred years of negotiations with no end in sight: Where is the Murray Darling Basin Initiative leading us?

The finalisation of the *River Murray Waters Agreement 1914* was a major achievement coming at the tail end of decades of negotiations, as was the agreement to construct and jointly fund the built infrastructure which is now found throughout the River Murray system. This extensive system of storages, locks, weirs and barrages has secured the ability to provide water for irrigation, urban, industrial, recreational and navigational purposes under all conditions.²⁵

The most significant contemporary measures taken under the Agreement have been by the Ministerial Council, which was first established in 1985. Recent achievements of the Ministerial Council have both enhanced productivity and improved the health of the system. They include:

1988-2001 Salinity and Drainage Strategy (the Strategy)

From 1975-1985 salinity levels when measured at Morgan in South Australia exceeded the Australian water quality guideline of 800 EC units 42% of the time. As a result of the implementation of the Strategy, including groundwater management schemes costing over \$50 million, salinity levels were reduced to the point where in 1999 they exceeded 800 EC units 8% of the time, with average salinity being 520 EC units. In 2004-2005 average salinity at Morgan was 395 EC units²⁶ but this figure is generally attributed to drought conditions reducing the level of salt entering the River from the floodplains.²⁷

The Strategy provided a framework for joint action by the New South Wales, Victorian, South Australian and Commonwealth governments to deal with water logging and land salinisation in certain upstream irrigation districts of the River Murray and river salinity in the lower part of the River. Under the Strategy no State was, or is currently, allowed to undertake any action that would have an adverse impact on the salinity of the River, unless it had previously earned “salinity credits” by investing in salinity mitigation works. The Commission maintains an externally audited register of salinity debits and credits.²⁸

The basic concepts that underpinned the Strategy²⁹ were that:

. there was to be a salinity target of less than 800 EC units, 95% of the time³⁰ at

Morgan in South Australia, (a point near offtakes for water for urban use by Adelaide³¹ and Whyalla);

- . salt interception schemes would be constructed by the Commission (through constructing authorities), which were to reduce salinity at Morgan by 80 EC units;
 - . New South Wales and Victoria would each earn salinity credits equivalent to 15/80 of each EC credit from investing in salt interception³² which would be used to cover the salinity impacts of constructing drains to protect irrigation areas; and
- (²⁵ See Crabb, n 1, p 283, Pt VI of the *Construction Operation and Maintenance of Works* and Sch A of the Agreement. Water is also used to generate hydroelectricity at the Dartmouth Dam, Hume Dam and the Yarrawonga Weir. (²⁶ See *The Salinity Audit of the Murray Darling Basin* (MDBC, 1999) pp 11-13 and “Basin Salinity Management Strategy – 2004-2005 Annual Implementation Report”, (2006) MDBC. Both reports available online at www.mdbc.gov.au (26 September 2006). (²⁷ Among various other reasons (including the source of the water). See *Murray Darling Basin Commission Annual Report 2004-2005* (MDBC, 2005) p 70. (²⁸ See *Murray Darling Basin Commission Annual Report 1998-1999* (MDBC, 1999) p 31. □²⁹ Personal communication, Phil Cole, Department of Water, Land and Biodiversity Conservation (South Australia), 13 July (2006 with reference to draft “Register Adjustment” paper (July 2006) MDBC. (³⁰ Noting that modelling and simulation against a benchmark period is used to test the target rather than real time management. The target was based upon Australian guidelines for drinking water quality and on the risks to irrigated horticulture. Personal Communication, Phil Cole, n 29. (³¹ The capital city of South Australia with a population of over 1 million. Located outside of the Basin, the city obtains 40% of its water from the River Murray in average years and up to 90% in drought years. (³² South Australia waived its right to such credits. Personal communication, Phil Cole, n 29.

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As a result of a concern from irrigators in the mid section of the River – who were downstream from drains but upstream from salt interception schemes – credits and debits were based upon the cost of salinity to water users rather than the average EC at Morgan.³³ In this way the impact on mid river irrigators was considered as a part of the assessment of proposals.

The credit and debit system provided a consistent currency through which

investments in salt interception were assessed, trade-offs made and Basin-wide accountability achieved – a system that has carried over to the revised salinity strategy.

The Strategy was arguably the first time that the participating States, with the support of the Commonwealth,³⁴ agreed to tackle a major environmental problem through a common effort across jurisdictional borders, while sharing the costs of ecosystem degradation. The Strategy, which has since been revised and replaced by the Basin Salinity Management Strategy 2001-2015 (see below), paved the way for further interstate cooperation in promoting the sustainable use of land, water and environmental resources in the Basin.

1995: Cap on water diversions (the Cap)

This is the most significant decision ever made by the Ministerial Council, in which all jurisdictions voluntarily agreed to cap their own surface water diversions from the Basin.³⁵ An interim cap on diversions was introduced in 1995 and made permanent in 1997.

The Cap limits the amount of surface water that may be diverted from the Basin's rivers. In regulated rivers diversions are limited to what would have been diverted under 1993-1994 levels of development. In unregulated rivers the Cap may be expressed as an end-of-valley flow regime. The Cap has been applied in this way, with small variations, in New South Wales, Victoria and South Australia, which, when combined, account for 94% of the Basin's diverted water. Queensland and the Australian Capital Territory take a total of 6%; their Cap and the way it is determined has not yet been finalised.

The Ministerial Council implemented the Cap as the first step towards striking an appropriate balance between the economic and social benefits obtained from the development of the Basin's water resources, and the environmental uses of water in the Basin's rivers.³⁶ The Cap was not set to reflect the sustainable level of extraction. While it limits diversions, this limit is based upon prior use not sustainable yield.

The implementation of the Cap is subject to an annual audit by the Commission's Independent Audit Group³⁷ and where it is exceeded by an agreed percentage a Special Audit³⁸ is triggered. The audit report is provided to the Ministerial Council annually and if a State is found to have exceeded its Cap in any of its valleys, it is given the opportunity to explain why this has occurred and what action it plans to take to re-align water use to bring it within the Cap.

1997: Pilot program for permanent interstate trade

³³ Costs to urban and rural users were calculated, urban costs (1988 estimates) making up 97% of the total salinity costs. A recent review has adjusted the cost functions, with agricultural costs now 24% of the total salinity costs and 96% of the costs calculated to occur within South Australia. Personal communication, Phil Cole, n 29, with reference to "Register Adjustment" paper (MDBC, July 2006).

³⁴ The Commonwealth contributed 50% of the cost of salinity mitigation investigations and 25% of capital construction costs.

³⁵ Queensland has agreed to a cap on diversions but is awaiting the finalisation of its water resources plans before it agrees on the level of diversions.

³⁶ See Murray Darling Basin Ministerial Council, “The Living Murray Discussion Paper”, (MDBC, 2002) p 17.

³⁷ The Independent Audit Group (IAG) was established in 1996 to set-up the Cap and it now reviews its implementation. The IAG is independent in that its members are not part of any partner government.

³⁸ The IAG conducts a Special Audit of any Cap valley in which diversions have exceeded Cap targets by 20% of the average annual cumulative diversion.

□ after all of the States had used their credits, the salinity at Morgan would be reduced by 50 EC units.

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A hundred years of negotiations with no end in sight: Where is the Murray Darling Basin Initiative leading us?

The ability to trade water both within and between jurisdictions has allowed water to move to more valuable uses and has meant that the Cap on diversions has not been a cap on development.³⁹

The pilot program for permanent interstate trade built on longstanding permanent and temporary trade in water within jurisdictions. It allowed, and set the rules for, cross jurisdictional trade in high security water in a defined part of the Southern Basin in order to maximise its commercial use by allowing the market to determine where water would achieve the best return. Trade was subject to the assessment of environmental and social issues, and physical constraints. It did not affect agreed water sharing rules between jurisdictions. Adjustments to volumes were made to take trading into account, which may also affect future contributions to the recurrent costs of the overall Initiative as they are based upon the service received by each jurisdiction.

The pilot program was successful, with 22.9 GL of high security water permanently traded between New South Wales, Victoria and South Australia from 1998-2003. This volume is however a small proportion of the overall volume of temporary water, or annual water allocations, traded across the Basin which accounts for 800 to 900 GL of water per annum.⁴⁰ Temporary trade in water allocations across State borders was not subject to the pilot scheme.

At its 40th meeting in May 2006, the Ministerial Council agreed to adopt a new schedule on interstate water trade expanding the ability to permanently trade water within a wider area of the Southern Basin. The same rationale that underpinned the

pilot program underpins this expanded trading regime.

The new Schedule sets a framework for two different trading methods, “exchange rate trade” (as was adopted under the pilot trading regime) and “tagged trade”.⁴¹ The new Schedule, and the extensive protocols adopted (or to be adopted) under it, seeks to facilitate expanded trade through addressing a range of contentious issues including: the nature of entitlements to be traded; the setting of access and exit fees; the need for environmental assessment; addressing the impact of trade on the Cap; environmental flows; salinity; the parties’ financial contributions; and the capacity of the River to deliver water.⁴² The new Schedule, unlike the pilot program, applies to both temporary and permanent trade in water.

The pilot program and the expanded program are funded through each participating jurisdiction and through the Commission’s River Murray Water operational budget, which is jointly funded by the jurisdictions sharing the waters of the River Murray on the basis of the level of services received.⁴³

2001 Basin Salinity Management Strategy

This cooperative and jointly funded strategy⁴⁴ was developed to maintain river salinity at an agreed level, to control salt loads in all tributaries, and to control land degradation, while allowing productive

³⁹ See Land & Water Australia, *Property: Rights and Responsibilities – Current Australian Thinking*, (Land and Water Australia, 2002); Dyson M and Scanlon J, “Trading in Water Entitlements in the Murray Darling Basin – Realizing the Potential for Environmental Benefits”, IUCN ELP Newsletter, (Issue 1 2002), p 14 available at www.iucn.org/themes/law (viewed 26 September 2006); “Understanding Water Rights and Water Allocation”, 1st NARBO Thematic Workshop on Water Rights and Water Allocation, (Hanoi, 2005).

⁴⁰ Personal communication, Adam West, Department of Water, Land and Biodiversity Conservation (South Australia), 21 July 2006 with reference to “Evaluation of the Interstate Water Trade Program”, (2005) Tim Cummins and Associates. See also Australia, Draft Report of the Productivity Commission, “Rural Water Use and the Environment: the Role of Market Mechanisms” (June 2006), p 198.

⁴¹ As defined in Sch E, cl 3. Generally speaking, exchange rate trade cancels the entitlement in the State of origin and creates an equivalent entitlement in the State of destination, tagged trading leaves the entitlement in the State of origin but allows annual allocations to be used in the State of destination.

⁴² The trading method adopted for permanent trade, and the entitlements and allocations able to be traded and across which trading zones, will further develop over time.

⁴³ The River Murray operations and maintenance budget is currently shared in the following proportions: New South Wales 38%, Victoria 35% and South Australia

27%.

⁴⁴ Replacing the 1988 Salinity and Drainage Strategy.

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activity to expand where appropriate. The Strategy builds upon earlier agreements to collectively address irrigation induced salinity and now covers both irrigation induced and dryland salinity.

The Strategy was adopted by the Ministerial Council in 2001 to revise and replace the 1988 Salinity and Drainage Strategy. It is given effect through a schedule to the Agreement⁴⁵ that sets new agreed “baseline dates”, time-based salinity “baseline conditions”⁴⁶ and quantitative Basin-wide and river valley salinity targets. The Strategy retains the Basin-wide target of less than 800 EC units 95% of the time at Morgan and incorporates former salinity and drainage works. The main changes from the 1988 Strategy are the inclusion of salinity impacts and salinity targets in tributaries, including Queensland, and the creation of a new program for salt interception investment.

This new program of joint works and measures sets a salinity reduction target of 61 EC units by 2007⁴⁷ – to be measured at Morgan. It allocates salinity credits to each of the three investing States, New South Wales, Victoria and South Australia, equivalent to 10/61 of each salinity credit achieved through investing in salt interception – thereby allowing an equivalent salinity debit to enable drainage disposal or increasingly, the development of new irrigation areas. The remaining 31 EC units are allocated against the anticipated “delayed salinity impacts”⁴⁸ in tributaries required by 2007.

In addition to the Basin-wide target, the 2001 Strategy sets out a process for proposing, reviewing and adopting ‘end of valley targets’ for tributaries,⁴⁹ and a process for each State to develop agreed programs of actions in catchments, such as reforestation, aimed at reducing dryland salinity impacts in order to achieve the “end of valley targets”.⁵⁰ Programs are delivered through catchment management authorities linked to Commonwealth led funding programs such as the National Action Plan for Salinity and Water Quality and the Natural Heritage Trust.

The States of New South Wales, Victoria and South Australia are responsible for all actions that have a significant effect on salinity⁵¹ taken after their baseline date of 1 January 1988, and the State of Queensland is responsible for actions taken since 1 January 2001. Dealing with other salinity impacts is a shared responsibility. An annual audit of the performance of each State jurisdiction and of the Commission is carried out by the Independent Audit Group for Salinity which is appointed by the Commission.⁵²

The salinity register established under the 1988 Strategy has been revised to include Registers A and B which, generally speaking, distinguish between actions that have a significant effect on salinity and those actions that relate to “delayed salinity impacts”.⁵³ Each jurisdiction acquires salinity credits and debits based on the actions they take after their “baseline date” in both irrigation areas and tributaries that affect salinity levels. They are required to remain in credit overall. Credits are achieved by investing in measures to reduce salinity, with debits being assigned to actions that increase salinity and to predicted “delayed salinity impacts” as determined every seven years.

⁴⁵ Sch C – Basin Salinity Management.

⁴⁶ Defined in Sch C, cl 2 and elaborated in cl 5.

⁴⁷ It also estimated credits of 10 EC units to be achieved by 2007 through State based activities such as targeted reforestation and improved management of remnant vegetation. See Murray Darling Basin Commission, *Report of the Independent Audit Group 2004-2005* (MDBC, 2006) p 10.

⁴⁸ Defined in Sch C, cl 2.

⁴⁹ Targets are proposed by State governments, reviewed by the Commission and adopted by the Ministerial Council. For general information on the process see Murray Darling Basin Commission, “Basin Salinity Management Strategy Operational Protocols”, (Version 2.0 – March 2005).

⁵⁰ Defined in Sch C, cl 2 and elaborated in cl 8.

⁵¹ Defined in Sch C, cl 18 as a change in average daily salinity at Morgan which the Commission estimates will be at least 0.1 EC units within 100 years after the estimate is made.

⁵² See Sch C, cl 34.

⁵³ Register A transfers all debits and credits from the previous register and records debits and credits for actions taken under the 2001 Strategy as assessed against the revised baseline conditions, excluding actions taken to offset “delayed salinity impacts”. Register B records “delayed salinity impacts”, being salinity impacts resulting from actions taken before the baseline dates, and records credits for actions in catchments taken to meet end of valley targets after 1 January 2000.

Darling Basin Initiative leading us?

As with its predecessor, the overall result of this Strategy has allowed productive areas to expand while achieving significant reductions in river salinity.

2004: The Living Murray First Step

This is a cooperative and jointly funded initiative to return up to 500 GL of permanent “new water” to the River Murray as an environmental flow with an initial focus to improve the health of six agreed significant ecological assets, or icon sites, and to invest in a range of capital works and measures to make the best use of recovered water.

This initiative followed an extensive process of scientific analysis and community consultation.⁵⁴ It was concluded outside of the Agreement through the *Living Murray Intergovernmental Agreement*⁵⁵ and is known as the Living Murray First Step (the First Step), a separate intergovernmental agreement between the Commonwealth, New South Wales, Victorian, South Australian and Australian Capital Territory governments. Its implementation is overseen by the Ministerial Council and is externally audited by the Commission’s Independent Audit Group.⁵⁶

Each State jurisdiction is set investment and water recovery targets based upon its share of consumptive water use, the indicative targets for water recovery being 269 GL from New South Wales, 214 GL from Victoria, 35 GL from South Australia and 2 GL from the Australian Capital Territory. Each State is responsible for developing water recovery plans for icon sites within their jurisdictions, there are six icon sites overall. The Commission is responsible for the Basin-wide environmental watering plan.

The Commonwealth is the major financial contributor to the First Step, committing 40% of the \$500 million, followed by New South Wales and Victoria at 23% each, South Australia at 13% and the Australian Capital Territory at 1%. The total investment is set against annual investment targets spread over the five years of the First Step. The Commonwealth has since invested a further \$500 million in the First Step (and other related works and measures under the Initiative) to ensure there are no financial impediments to its success.

The works and measures, known as the Living Murray Environmental Works and Measures Program, involve an additional investment of \$150 million over eight years (to 2011). It is separately funded through the capital and operational budget of the Commission, with the budget now being supplemented by the additional Commonwealth funds referred to above. Improvements in the health of the River will result from the combined impact of the additional flows and the improved structural and operational management.

It is recognised that the additional flow is a first step towards recovering the health of the River Murray and that more water will be needed over time to achieve this objective. The First Step is, however, a major achievement in its own right, which now has a combined budget of over \$1 billion.

The five issues addressed above are major achievements of the Ministerial Council

that are aimed at collectively providing greater investment security, addressing environmental degradation and allowing the market to influence where water is to be used. They have been jointly funded by the jurisdictions participating in the particular program or measure, with the share of funding being separately negotiated for each of them. The Commonwealth has exercised national leadership by using its financial power to help support and drive these programs and measures, in particular the First Step where its investment now amounts to over \$700 million.

WALKING THE TALK – SOME EQUALLY REAL CHALLENGES

⁵⁴ For a general discussion of the process of determining the environmental flow regime for the River Murray see Scanlon J, “From Taking to Capping to Returning: the Story of Returning Environmental Flows to the in the Murray Darling Basin in Australia”, *Report of the Stockholm International Water Institute Seminar* (Stockholm, 2002) p 77.

⁵⁵ *Intergovernmental Agreement on Addressing Water Overallocation and Achieving Environmental Objectives in the Murray Darling Basin 2004* and the Business Plan developed under the *Intergovernmental Agreement* and adopted by the Ministerial Council.

⁵⁶ See cl 78 of the *Living Murray Intergovernmental Agreement* and cl 158 of the Business Plan.

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I'm not happy with the progress of the Murray-Darling ... I don't think there is a lot of State co-operation there. I tend to sympathise with those from South Australia who say that ... I think we've got to put a bit of a bomb under the process.

While there have been many significant achievements over the past century, which stand as testament to the strength of the Federation of Australia and our ability to peacefully negotiate the sharing of natural resources in a pragmatic and cooperative manner, the situation is changing significantly for many reasons.

All Australian governments have agreed to a bold new water reform agenda under the *National Water Initiative*.⁵⁸ The Initiative now operates in an environment where:

- ☐ new secure water rights have been created;
- ☐ newly created water markets are maturing;
- ☐ full cost-recovery for water services is being implemented;⁵⁹

- the environment is now seen as a legitimate user of water;
- skills-based catchment management authorities play an increasingly significant role in natural resources management;⁶⁰
- available water resources are becoming scarcer;
- significant new investment is being channelled through the Commission; and
- community values have changed and expectations increased. (Collectively, these changes require us to find new and more effective ways of managing our shared resources. As will be seen below, our biggest challenge revolves around the effective implementation of the policy agenda that has already been agreed to at the highest levels of government. (In response to these changes the Initiative is going through a period of review. Evolutionary change is required to the way in which the shared resources of the Basin are managed. Some of the more significant changes required are outlined below.

Avoiding cold feet and actually letting emerging water markets work

(The *Living Murray Intergovernmental Agreement* committed jurisdictions to invest \$500 million to recover up to 500 GL of “new water” for the environment over a period of five years. The target period of five years will expire in mid 2009.⁶¹ (In June 2005 the Productivity Commission⁶² advised that governments should start buying water from willing sellers in order to achieve the First Step water recovery target. This advice is consistent with the independent advice tendered to the 40th meeting of the Ministerial Council in May 2006 in reports from the Independent Audit Group, private consultants⁶³ and the Murray-Darling Basin Commission. (⁵⁷ Australian Prime Minister, Hon John Howard MP, as reported in Tingle L, “PM Backs Nuclear Solution”, *Australian Financial Review* (24 February 2006) p 78. (⁵⁸ *Intergovernmental Agreement on a National Water Initiative 2004*. (⁵⁹ Among other things, calling into question the manner in which the costs for water services are determined by monopoly service providers. See for example New South Wales Farmers Association, “Water Reforms off the Rails”, (Media Release, 12 July 2006). (⁶⁰ There are now 56 regions across Australia through which Natural Heritage Trust and National Action Plan for Salinity and Water Quality funds are invested. See www.nrm.gov.au/index.html (26 September 2006). (⁶¹ As at 15 March 2006, the date of Meeting 87 of the Commission, none of the \$500 million had been invested in water recovery and no water has been recovered. (⁶² Draft Report of the Productivity Commission, n 40. □⁶³ The Ministerial Council resolved to publicly release these reports, which will be available online at www.mdbc.gov.au.

A hundred years of negotiations with no end in sight: Where is the Murray Darling Basin Initiative leading us?

The Chair of the Ministerial Council and Commonwealth Minister for Agriculture, Peter McGauran, has been reported as responding to the Productivity Commission draft report (referred to above), saying that “it would hurt farmers”.⁶⁴

The Wentworth Group of Concerned Scientists responded to this suggestion in an opinion piece⁶⁵ as follows: “[W]e are being told that, if you buy water from irrigators, you’ll send the rural economy into recession. What nonsense.”

The water reforms that have been made through the 1994 Council of Australian Government (CoAG) water-related reforms and the *National Water Initiative* of 2004 have revolutionised water resources management in Australia. One of the outcomes of the reform process is that the situation has changed from being one where water entitlements were short term, often annual, licenses, which did not vest the holder with any property right or long term security of water access entitlement, to the creation permanent, tradable, property rights.

Generally speaking, licenses across Australia were tied to the land and legally (as opposed to politically) able to be revoked by administrative decision without the payment of compensation to the holder, subject to the rules of natural justice being adhered to.

As the *National Water Initiative* states, the objective of the parties in implementing the agreement is to: “provide greater certainty for investment and the environment, and underpin the capacity of Australia’s water management regimes to deal with change responsively and fairly”.

Part of the deal was to facilitate the establishment of water markets and provide opportunities for trading, subject to interim threshold limits set within the Agreement.⁶⁶ Over time, this would allow the market to determine the best use for water, including for the environment.⁶⁷

While the practice of paying a premium for appropriate infrastructure improvements to generate water savings should continue to be considered, this needs to occur in a sensible, balanced and economically sound manner. This manner is anticipated by the *National Water Initiative*⁶⁸ and The *Living Murray Intergovernmental Agreement* and Business Plan⁶⁹ which requires measures to be assessed for their cost effectiveness.⁷⁰

The Wentworth Group appears to take a rather extreme view in support of the market. The Productivity Commission’s draft report recognises that in some infrastructure projects source water may have other benefits⁷¹ and The *Living Murray Intergovernmental Agreement* and Business Plan supports a range of possible eligible measures for water recovery.⁷²

The views of the Wentworth Group do serve to remind us of the importance of

utilising the market mechanisms that have been established throughout the past decade of reforms. Their recent opinion piece concludes by saying that

⁶⁴ See Breusch J, “McGauran Hoses Down Water Alert”, *Australian Financial Review* (16 June 2006), p 3.

⁶⁵ See Cosier P “Let Market Set the Water Mark”, *Australian Financial Review* (20 June 2006) p 63.

⁶⁶ See cls 58-63 of the *National Water Initiative*.

⁶⁷ Under the *National Water Initiative* the threshold limits are to be reviewed in 2009 with a view to “full and open trade by 2014 at the latest”. See cl 60.

⁶⁸ See cl 79 of the *National Water Initiative*.⁶⁹ Adopted by the Ministerial Council at Meeting 36 of the Ministerial Council, November 2004.

⁷⁰ See for example cl 32 of the *Intergovernmental Agreement on Addressing Water Overallocation and Achieving Environmental Objectives in the Murray Darling Basin 2004*.

⁷¹ See Draft Report of the Productivity Commission, n 40, p 121.⁷² See cl 23 of the *Intergovernmental Agreement on Addressing Water Overallocation and Achieving Environmental Objectives*

in the Murray Darling Basin 2004.

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Commonwealth funds should not be used to subsidise uneconomic projects ... Instead of running grants schemes that aren’t delivering water, buy it from willing sellers and let them use the money to invest in water efficiency.</blockquote>

The market under The Living Murray First Step

Based upon current estimates from the Independent Audit Group, 275 GL of water will have been recovered within the five-year target period. Jurisdictions have focused their initial effort on maximising the amount of water that may be recovered through infrastructure improvement projects, in particular in the Australian Capital Territory, New South Wales and Victoria.⁷³

It is apparent that the target of 500 GL of “new water” will not be achieved through

infrastructure improvement projects alone and it will be necessary to purchase water from willing sellers if the target is to be achieved. The Commonwealth Parliamentary Secretary with responsibility for water, Malcolm Turnbull MP, emphasised that, “[w]e are committed to ensuring that we meet the target of restoring 500 GL to the river by 2009 ... the rate of progress ... is simply not good enough.”⁷⁴

The purchase of water on the market – and the use of other market-based measures – has already been approved by the Ministerial Council through the *Living Murray Intergovernmental Agreement*,⁷⁵ is entirely consistent with the *National Water Initiative* and is fully supported by the Productivity Commission.

In order to meet the 2009 deadline, the fastest market-based measure to recover water is to purchase existing water entitlements from willing sellers through a tender process or direct purchase. There are no technical or legal impediments preventing the purchase of water from willing sellers under the laws of any jurisdiction to achieve the target of 500 GL. The timing of when to enter the market is a political rather than a technical decision and it is political considerations that have delayed entry into the market.⁷⁶

⁷³ It is possible that Victoria will reach its jurisdictional indicative water recovery target through infrastructure improvements, but this is not the case in other jurisdictions.

⁷⁴ Commonwealth Parliamentary Secretary with responsibility for water. See Anderson L, “Grants Plan to Raise River Murray Flows”, *The Advertiser* (Adelaide, 28 April 2006)

⁷⁵ See cl 23 (ii) of the *Intergovernmental Agreement on Addressing Water Overallocation and Achieving Environmental Objectives in the Murray Darling Basin 2004*.

⁷⁶ The purchase of water through the *Living Murray Intergovernmental Agreement* in a particular jurisdiction requires the approval of that jurisdiction under cl 43 of the *Living Murray Intergovernmental Agreement* and cl 63 of the Business Plan.

Assessing market-based options under the *Living Murray Intergovernmental Agreement*

In December 2005 the Ministerial Council directed the Commission to report back to them in April 2006 on the use of market options, including purchasing entity options. A report prepared for the Commission⁷⁷ concludes that:

- ☐ The cost of purchasing water entitlements would be cost effective subject to the payment of any “exit fees” or price effects on water entitlement markets arising from the scale of purchases.
- ☐ The purchase of 200 GL would represent some 2.3% of the long term diversion Cap for the potential Living Murray water recovery districts in the Southern Basin.
- ☐ Entitlement purchases for use under The Living Murray First Step could be progressed within the *National Water Initiative* 4% annual threshold limit on the level of entitlements to be traded out of irrigation areas.
- ☐ To progress water recoveries through market measures, there are a number of existing bodies, public and private, which can or do purchase water entitlements.
- ☐ The development of robust water registers and compatible institutional and regulatory arrangements by 2007, as already agreed under the *National Water Initiative*, will be important in enabling the use of market measures within the timeframe for water recovery for the First Step.

Some positive first steps to enter the market were made at the 40th Ministerial Council meeting in May 2006 through the package of measures put forward by The Hon Karlene Maywald MP, Minister for the River Murray in South Australia. These included the purchase of water from willing sellers and an indication from New South Wales of its preparedness to enter the market to meet its indicative targets – with New South Wales having taken a lead in the “purchase of water from willing sellers in an open market place for environmental flows” through its “Riverbank Fund”.⁷⁸ Malcolm Turnbull MP also detailed the Commonwealth’s intention to purchase water from willing sellers by inviting tenders to sell water but on the condition that “the water offered for sale for the environment is water that can be delivered not later than 2009 and, most importantly, is water that has become available by reason of water efficiency measures”.⁷⁹

PUTTING INTO PLACE AN ENVIRONMENTAL FLOW REGIME THAT WILL ENSURE A HEALTHY SYSTEM WHILE MAINTAINING PRODUCTIVITY.

The Ministerial Council has received consistent advice from the world’s best river ecologists that additional flow in the River Murray is the key to restoring it to good health. The Scientific Reference Panel advised that at the whole-of-river scale, an

additional 1,500 GL per year option alone would deliver, at best, a moderate improvement in the health of the River – assuming it was combined with improved structural and operational management.⁸⁰ These conclusions were based on the conditions that prevailed in 2003, including any surplus or unregulated flows.

The Hon John Hill MP, then Minister for the River Murray in South Australia, in a paper delivered to the Ministerial Council in 2002 described the advice as follows:

⁷⁷ See BDA Group, “Issues and Options in Applying Market Based Measures in The Living Murray First Step” (March 2006). The Ministerial Council has agreed to publicly release this report.

⁷⁸ See Debus B, “\$105 million Fund to Rejuvenate Inland Rivers and Wetlands”, (Media Release, 30 November 2005). This funding package is not part of The Living Murray.

⁷⁹ The tender has since been released. For initial announcement see Turnbull M, “Malcolm Turnbull announces new measures to recover water for the River Murray” 28 April 2006 available at www.malcolmturnbull.com.au/news/article.aspx?ID=423 (viewed 26 September 2006).

⁸⁰ See Cooperative Research Centre for Freshwater Ecology, “Scientific Reference Panel, Ecological Assessment of Environmental Flow Reference Points for the River Murray System” (October 2003).

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The Murray-Darling Basin Ministerial Council received advice last April from the very best river ecology scientists in the world that, at the very least, an additional average annual flow in the Lower Murray of 1630 GL per annum would provide a moderate likelihood of a healthy working river system. I don’t believe that we can contemplate a figure lower than this if we are serious about the health of the River Murray.⁸¹

The First Step has since been agreed through the *Living Murray Intergovernmental Agreement*, which seeks to return up to 500 GL of “new water” to the River for environmental flows by 2009 through a collective investment of \$500 million; the Commonwealth has now invested significant additional funds to ensure there is no financial impediment to implementation.

The First Step is just that, an essential and significant first step along the path of returning the River Murray to good health. It is intertwined with the finalisation of the Living Murray Environmental Works and Measures Program⁸² to achieve the best possible environmental outcomes from the use of recovered water and existing

flows,⁸³ including the management of surplus or unregulated flows.

It is essential that 500 GL of “new water” is recovered by mid 2009, which environmental managers will be able to make best use of through the infrastructure being developed under the Living Murray Environmental Works and Measures Program. If the “new water” is recovered and managed in accordance with the First Step, some excellent environmental outcomes can be expected, especially if surplus or unregulated flows are effectively managed (this is addressed below).

Access to permanently recovered water will allow environmental managers to trade water on the temporary market at times when not all of the water is needed for environmental purposes and to build up resources to purchase temporary water in years where they wish to manage a larger flow. The second step of The Living Murray can open up opportunities to pursue other more novel market-based measures such as leasing water and purchasing options.⁸⁴ These different market-based options should not be pursued as a part of the First Step, which should continue to focus on permanently recovering 500 GL of “new water”.

The Commonwealth has exercised strong national leadership, including making a substantial unilateral investment in the First Step to get it back on track. It is open to the Commonwealth to further support the implementation of The Living Murray First Step by enhancing its use of existing laws and related conventions.

The Ramsar Convention and the Montreux Record

Wetlands on the List of Wetlands of International Importance (the List) under *The Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971*, commonly known as the Ramsar Convention,⁸⁵ are selected on the basis of their “international significance in terms of ecology, botany, zoology, limnology or hydrology”.⁸⁶ Once a wetland is included on the List by a contracting party, the State is obliged under the terms of the Convention to, among other matters,

⁸¹ Per the Hon John Hill, “Environmental Flows in the River Murray”, Ministerial Council Meeting 32 (Adelaide November 2002).

⁸² Based upon Murray Darling Basin Commission budget projections in March 2006, the Environmental Works and Measures Program target completion year of 2011 would have been extended by almost 10 years to 2020. The Commonwealth injection of \$500 million has put the programme back on track.

⁸³ Through cll 108-110 of the Business Plan.

⁸⁴ The various market based options are addressed in BDA Group, “Issues and Options in Applying Market Based Measures in The Living Murray First Step” (March 2006); Draft Report of the Productivity Commission, n 40; and the submission presented to the Productivity Commission by the Australian Conservation Foundation (July 2006) available at www.pc.gov.au/study/waterstudy/subs/sublist.html (viewed 26 September 2006).

⁸⁵ Placing a wetland on the List of Wetlands of International Importance under the

Ramsar Convention is a decision for each Contracting Party to the Convention. Australia was one of the first parties to join the Convention in 1975.

⁸⁶ Today there are 1,590 wetlands included on the List by the Conventions 150 contracting parties, 64 of which are included in Australia with 11 being in the Murray Darling Basin. See www.ramsar.org/ and <http://www.deh.gov.au/> (viewed 26 September 2006).

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“Formulate and implement their planning so as to promote the conservation of wetlands included in the List”.

The Ramsar Convention provides for the contracting parties to adopt recommendations to promote the functions of the Convention and for them to take such recommendations into account in managing wetlands.⁸⁷ The Conference of the Parties to the Ramsar Convention has created a public register to draw attention to sites where an adverse change in ecological character has occurred, is occurring or is likely to occur, to indicate that the site is in need of priority conservation attention. The register is known as the *Montreux Record*.⁸⁸

The Commonwealth is able to request that the Ramsar Secretariat include a Ramsar listed site in need of priority conservation attention on the *Montreux Record*. It is also open to anyone to raise the issue with the Ramsar Secretariat, which will in turn bring it to the attention of the Contracting Party. Including a site on the *Montreux Record* (and subsequently removing a site) is always a matter for the contracting party.⁸⁹

The Environment Protection and Biodiversity Conservation Act 1999 (Cth)

The *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (the EPBC Act) is essentially divided into two parts. The first part deals with the assessment and approval of actions that have, will have, or will be likely to have a significant impact on “matters of national environmental significance”. The second part deals with the listing and management processes associated with biodiversity conservation and heritage.⁹⁰

Under the EPBC Act no “action” can be undertaken that will have “a significant impact on the ecological character” of a Ramsar wetland⁹¹ without the prior approval of the Commonwealth Environment Minister.⁹² The Commonwealth and its agencies are also obliged to take all reasonable steps to “ensure it exercises its powers and

performs its functions in relation to a wetland in a way that is not inconsistent with ... the Ramsar Convention”.⁹³

The Coorong and Lower Lakes: The Ramsar Convention and the EPBC Act

⁸⁷ Conferences of the Parties have included recommendations on many issues, including “environmental flows”. ⁸⁸ Full text of resolution available at www.ramsar.org/key_montreux_record.htm (viewed 26 September 2006).

⁸⁹ There are at present 57 sites listed on the *Montreux Record* including sites in both the United Kingdom and the United States. No Australian Ramsar sites have been listed to date.

⁹⁰ The *Environmental Protection and Biodiversity Conservation Act 1999* (Cth) lists seven matters of national environmental significance, national heritage places having been added since the passage of the Act in 1999. The Act seeks to give effect to Australia’s international environmental obligations under a range of international conventions and to deal with the management of Commonwealth places, including heritage places. More information on the Act is available from its home page at www.deh.gov.au/epbc/index.html (viewed 26 September 2006).

⁹¹ See *Environmental Protection and Biodiversity Conservation Act 1999* (Cth), s 16.

⁹² Any action that reduces the surface flow of the River Murray or its tributaries, for example when a prescribed volume is exceeded, could be investigated as a new matter of national significance under the *Environmental Protection and Biodiversity Conservation Act 1999* (Cth), thereby requiring the consideration of the Commonwealth Environment Minister before the action proceeds. The precise description of such a trigger would require further thought and analysis. The Environmental Defender’s Office of New South Wales has considered a possible water extraction trigger. For information see www.edo.org.au/edonsw/site/default.php (viewed 26 September 2006). Section 100 of the *Constitution* provides that the Commonwealth shall not “by any law or regulation of trade or commerce, abridge the right of a State or the residents therein to the reasonable use of the waters of rivers for conservation or irrigation”, a provision that has never been fully tested. The Commonwealth has used many heads of power to legislate on environmental issues, including legislating for the domestic implementation of international treaties under its ‘external affairs’ power. Powers can also be referred to the Commonwealth by the States under Section 51(xxxvii) of the Australian Constitution.

⁹³ See *Environmental Protection and Biodiversity Conservation Act 1999* (Cth), s 334.

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In 1985 the Coorong and Lakes Alexandrina and Albert Wetland located at the mouth of the River Murray in South Australia (the Coorong and Lower Lakes) were recognised as a wetland of international importance and included on the List.

Colin Thiele, in his book *Storm Boy*, vividly describes the wild beauty of the Coorong: <blockquote>

His home was the long, long snout of sandhill and scrub that curves away south eastwards from the Murray mouth. A wild strip it is, windswept and tussocky, with the flat shallow water of the South Australian Coorong on one side and the endless slam of the Southern Ocean on the other ... They call it the Ninety Mile beach. From thousands of miles round the cold, wet underbelly of the world the waves come sweeping in towards the shore and pitch down in a terrible ruin of white water and spray. All day and all night they tumble and thunder.⁹⁴</blockquote>

In 1981 the River Murray mouth closed, “the *only occasion since non-indigenous settlement*” and in 2003-2004 “*only dredging enabled it to stay open*”.⁹⁵ Low flows and their effects at the end of the system are not a new phenomenon. What is new is the frequency at which low flow events occur, with the median flow now 27% of what it was under natural conditions and low flows occurring 66% of the time under regulated conditions compared with 7% of the time under natural conditions.⁹⁶

The Coorong and Lower Lakes is one of the six significant ecological assets under The Living Murray First Step. Recent reports have described a significant decline in the ecological health of the Coorong and Lower Lakes which is largely attributable to a lack of sufficient water flowing through the lower reaches of the River Murray.⁹⁷

The state of health of the mouth of the River Murray and the Coorong and Lower Lakes is the most obvious and emotionally evocative indication of the success or failure in managing the shared resources of the Basin.⁹⁸ Minister Maywald from South Australia has long advocated that: “*if we can get it right at the end of the system the rest will follow*”.⁹⁹

All of the reports currently available warrant consideration about the inclusion of the Coorong and Lower Lakes on the *Montreux Record* under the Ramsar Convention. Placing the Coorong and Lower Lakes on the *Montreux Record* will provide very public recognition of the plight of the area and reinforce the Commonwealth’s commitment to fulfilling its responsibilities under the Ramsar Convention, other relevant conventions,¹⁰⁰ and the EPBC Act.

SERIOUSLY ADDRESSING THE SIX RISKS TO SHARED WATER RESOURCES AND MANAGING UNREGULATED FLOWS FOR THE BENEFIT OF THE WHOLE BASIN

⁹⁴ Thiele C, *Storm Boy* (Rigby, Adelaide 1963) in Muirhead P, “The Changing face of

the River Murray” *ABC News Online* (undated) available at www.abc.net.au/news/features/ocean/adelaide.htm (viewed 26 September 2006).

⁹⁵ Murray Darling Basin Commission, “The Lower Lakes, Coorong and Murray Mouth Asset Environmental Management Plan for 2005/2006” (2005) p 39.

⁹⁶ See Walker D, “The Behaviour and Future of the River Murray Mouth” (Centre for Applied Modeling in Water Engineering, University of Adelaide, 2002) p 3, available online at www.thelivingmurray.mdbc.gov.au/reports/archived_reports (viewed 26 September 2006).

⁹⁷ See eg South Australia, Department for Environment and Heritage, “Ecological Character of the Coorong, Lakes Alexandrina and Albert Wetland of International Importance – working draft for public consultation”, (October 2005).

⁹⁸ Dredging has been underway at the Mouth of the River since October 2002, at a total cost of \$15 million to June 2005. See Murray Darling Basin Commission, “Murray Darling Basin Commission Annual Report 2004-2005”, (2005) p 32. The total cost of dredging operations from October 2002 to June 2006 is \$22.006 million. The cost of dredging has been shared equally by the Commonwealth, New South Wales, Victoria and South Australia. Personal communication, Geoff Haberfield Office of the Commission 26 July 2006.

⁹⁹ Per the Hon Karlene Maywald MP, Personal Communication (July 2006, emphasis added).

¹⁰⁰ Australia has also entered into separate treaties with China in 1988 (CAMBA) and Japan in 1981 (JAMBA) for the protection of migratory birds that migrate between their respective countries (which were negotiated under the framework of the *Convention on Migratory Species 1979*, to which Australia is a party). Migratory birds protected under these treaties migrate to the Coorong and Lower Lakes.

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The CSIRO has identified six risks to the shared resources of the Basin,¹⁰¹ appropriately described by some as “flow reducing activities” given that the impacts of most of them have been felt within the Basin for over a decade and have already eroded surface flows since the introduction of the Cap.¹⁰² The six risks could reduce surface water flows by anywhere between 2,500 GL and 5,500 GL over the next 20 years.¹⁰³ The six risks are:

- climate change;
- changes in stream flow due to afforestation (large scale planting);
- groundwater extraction;¹⁰⁴
- irrigation water management;
- farm dams; and
- bushfires. (Two of these risks are beyond the direct control of the parties: climate change and bushfires. A third risk, irrigation water management, refers to reduced return flows as a result of greater irrigation efficiencies. This should have been addressed at the time water entitlements were created by granting net rather than gross entitlements.¹⁰⁵ (There are three risks that are within the direct regulatory control of the parties yet there remains ongoing reluctance to promptly deal with them. They are afforestation, groundwater extraction and farm dams, the potential impact of which has been known for a decade or more. The estimates included in the CSIRO reports predict that these three risks could reduce surface water supply by 1,075 GL to 4,100 GL in the next 20 years – afforestation between 550 to 700 GL, farm dams between 250 to 3,000 GL and groundwater between 275 to 550 GL. (This volume needs to be considered in the context of the following figures taken from the CSIRO reports:
- average general run off within the Basin is 24,000 GL;
- total diversions in the Basin are about 11,000 GL per year, about 95% of which is used (for irrigation;
- discharge at the mouth of the River Murray is 3,000 GL;
- The Living Murray First Step seeks to recover 500 GL of “new water” for environmental flows. (The CSIRO reports reveal a serious challenge to river health and productivity. (Although the Murray Darling Basin Commission is spending \$1 billion to secure and manage an additional 500 GL of water for environmental flows, the parties to the Agreement are allowing the continuance of a situation where the three risks that are within the control of the jurisdictions are projected to decrease flows over the next 20 years by between two and eight times this volume. This is occurring in the context of the best science indicating that an additional 1,500 GL per year is required to deliver a moderate improvement in the health of the River. (¹⁰¹ See Murray Darling Basin Commission, “CSIRO, The Shared Water Resources of the Murray-Darling Basin”, (February 2006);and Murray Darling Basin Commisison, “CSIRO, Risks to the Shared Water Resources of the Murray Darling Basin”, (February 2006), both available online at www.mdbc.gov.au/news/MC_communique/mc40-reports (viewed June 2006). (¹⁰² Professor Mike Young, Personal Communication (17 July 2006). Professor Young also notes that the impacts of “flow *reducing activities*” need

to be assessed as from the date of the Cap. (¹⁰³ And in 50 years by between 4,500 gegalitres and 9,000 gegalitres. (¹⁰⁴ An impact that is not accounted for is the reduction in flows caused by salt interception schemes. Young, n 102. (¹⁰⁵ See Draft Report of the Productivity Commission, n 40, p 25; and for a detailed discussion see Young M and McColl J, “Robust Reform: Implementing Robust Institutional Arrangements to Achieve Efficient Water Use in Australia”, (CSIRO Land and Water, 2003).

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New compensable rights to water resources cannot continue to be created in light of this knowledge. Creating new rights now will severely impact upon the resource security of existing water users and impose an additional cost on taxpayers in the future as newly created water rights are purchased to provide for environmental flows.¹⁰⁶

The Productivity Commission has called for groundwater to be included within the Cap.¹⁰⁷ There is no need for a moratorium on taking water or prohibiting the establishment of new areas for afforestation. What is needed is for each proposal, with reasonable exceptions for some small farm dams, to be assessed in terms of its impact on the surface water flows of the River Murray. If it will have an impact, the proposal can still proceed but only if a surface water allocation is first obtained from within the Cap. It is open to jurisdictions to do this under their own laws without extending the Cap.

The response from some respected colleagues is that if they cannot access groundwater they will have nowhere to go for additional water. First, they do have somewhere to go, they can access water from within the Cap. Secondly, it is well established that there is a limit to the available resource, something South Australia recognised in 1969 when it put into place a self-imposed cap on diversions from the River.

This is a critical matter for the parties to address. The Ministerial Council and the Commission are responding to the six risks by undertaking further studies and analysis and at its 40th meeting in May 2006, the Ministerial Council agreed that the issue should become a standing item for all future meetings of the Council until strategies are in place to deal with the risks.¹⁰⁸ All of this is good, but in light of the available knowledge and the regime that has been put into place through the CoAG water related reforms and the *National Water Initiative*, decision-makers must act now to stop creating new water rights that could impact the surface water resources of the Basin unless sourced within the Cap. All of this can be achieved in the context of the States’ existing legislative regimes, with the possible exception of some farm dams which may require legislative (as opposed to regulatory) change.¹⁰⁹

Unregulated or surplus flows

The Independent Audit Group after reviewing the progress of the First Step has stated that the potential impact of altered unregulated or surplus flows (unregulated flows) management (including for local environmental benefits) “on the achievement of the overall objectives of The Living Murray First Step is the most significant risk it identified in its audit”.¹¹⁰

The Independent Audit Group also noted that the decisions made through The Living Murray First Step were premised upon a general baseline that assumed the 2003 distribution of unregulated flows in the River Murray System. This baseline information includes the reports provided by the Scientific Reference Panel on the volume of water required to be recovered in order to restore the River to good health.

Median unregulated flows in the Lower Murray below Wentworth in New South Wales under the conditions that prevailed in 2003 was 4,500 GL. Any significant reduction in this flow will change the general baseline assumed by the Scientific Reference Panel, which was the scientific basis upon which The Living Murray First Step was developed.

The volume of water recovered through the First Step is small compared to the volume of water available through unregulated flows and it does not match the amount of available water that can be

¹⁰⁶ The Murray Darling Basin Commission cannot assume continuing budget surpluses to spend on recovering water. ¹⁰⁷ See Draft Report of the Productivity Commission, n 40, p 11.

¹⁰⁸ See Ministerial Council Communique available online at www.mdbc.gov.au/news/MC_communique/mc40-reports (viewed July 2006).

¹⁰⁹ See Dyson M, “Risks to Shared Water Resources, Overview of Statutory Frameworks”, (Murray Darling Basin Commission, 2005). Also see n 92, above, regarding a possible role for the Commonwealth under the *Environmental Protection and Biodiversity Conservation Act 1999* (Cth).

¹¹⁰ See “Review of The Living Murray Implementation” presented to the Ministerial Council at Meeting 40 (May 2006) p 26.

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lost to the system through the six risks to shared water resources, estimated at being between 2,500 GL and 5,500 GL per year by 2023.

A failure to adequately address the issue of unregulated flows will seriously undermine the objectives of the First Step, especially when considered in conjunction with the six risks to shared resources. The Ministerial Council recognised the significance of unregulated flows by incorporating the following provisions into the Business Plan:

20. requiring the Commission to propose options for achieving improved environmental outcomes for the River Murray through the management of unregulated flows by June 2005 and to provide a report to the Ministerial Council in October 2005;¹¹¹
21. requiring the Living Murray Environmental Watering Plan to include rules for the management of unregulated and/or surplus flows;¹¹²
22. requiring a Basin-wide account to be developed to enable monitoring and reporting on the volume and spatial distribution of unregulated flows in the Murray Darling Basin over time; and¹¹³
23. requiring jurisdictions, while retaining responsibility for unregulated flows, to comply with cl 46 of the Agreement at any time when the assignment of water resources to tributary ecological assets is being considered in order to assess the relative merits of the various options.¹¹⁴ (Minister Maywald from South Australia took the matter further in a statement delivered to the 40th Ministerial Council in May 2006¹¹⁵ and secured resolutions that the Council: (<blockquote> (Recognises that the management of all environmental flows for the River Murray, including unregulated flows, requires a “One River” approach. In this respect, the appropriate vehicle is an agreed Living Murray Watering Plan, as amended from time to time ... (Directs the Murray-Darling Basin Commission to include in its report advice on how unregulated flows within the Murray-Darling Basin might be clearly defined, quantified, managed, monitored and reported on in The Living Murray Initiative.

The need to recover additional new water (

Jurisdictions are finding it challenging to recover the 500 GL of water as is required by the First Step. Additional volumes of “new water” will need to be recovered under subsequent steps of The Living Murray Initiative in order to restore the River to good health. How such water is recovered remains open.¹¹⁶ (The Commission, and each jurisdiction, wishes to minimise the amount of additional “new water” that is recovered from consumptive users, including irrigators, following the success of the First Step in restoring the River to good health. The only future option available to the Ministerial Council to achieve this objective through better flows – other than recovering additional “new water” from consumptive users – is to better manage unregulated flows.¹¹⁷ This needs to be done correctly. (The optimal management of unregulated flows to achieve specific environmental outcomes for the six significant ecological assets and other local assets may reduce the additional volume of “new

(¹¹¹ An options paper or report has not yet been prepared by the Commission. □ ¹¹² Rules have not yet been prepared. □ ¹¹³ A Basin-wide account has not yet been prepared. □ ¹¹⁴ No proposals have been submitted to the Commission under cl 46 of

the *Murray Darling Basin Agreement*.¹¹⁵ “Unregulated Flows – An Immediate Threat”, Murray-Darling Basin Ministerial Council Meeting No 40, May 2006.¹¹⁶ Which could be through the use of an array of other market based measures including leasing water and purchasing options.¹¹⁷ Addressing the six risks to shared water resources does not provide additional water.

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water” that will need to be recovered to restore the River to good health after the implementation of the First Step.

If unregulated flows are not collectively managed for the health of the overall river system, its health will continue to decline and pressure to recover significant additional volumes of “new water” from consumptive users will only increase.

CREATING MODERN AND EFFECTIVE GOVERNANCE AND COMPLIANCE ARRANGEMENTS.

The importance of “good governance” for sustainable development¹¹⁸ and of effective water governance has been universally recognised.¹¹⁹ Governance arrangements are not static; they evolve over time to adapt to changing circumstances.

The governance of the Commission has evolved over the years. In 1987 it was expanded from one commissioner per jurisdiction to two commissioners. Its role was also revised to include advising the new peak body under the Agreement, the Ministerial Council. The time has arrived for the further reform of the Commission¹²⁰ in order to:

24. provide the Ministerial Council with a more independent source of advice;
25. give it the capacity to more effectively implement decisions of the Ministerial Council;
26. more clearly define its roles and responsibilities; and
27. be more open, transparent and accountable to governments and the community for its actions. (In 2001 the South Australian Parliament released a report supported by all political parties that recognised the need to reform the Commission.¹²¹ More recently the Commonwealth, as a precondition to investing an additional \$500 million in The Living Murray First Step, has required the parties to the Agreement to “undertake a review of the governance and financing of the Murray Darling Basin Commission”.¹²² (Views expressed in evidence before a Select Committee of the South Australian Parliament, the downstream State, in 2000 on the need to reform

the Commission (see below) remain equally valid today.¹²³ (Heads of government agencies work very closely with Ministers, and while not political in a party political sense, are appropriately close to the politics of government. They are contracted to (¹¹⁸ The World Summit on Sustainable Development, (Johannesburg, South Africa, 26 August-4 September 2002), *Johannesburg Plan of Implementation* stated that “good governance within each country and at the international level is essential for sustainable development”. (¹¹⁹ And numerous initiatives have been launched to promote water governance such as the joint initiative of the United Nations Development Programme and Stockholm International Water Institute through the Water Governance Facility available at www.watergovernance.org/ (viewed 26 September 2006), and the Global Water Partnership available at www.gwpforum.org/servlet/PSP (viewed 26 September 2006). (¹²⁰ Having viewed the Initiative from many different perspectives, including as a Chief of Staff to a member of the Ministerial Council, Commissioner, Chief Executive of a government agency responsible for, inter alia, water resources management, and now independent Commissioner. (¹²¹ South Australia, House of Assembly Select Committee on the River Murray (3 May 2000 and 13 March 2001), available online at www.parliament.sa.gov.au/committees/committee.asp?doCmd=show&intID=11 (viewed 26 September 2006). Committee Chair, the Hon David Wotton, is now the Chair of the South Australian Murray Darling Basin Natural Resources Management Board and Committee Member, the Hon Karlene Maywald MP, is now South Australia’s Minister for the River Murray. (¹²² See Agenda Item 5A Ministerial Council Meeting 40 – May 2006. See also Turnbull M, “Commonwealth Injects \$500 Million, New Urgency Into Water Recovery For Murray Darling Basin”, (Media Release, 19 May 2006), available online at www.malcolmturnbull.com.au/news/default.asp?action=article&ID=441 (viewed 26 September 2006). (¹²³ See transcript of Scanlon J in, South Australia, House of Assembly Select Committee on the River Murray, *Hansard* (3 May 2000 and 13 March 2001), available at <http://www.parliament.sa.gov.au/committees/committee.asp?doCmd=show&intID=11> (viewed June 2006). See also Scanlon, J “The Need to Reform the Murray Darling Basin Commission” (2001) 18 EPLJ 230.

carry out the government's policy agenda,¹²⁴ yet the expectations of the government of the day and obligations to the Basin under the Agreement may not always coincide. This stands in contrast to the intended role of commissioners under the Agreement which is to act in the best interests of the Basin without regard to political borders; this obligation is not expressly stated.¹²⁵

The Commission has been inclined to shadow the political debate, to reflect jurisdictional positions and to exercise excessive caution in the nature of the advice it provides to the Ministerial Council. Advice from a body of this nature should be frank and fearless and the politics of the Basin should be left for the elected members to debate, namely the Ministers who comprise the Ministerial Council, not the Commission.¹²⁶

Since the author returned to the Commission in 2006, it has become equally apparent that a level of independence is also required in the implementation of measures under the Agreement. Under current arrangements the heads of State agencies responsible for the implementation of many measures, and related federally funded programmes sit on the Commission, which is also often responsible for overseeing, reviewing or advising the Ministerial Council on the implementation of the very same initiatives.

It is time to have a more independent Commission, one that is skills-based¹²⁷ with members obliged to act in the best interests of the Commission and able to dedicate sufficient time to the task at hand. However, to be effective, the Commission also requires good links to State and Commonwealth agencies that possess significant knowledge and expertise and remain critical to the success of the Initiative.

The challenge in reforming the Commission is to achieve an appropriate level of independence while retaining strong links to these agencies. This can be achieved through the appointment of a commissioner by each party from within government as an ex officio non-voting member, which is further discussed below, the continued involvement of agency staff on committees of the Commission and through the ongoing role of the network of departmental liaison officers.

A selection process for independent members of the Commission that closely followed the process used at Commonwealth level for appointments to research and development cooperation boards was recommended in evidence before the Select Committee.¹²⁸ This process should be adapted and applied to the appointment of a skills-based Commission. It would involve the chair of the Ministerial Council appointing a selection panel following consultation with all members of the Ministerial Council, an open process of inviting expressions of interest in being appointed to the Commission, and the Panel making nominations to the Chair based upon established selection criteria. The Minister's discretion to reject nominations would be constrained, but if exercised would require the process to be repeated. The evidence presented to the Select Committee included the following:

¹²⁴ Department heads today are typically placed on three to five year contracts and subject to one to three months notice of removal without cause, and contracts of employment require the promotion of the government's policy agenda. By way of example, the author's own contract with the then Premier of South Australia as head of department said that he was to "*faithfully serve the SA Government and at all times use his best endeavours to promote the interests of the SA Government*". There was

nothing unusual or inappropriate about this, and the government of the day quite reasonably expects its Chief Executives to give effect to its policies.

¹²⁵ This role would be clearer if the Commission was treated as body corporate. For a discussion of this issue see Clark SD, “Divided Power, Co-operative Solutions”, in Connell D (ed), *Unchartered Waters*, (MDBC 2002) p 15.

¹²⁶ The Commission has achieved a lot over the years, and there have been many excellent and committed Commissioners. This is no criticism of individual Commissioners or their personal commitment to the Basin.

¹²⁷ Membership should be drawn from appropriate disciplines including finance, business management, science and technology, law, engineering, conservation and management of natural resources, and government.

¹²⁸ See transcript of Scanlon J, n 123.

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So your Murray Darling Basin Commission would be comprised of a president, six skills based individuals, the chair of the Community Advisory Committee (CAC), the chief executive of the office, and a government officer from each of the participating States. However, the only voting members of the commission would be the president and the six skills based officers appointed following that selection process. That would ensure that the ministerial council does have access to a skills based commission, but it would also ensure that the commission retains its linkages through to government agencies of all participating jurisdictions and also retains linkages with the CAC and the office.

The Select Committee’s recommendations closely followed this evidence, with the Committee’s findings including Recommendation 4, which states that:¹²⁹

The Murray-Darling Basin Ministerial Council give consideration to the composition of the Murray-Darling Basin Commission with the aim of changing it to an independent, expert (skills-based) Commission. The Commission must contain skills in ecology and natural resource management, irrigation technology, engineering, finance and business administration, resource economics, law, regional development and public administration.

- The structure of the new Commission be:
 - an independent President
 - six Commissioners who between them have extensive experience and/or

qualifications in the disciplines of ecology and natural resource management, irrigation technology, engineering, finance and business administration, resource economics, law and regional development

– a senior bureaucrat from each of the Murray-Darling Basin Initiative partners – Chair, Community Advisory Committee (non-voting member) – Chief Executive Officer, Office of the Murray-Darling Basin Commission (non-voting member).

- The model used to appoint Directors to Research and Development Corporations under the Commonwealth's Primary Industries and Energy Research and Development Act, 1989 be applied to the appointment of Commissioners, with responsibility for the selection process delegated to the Chair, Murray-Darling Basin Ministerial Council.

- The appointment process, where possible, seek to obtain a reasonable geographic spread of Commissioners from across the various Basin states.</blockquote>

In addition to this recommendation¹³⁰ it needs to be clearly set out in the Agreement and implementing legislation that commissioners are to act in the best interests of the Commission. This could be achieved by establishing the Commission as a statutory board to direct, govern, guide, monitor, oversee, and supervise the work of the Office. The role and function of the Office would also need to be recognised in the Agreement, along with requirements for the more open and transparent transaction of the Commission's business.

Moving **ahead with Independent Commissioners** □

Learned writers such as Professors Clark and Cullen have expressed a variety of views on reform of the Ministerial Council and the Commission.

Of particular note are the opinions expressed by Professor Sandford D Clark¹³¹ in an article written in 2002.¹³² Professor Clark expressed the view that:

¹²⁹ South Australia, Select Committee on the Murray River, *Final Report – 2001* (South Australia, 2001) p 6, available at: www.parliament.sa.gov.au/committees/documents/MurrayRiver_49_4/public_documents/Reports/SCRiverMurayFinal.pdf (viewed 26 September 2006).

¹³⁰ The author suggests government members are appointed as ex officio, non-voting members. ¹³¹ A long time legal adviser to the Commission.

¹³² An early contribution being his submission to the River Murray Select Committee and Working Party in March 1975 titled "Possible Changes in River Murray Administration" available from the Office of the Commission.

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The present principle of unanimity should ... be abolished in favour of decisions by a majority of ministers or commissioners voting on any issue. Further, legislation in each jurisdiction should require that any person appointed as a Commissioner or Deputy Commissioner must have such skills, experience and background relevant to the business of the Commission as will allow that person to understand and participate effectively in making decisions upon issues determined by the Commission.¹³³

The notion of appointing commissioners on the basis of their skills was also supported by Professor Peter Cullen through a recommendation made to the Government of South Australia as an Adelaide Thinker in Residence in 2004.¹³⁴ Professor Cullen recommended that:

Recommendation 7

South Australia should appoint one of its Murray Darling Basin Commissioners to speak from a whole of government perspective. The second Commissioner position should be used as an opportunity to appoint an expert in a relevant area.

The South Australian Government took the lead under the Agreement when it implemented this recommendation in January 2006 with the appointment of the author as Australia's first independent commissioner, with terms of reference that included providing:

Strategic advice ... on improving communication and collaboration between government agencies, academia and industry ... maximising Commonwealth involvement and commitment to the MDBC¹³⁵ and the development of appropriate policy; an independent assessment of issues raised at the MDBC; leadership and knowledge at the MDBC.

Minister Maywald also encouraged other governments to follow South Australia's lead. To date no other independent commissioners have been appointed.

Utilising majority voting – a first for the Commission

While most of the decisions required to administer the Agreement need the unanimous vote of all commissioners present and constituting a quorum,¹³⁶ the Commission can provide advice to the Ministerial Council by majority vote.¹³⁷ In the case of a majority vote, the President and each commissioner may tender separate advice to the Ministerial Council.

This option was exercised for the first time under the Agreement in March 2006 – with advice on The Living Murray First Step provided to the Ministerial Council by both a majority of commissioners and the present author's minority report. At the heart of the issue was the nature of the advice to be provided to the Ministerial Council on the progress being made in the implementation of the First Step.

The minority report provided unequivocal advice to the Ministerial Council that the First Step was not going to be implemented within the agreed timeframes for a variety

of reasons, including a significant underinvestment by participating jurisdictions¹³⁸ and reluctance to purchase water from willing sellers.¹³⁹

Majority Voting – removing the veto from the Ministerial Council

¹³³ Clark SD, “Divided Power, Co-operative Solutions?”, in Connell D (ed), *Unchartered Waters*, (MDBC 2002). ¹³⁴ See report of Cullen P, *Water Challenges for South Australia in the 21st Century*, (South Australia, 2004).¹³⁵ Murray Darling Basin Commission.¹³⁶ See cl 32 of the *Murray Darling Basin Agreement*.

¹³⁷ See cl 17 of the *Murray Darling Basin Agreement*.¹³⁸ The Commonwealth Government came to the financial rescue of The Living Murray by unilaterally agreeing to invest a

further \$500 million thereby ensuring there was no financial impediment to implementation.¹³⁹ See Agenda Item 9.3, Ministerial Council Meeting 40 – May 2006 referenced by Minister Maywald in Agenda Item 9.4.

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The Ministerial Council takes all of its decisions by the unanimous vote of all Ministers present and constituting a quorum.¹⁴⁰ This has, on occasion, led to a situation where one jurisdiction has refused to yield and effectively vetoed progress on reform.¹⁴¹ There are many examples, the European Council of Ministers is one, of political bodies adopting voting requiring a qualified majority, or super majority, rather than a unanimous decision or simple majority vote.

A move to majority voting by the Ministerial Council should be promoted but the majority should require five of the six participating governments thereby ensuring strong support for a measure but preventing a veto. The extension of qualified majority voting to all decisions of the Commission should be incorporated into the Agreement to facilitate its administration.

FULLY IMPLEMENTING MAJOR INITIATIVES OF THE MINISTERIAL COUNCIL, IN PARTICULAR THE CAP ON WATER DIVERSIONS, BASIN SALINITY MANAGEMENT STRATEGY, LIVING MURRAY FIRST STEP AND INTERSTATE TRADE

These initiatives represent major achievements of the Ministerial Council, but a closer analysis of the independent audits and the facts reveals that implementation is still falling short of expected targets. For example, the Cap targets have still not been established in all jurisdictions ten years after it was agreed to cap diversions,¹⁴² the Registers required under the Basin Salinity Management Strategy have not been

created in accordance with the Operational Protocols and cannot be used with confidence,¹⁴³ water has not yet been recovered under The Living Murray First Step, decisions on unregulated flows have not yet moved forward,¹⁴⁴ and the implementation of the expansion of interstate trade is not yet completed.

It is not the purpose of this article to run through the implementation challenges in detail, rather it is to highlight the importance of ensuring that focus is maintained on implementation and not being unduly distracted by the next emerging policy initiative.

Effective “on ground” implementation is the true test of policy success. Implementation does not happen by itself. It requires people with the necessary skills to deliver “on ground” results and an ongoing process of building capacity.

Implementation of the Murray Darling Basin Initiative is essentially a matter for State agencies and the Commission, with success inextricably linked to having the capacity to deliver on Australia’s broad and ambitious reform agenda at a time when State agency, and until recently Commission, budgets have been shrinking. Many of the measures and programs developed through the Initiative are highly complex and demand significant professional expertise and experience. Successful implementation will require sustained levels of investment at agency and Commission levels.

ACHIEVING COMPLIANCE WITH THE NATIONAL WATER INITIATIVE.

For the first time, all Australian governments have committed to a national blueprint for water reform ... The National Water Initiative is the agreed blueprint for the reform of water management throughout Australia.¹⁴⁵

The *National Water Initiative* has set an ambitious water reform agenda that makes good use of market-based measures to address our water resources challenges. As with other bold policy initiatives implementation is the key, and in this case implementation essentially rests with the States.

¹⁴⁰ See cl 12(3) of the *Murray Darling Basin Agreement*. ¹⁴¹ See generally Clark, n 133.

¹⁴² See Murray Darling Basin Commission, *Review of Cap Implementation 2004/5, Report of the Independent Audit Group* (MDBC, 2006).

¹⁴³ See Murray Darling Basin Commission, *Report of the Independent Audit Group for Salinity 2004-2005* (MDBC, 2006) p 6. ¹⁴⁴ See Agenda Items 9.3 and 9.4 Ministerial Council Meeting 40 – May 2006.

¹⁴⁵ Transcript of the Prime Minister, the Hon John Howard MP, “Address to the Committee for Economic Development of Australia” and “Securing Australia’s Water Future July 2006 Update”, (CEDA Conference, Sydney, 17 July 2006).

A hundred years of negotiations with no end in sight: Where is the Murray Darling Basin Initiative leading us?

Unlike the 1994 CoAG Water Related Reforms,¹⁴⁶ compliance with the *National Water Initiative* is not tied to competition payments, nor does it include any legislative compliance options.

If the *National Water Initiative* is to be implemented within agreed timeframes then, at a minimum, compliance will need to be directly linked to funding. This will be important for the recovery of the health and ongoing productivity of the River Murray.

The *National Water Initiative* requires the Murray Darling Basin parties to review the Agreement to ensure it is consistent with the *Initiative*.¹⁴⁷ Steps have been taken to carry out this review, which includes determining the Agreement's consistency with the requirements of the *Initiative* in relation to integrated water resources management, adaptive management and managing the shared risks to water resources referred to above. In this context the Initiative's water sharing rules¹⁴⁸ and the way in which they are administered is of particular significance. Unlike many other aspects of the Agreement, the water sharing rules have changed little since the time of the *River Murray Waters Agreement of 1914*. Today they are inconsistent with both the *National Water Initiative* and the *Living Murray Intergovernmental Agreement*, in particular with regard to recognising the "environmental and other public benefit outcomes sought for water systems".¹⁴⁹

The Commonwealth, as a pre condition to investing an additional \$500 million in The Living Murray Initiative, has required a wide-ranging review of the Agreement.¹⁵⁰ This review will address the governance and financing of the Commission, Basin water sharing and natural resource management arrangements generally, including the case for creating a new legal entity to hold and operate water entitlements acquired by the Commission.

The requirement of reviews gives parties the opportunity to address each of the challenges referred to above. It also provides the opportunity for the Commonwealth to consider whether to start tying funding to the *National Water Initiative* and its ongoing investment in the Initiative to achieving necessary reform. Whether the parties seize the opportunity presented by these reviews remains to be seen.

A NEVER ENDING STORY: CREATING THE FRAMEWORK FOR ONGOING NEGOTIATIONS

The negotiation process is a little over a century old and will continue in perpetuity as governments and the community adapt to changing economic, social and environmental conditions by utilising innovative tools to enhance productivity and to improve the ecological health of the Basin.

High tension over sharing the resources of the River Murray, and later the Basin, can

be traced back to the 1880s. This was the time when irrigation schemes first started to emerge in one of the upstream colonies causing alarm to the downstream colony that had invested heavily in navigation to promote trade and communications.

Many royal commissions and government and community-based conferences have been held both prior to and since the creation of the Commonwealth of Australia in 1901 and strongly-held negotiating positions have been defended with great vigour. However, a sense of shared ownership

¹⁴⁶ The National Competition Policy was an agreement between the Commonwealth and State and Territory governments to progress a nationally coordinated approach to microeconomic reform in return for a series of national competition tranche payments, based upon the effective implementation of the reform agenda. The reform agenda included so called “related” reforms, including the strategic framework for the reform of the Australian water industry, adopted by all Australian governments in 1994. Through including the “related reforms”, the National Competition Policy entrenched the following issues on the national agenda: identifying and managing assets; efficient pricing; trade in water rights; environment flows; and community involvement. More specifically, this strategic framework included provisions relating to urban and rural pricing, separating water allocations or entitlements from land title, institutional reform, water trading, third party access to infrastructure, environment flows and community consultation.

¹⁴⁷ See cl 14 of the *National Water Initiative*. ¹⁴⁸ See Pt X – Distribution of Waters of the Agreement. ¹⁴⁹ See eg cll 78-79 of the *National Water Initiative*. ¹⁵⁰ See Agenda Item 5a: Australian Government Funding Package paragraph 5(h), Ministerial Council Meeting 40 – May 2006.

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and responsibility has prevailed as the parties have strived to work with the Basin community to find pragmatic and cooperative solutions to the economic, social, and increasingly environmental challenges that confront the Basin, its governments and its community.

The legislative framework was created in 1915 and has been changing ever since. In 1987 it was adapted to cover the entire Murray Darling Basin and to incorporate all jurisdictions and the community into the process. The Murray Darling Basin Initiative’s solid legislative framework and its willingness to review and adapt this framework over time has provided a sound and robust negotiating environment within which to operate and confront new challenges as they emerge.

Over the past century the governments and communities of the Murray Darling Basin have done some truly great things within the Basin along with some things that, with

hindsight, might have been done differently. The parties now have a significant knowledge base which allows a better understanding of the consequences of both current and future actions.

The latest version of the Agreement has been in place since 1992 and was revised in 1996. As has been described above, the Commission and Ministerial Council have now entered an era where they are confronting new and significant challenges. The inescapable conclusion from all the knowledge available is that changes are required to the Agreement and the way it is administered if the parties are going to successfully implement the measures deemed necessary by all governments to restore the system to good health and to maintain productivity.

If the necessary changes are made, society will be heading in the right direction to pass on a healthy and productive Basin to the next generation of Australians. If not, a steady decline in the health and productivity of the system is assured. Responsibility for the direction taken is shared by all of us.

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Policy without action: groundwater reform in the Murray-Darling Basin.

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Abstract:

The cumulative impacts of incremental development present governments all over the world with major difficulties. Well-intended strategic approaches often fail, in whole or in part. In Australia, a joint Federal/State agreement in 1992 initiated reforms of State environmental legislation and policy, which led to the *Council of Australian Governments Water Reform Framework 1994* – an agreement to introduce comprehensive water reforms targeted at both financial and environmental issues. The Murray-Darling Basin, Australia's largest catchment, overlaps four States plus the small Australian Capital Territory. In 1995 pressing problems of land and water degradation, and the decline of widespread and important environmental values in the Basin, led only to a cap on river water extraction, even though the importance of the surface water / groundwater connection was evident. Moreover, State Governments have been extremely slow to implement core groundwater reforms added to the *Framework* in 1996 – with some important elements not yet implemented after 12 years. This delay, combined with the failure of States to implement commitments to the precautionary management of natural resources, has magnified the environmental and economic crisis facing the Basin. This crisis appears likely to worsen if current climate change predictions eventuate. Recent initiatives by the Australian Government acknowledge past procrastination, and provide a new administrative framework – an approach which will only work if

backed by political intelligence and will-power, and good-will and cooperation amongst State premiers. These factors have been absent in the past. The paper concludes with key recommendations aimed at comprehensive and integrated management of the cumulative impacts of incremental water-related development on a catchment-by-catchment basis.

Keywords: groundwater dependent ecosystems, groundwater overdraft, water reform, conjunctive management, cumulative impacts, stygofauna, hyporheic zone, phreatophytes, water policy, governance, aquifers, freshwater, precautionary principle.

Introduction:

Most Australian rivers (particularly in the temperate south of the continent) feed on groundwater most of the time. Rivers and groundwaters are connected. When we extract water from a river's groundwater supply, we diminish that river's flow – even though the effect may not be noticed for some time. Generally speaking, freshwater biologists and river managers underplay the huge significance of groundwater in maintaining the health of rivers, streams, wetlands and associated vegetation communities, with the result that groundwater policy and management does not get the scrutiny it deserves – and needs. The needs of subterranean and hyporheic ecosystems are often entirely neglected.

Both surface waters and groundwaters within the Murray-Darling Basin have been grossly over-allocated for human use. Until very recently, little has been done to remedy this situation. Even now reform is happening far too slowly, and aquatic environments, and people, continue to suffer. Following a history of good policy poorly implemented, today catchment management within the Basin remains characterised by both lack of vision and lack of caution. For the Basin's inhabitants, deeper crises lie ahead.

This paper focuses on the disjunct between the recognition of the need for integrated management of the cumulative impacts of incremental catchment development on the one hand, and extended delays in implementing management reforms on the other. Important principles for the management of cumulative impacts within the Basin have typically been recognised many years before programs based on these principles are implemented – if indeed they are ever implemented.

This paper illustrates the problem by examining the integrated management of groundwater and surface water – or more correctly the lack of integrated management. *Important groundwater management policy reforms, agreed through the Council of Australian Governments (CoAG) water reform framework in 1996, have not been implemented in any comprehensive way – after more than a decade.* The paper concludes with three key recommendations.

What is groundwater?

Generally speaking, the Earth's water is always in movement. The *hydrological cycle*, or water cycle, is the name used to describe a never-ending cycle as

moisture evaporates from both land and sea, precipitates back, and is evaporated again (Figure 1.)

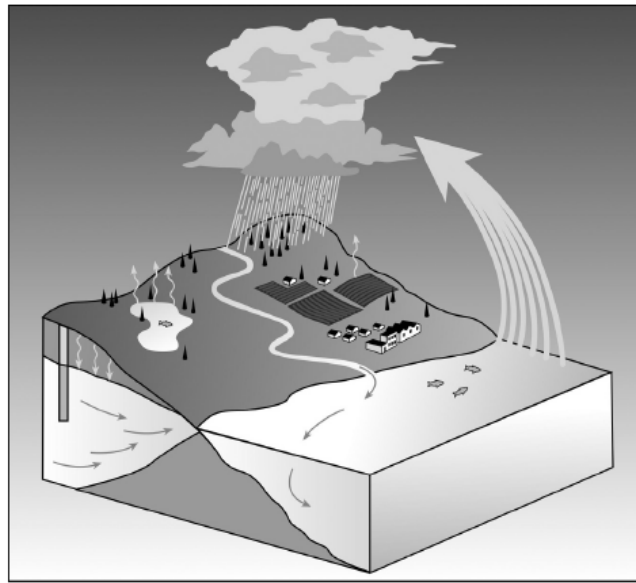


Figure 1: The water cycle (from Pringle 2006)

Rainwater reaches rivers and streams as surface runoff or groundwater. Groundwater feeds, and is fed by rivers, streams and wetlands. Groundwater 10 m or more below the surface of the land is out of reach of most plants other than deep-rooted trees (Canadell et al. 1996). Where plants cannot access groundwater, they depend on soil moisture from rain or capillary action (Figure 2.) which is strongest roughly a metre above the groundwater level.

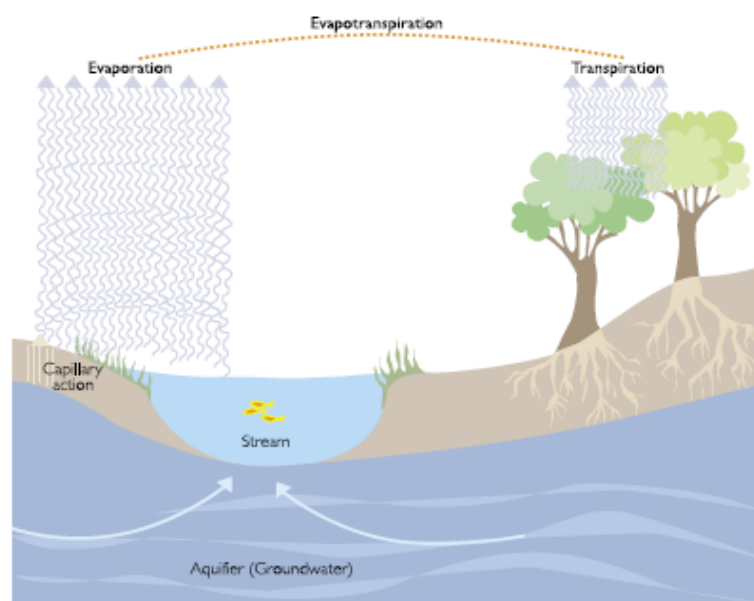


Figure 2: Water moves from groundwater, streams and soil to the atmosphere

(from LWA 2007:8).

In some parts of the world, rivers are primarily fed by snow-melt (e.g. the Himalayas), while in other areas of heavy and regular rainfall, rivers may feed substantially on runoff (many high mountains provide examples). Most of the time, Australia's rivers feed on groundwater – this applies more strongly in the temperate south of the continent than the monsoonal north. This is not the same thing as saying most of the river's water comes from groundwater. Particularly where rainfall is scarce and irregular (Australia's semi-arid zones) the bulk of a river's flow may come from runoff during rare but very heavy rainfall events, even though *most of the time* the river's flow depends on groundwater.

Groundwater is contained in geological strata, or layers, called aquifers, where water is contained in the pore spaces separating material comprising the aquifer. Rock with very low permeability effectively stops water movement, and layers of these rocks are called aquitards. Aquifers can be composed of a wide range of materials, including sand, gravel, limestone, sandstone or fractured rocks such as granite or basalt. The more permeable the aquifer (the greater its hydraulic conductivity) the more easily groundwater will flow through it. Groundwater generally moves relatively slowly through an aquifer, except in the case of large fractures, or tunnels in karst. How long water is retained in an aquifer will depend on the distance between the locations of recharge and discharge, and the speed with which the water moves.

All of Australia's freshwater, whether flowing on the surface or underground, originates from rain¹. While there is only one source, there are two sinks. Firstly, water can return to the atmosphere through evaporation and transpiration (by plants) – see Figure 2. Secondly, both rivers and coastal aquifers can discharge to the ocean. When more rain falls than returns to the ocean and the atmosphere, stocks of water will increase, in lakes, rivers or aquifers. And, of course, *visa versa*.

Several different types of ecosystem depend on groundwater, either in whole or in part. These are known as groundwater-dependent ecosystems, or GDEs. Perhaps the most obvious are surface water ecosystems which depend (at least part of the time) on groundwater feeds; these include many rivers, streams, and wetlands. Subterranean ecosystems are ecosystems below the water table, and, while most complex in alluvial and karst geology, can exist in a wide variety of landforms. The hyporheic ecotone represents a distinct 'boundary community', lying at the interface between 'free' water in rivers, streams and lakes, and the groundwater below. Phreatophytic vegetation communities depend either completely or substantially on groundwater, and include riparian ecotone vegetation associated with streams and wetlands.

Groundwater management:

Groundwater is usually extracted through holes drilled into an aquifer (wells). How much can be extracted will depend on how much water is in the aquifer initially, how much new water enters (recharges) the system and how much water is discharged through avenues other than extraction. The rate of extraction will depend on the permeability of the aquifer and the number and

depth of extraction points. If discharge exceeds recharge, groundwater levels will drop. The groundwater level in an unconfined surface aquifer is called the groundwater table. Extracting more groundwater than is recharged is referred to as groundwater mining. Extracting groundwater at a rate which prejudices important values (natural or agricultural) is referred to as groundwater overdraft. The Great Artesian Basin, a system of confined aquifers (aquifers confined by aquitards) underlying a large part of central and northeastern Australia, has been mined for over a hundred and thirty years, with subsequent drops in aquifer level and pressure (GABCC 2000).

In some cases groundwater mining is a justifiable management approach, noting as an aside that some degree of mining must occur in disturbing the dynamic equilibrium of an aquifer (Sophocleous 2002) and is thus a feature of all groundwater extraction. In most cases aquifer management by State water agencies attempts to limit extraction to a 'sustainable' level. The approach of using the so-called 'safe yield', calculated as the aquifer recharge rate, was discredited in the 1980s, and is no longer widely used (Sophocleous 2000). Today Australian approaches use, generally speaking, the same philosophy governing limits imposed on surface waters. Extraction entitlements on river water seek to provide for beneficial uses of the extracted water (e.g. irrigation) while also protecting the river's ecosystems as well as downstream extractive uses. In other words, they seek to impose 'an acceptable level of stress' on both the river ecosystem and downstream users of river water (human users). In just the same way, extraction entitlements on groundwater seek to impose an acceptable level of stressⁱⁱ on groundwater-dependent ecosystems (including river ecosystems where these depend on groundwater flowing into rivers) and other human users of the aquifer.ⁱⁱⁱ In Australia, the terms "acceptable yield" and "sustainable yield" are converging, although at this stage uniform definitions or calculation methods across Australia's eight States and Territories have not been adopted.

Groundwater extraction is often clustered around aquifers underlying river valleys (Fig. 3) demonstrating, at a practical level, the interconnected nature of the resource.

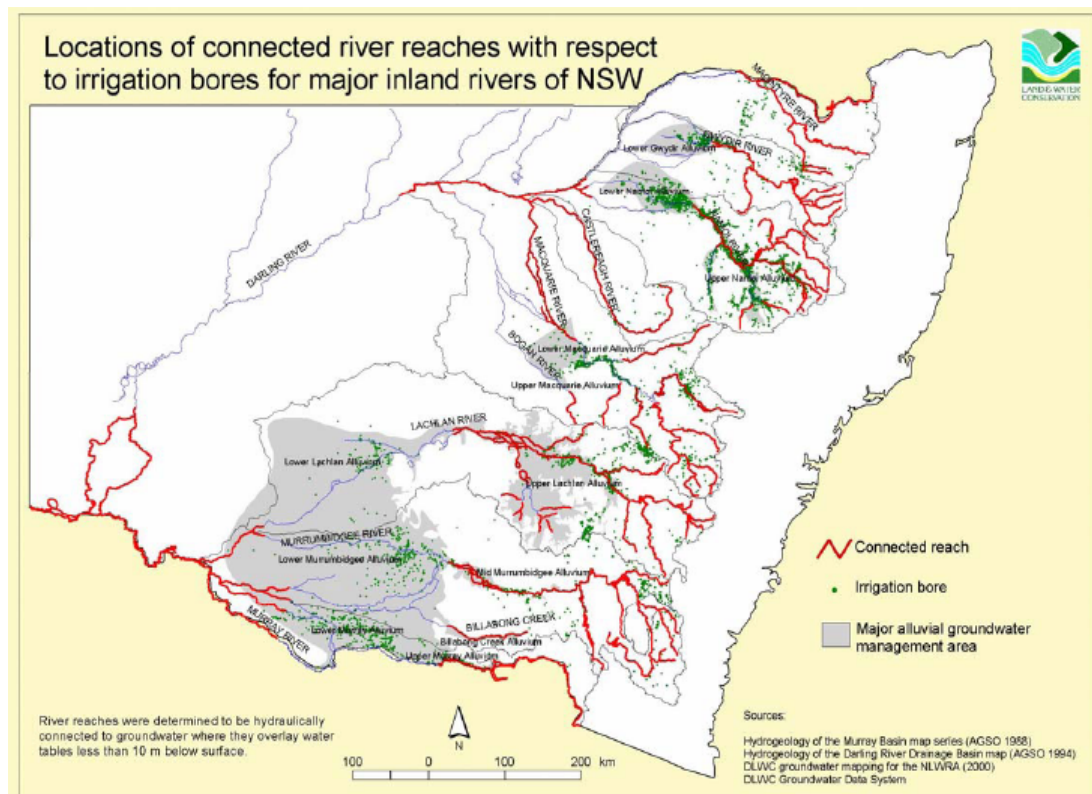


Figure 3: NSW river reaches and groundwater management areas.

Source: SKM (2006:103), from NSW Department of Land and Water Conservation data.

Systemic governance problems:

Certain problems have beset the use of groundwater around the world. Just as river waters have been over-used and polluted in many parts of the world, so too have aquifers. The big difference is that aquifers are out of sight. The other major problem is that water management agencies, when calculating the 'sustainable yield' of aquifer and river water, have often counted the same water twice, once in the aquifer, and once in its connected river. This problem, although understood for centuries, has persisted, partly through inertia within government agencies. Prior to the statutory reforms initiated by the CoAG water reform framework in the 1990s (see below), many Australian States managed groundwater and surface water through separate government agencies, an approach beset by rivalry and poor communication.

The (sometimes long) time lags inherent in the dynamic response of groundwater to development have generally been ignored by water management agencies, decades after scientific understanding of the issue was consolidated. In brief, the effects of groundwater overdraft (although undeniably real) may take decades or centuries to manifest themselves. In a classic study in 1982, Bredehoeft and colleagues (discussed in Sophocleous 2002) modelled a situation where groundwater extraction in a intermontane basin withdrew the entire annual recharge, leaving 'nothing' for natural groundwater-dependent vegetation communities. Even when the borefield was situated relatively close to the vegetation, 30% of the original vegetation demand could still be met by the

lag inherent in the system after 100 years. By year 500 this had reduced to 0%, signalling death of the groundwater-dependent vegetation. The science has been available to make these calculations for decades; however water management agencies have generally ignored effects which will appear outside the rough timeframe of political elections (3 to 5 years). Sophocleous (2002) argued strongly that management agencies must define and use appropriate timeframes in groundwater planning. This will mean calculating groundwater withdrawal permits based on predicted effects decades, sometimes centuries in the future. So far, Australian water management agencies have shown a strong reluctance to meet this challenge.

As water moves through the landscape it collects soluble salts, mainly sodium chloride. Where such water enters the atmosphere through evapotranspiration, these salts are left behind. In irrigation districts, poor drainage of soils and surface aquifers can result in water tables coming to the surface in low-lying areas. Major land degradation problems of salinity and waterlogging result, combined with increasing levels of salt in surface waters. As a consequence, major damage has occurred to local economies and environments. Often, lessons of the past have not been learned (Ludwig et al. 1993).

Four important effects are worthy of brief mention. First, flood mitigation schemes, intended to protect infrastructure built on floodplains, have had the unintended consequence of reducing aquifer recharge associated with natural flooding. Second, prolonged depletion of groundwater in extensive aquifers can result in land subsidence, with associated infrastructure damage – as well as (thirdly) saline intrusion (Zektser et al. 2005). Fourth, draining acid sulphate soils, often found in low-lying coastal plains, can result in acidification and pollution of freshwater and estuarine streams (Sommer & Horwitz 2001).

Another cause for concern is that groundwater drawdown from over-allocated aquifers has the potential to cause severe damage to both terrestrial and aquatic ecosystems (Hatton & Evans 1998; Evans & Clifton 2001) – in some cases very conspicuously but in others quite imperceptibly due to the extended period over which the damage occurs (Sophocleous 2002).

Generally speaking, freshwater biologists and river managers underplay the huge significance of groundwater in maintaining the health of rivers and streams, with the result that groundwater policy and management does not get the scrutiny it deserves – and needs.

To illustrate the magnitude of potential effects, groundwater extractions in the lower Murrumbidgee Valley (central Murray Darling Basin) increased by around 50% over the two years to mid-2003 because drought reduced the availability of surface water. While this groundwater system provided irrigators with a significant buffer against reduced surface water availability, this increase in use led to a 10-20 metre drop in hydraulic head in most parts of the deeper aquifer (Earth Tech Engineering 2003, quoted in Goesch et al. 2007:9). A study of the Dumaresq River Aquifer by the Queensland Government (Chen 2003, quoted in Hafi et al. 2006:11) indicated “the temporary sale of surface water at \$100 a

megalitre is estimated to result [through surface water/groundwater substitution] in additional aquifer drawdown ... leading to the groundwater table falling a further 34 metres.” Movement of the groundwater table on scales considerably smaller than these drops has the potential to cause the death of terrestrial vegetation over considerable areas, especially where climate change (through reduced rainfall) is placing vegetation communities under stress. Similarly, such changes can not only cut off natural groundwater flows to rivers, but reverse them, draining water away from river ecosystems already in stress.

At best, these changes place groundwater-dependent ecosystems under some physiological stress; at worst, they can result in irreversible loss of significant species and/or ecological communities^{siv} (Danielopol et al. 2003, Pringle 2001, Zektser et al. 2005).

Basin management history:

Water management, under the Australian Constitution, is primarily the responsibility of the six States and two Territories. The Commonwealth Government seeks to influence water management in the States through agreements tied to funding programs.

The Murray-Darling Basin (the Basin) is the largest of Australia's two continental-scale river basins^v, and occupies about 14% of Australia's land area – including parts of five States and Territories (Figure 4 below).

The cumulative impacts of incremental development in the Murray-Darling Basin have increased in importance over the last century as many of the Basin's aquatic ecosystems moved from general good health into crisis, and pressing problems of water quality and land degradation emerged. The environments and local economies of the Basin are now in crisis, and deeper crisis lies ahead. Their problems stem primarily from governance failures, exacerbated by declines in rainfall. Over the last seven years (to December 2007) a combination of climate change and drought has reduced (modelled) annual outflow from the basin under natural (unexploited) conditions from a long-term median of ~11,000 GL to 4,300 GL (P. Cullen, pers.comm. 2/2/08). Climate change predictions forecast further declines in rainfall combined with increased water losses from evaporation. Clearly there are no easy solutions. The Murray-Darling Basin Commission (like its predecessor, the River Murray Commission) did not address serious failures in governance in an effective way.

By way of historical background, the *River Murray Waters Agreement 1915* created the River Murray Commission. While initially focussed on waterway storages and transport (building dams and locks) the Commission became increasingly occupied with environmental issues, particularly salinity. In this endeavour the Commission was hampered by its terms of reference and its membership. The 1915 Agreement was modified in 1987 to change the name and scope of the Commission; these changes came into effect in 1988. Five years later the *Murray-Darling Basin Agreement 1992* formalised the expanded scope of the new Murray-Darling Basin Commission (the Commission), and the creation of the Murray-Darling Ministerial Council (the Council), including water

ministers from Queensland (Qld), New South Wales (NSW), Victoria (Vic), South Australia (SA) and the Australian Capital Territory (ACT), as well as the Commonwealth.

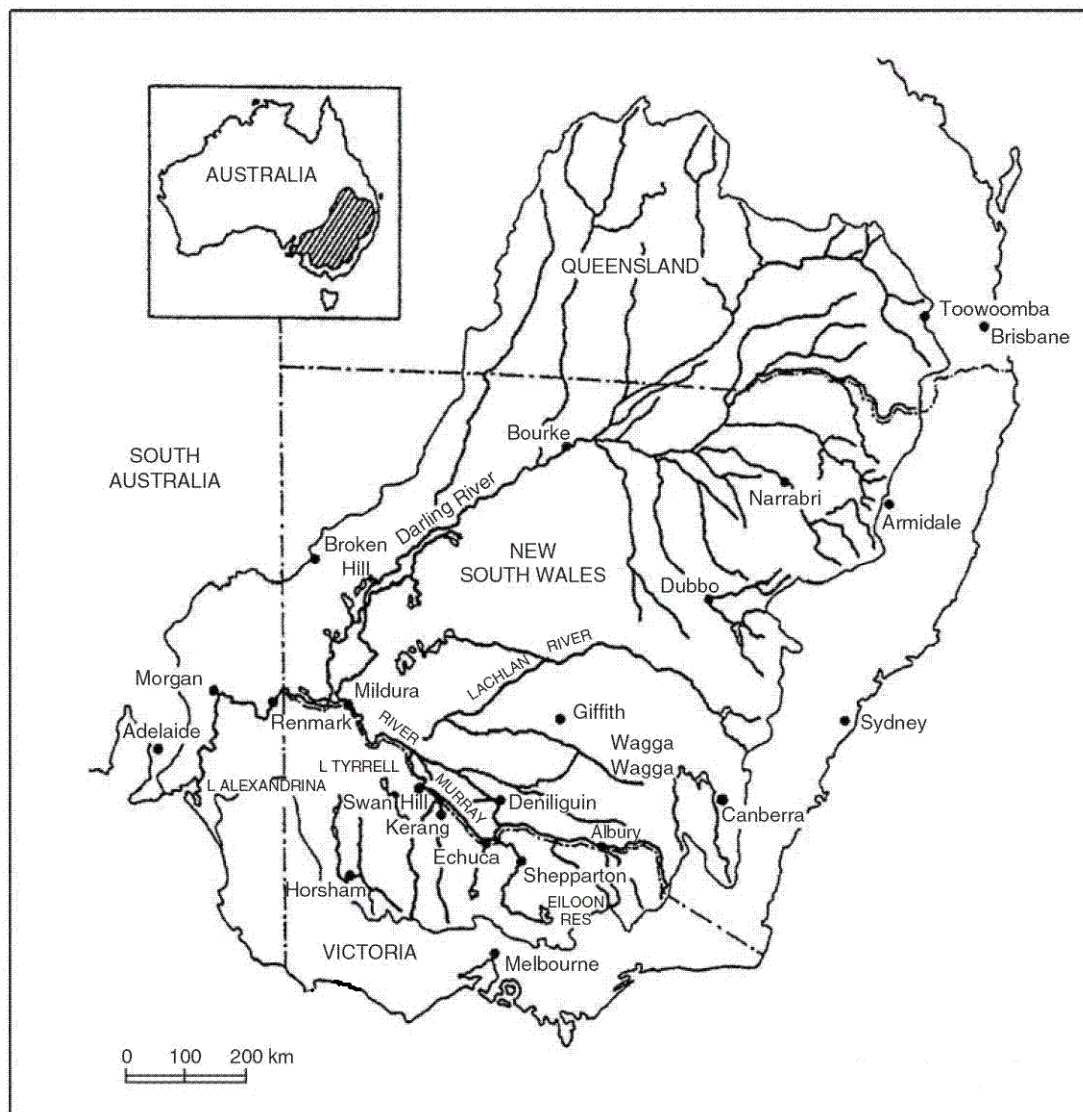


Figure 4: The Murray-Darling Basin.
2007.

Source: Turrall & Fullagar

Soon after the Commission was created (1988) there was a general recognition that serious environmental problems related to water management required urgent attention, not just in the Basin but in many areas of southern and eastern Australia. Waters of many Australian rivers, streams and aquifers had been over-allocated – in some cases grossly over-allocated. In the Basin, total annual water entitlements^{vi} (some in ‘sleeper’ or ‘dozer’ licences^{vii}) issued by State water management agencies amounted to 14,680 GL in 1994/95^{viii}, of which 12,131^{ix} GL were actually diverted, compared to the annual Basin river flow of 12,896^x GL/yr. In other words, licensed entitlements were 114% of the average available water, while usage ran at 94% - before accounting for groundwater withdrawals.

Flow patterns in the Murray had been drastically altered with the release of irrigation waters, moving the high flow period from Spring to Autumn – with consequent disruption of aquatic reproductive cycles (Ladson & Finlayson

2002). Over 50% of the Basin's average annual runoff (23,850^{xi} GL) had been diverted, compared to less than 3% in all but one of Australia's remaining drainage divisions^{xii}. The long-term median annual river flow at its mouth prior to development is estimated at 11,318 GL, less than the average annual volume diverted for human use^{xiii} in 1995. It is not surprising that outflow to the sea has stopped on several occasions in recent years.

Australia's largest river system, the site of our most intense surface water and groundwater development^{xiv}, was (and remains) in serious trouble.

A cap on river water diversion:

The over-allocation of the Basin's waters, and the pressing environmental problems of land degradation, water quality and declining biodiversity values forced the Council and the Commission to confront the concept of limiting catchment development. Although integrated catchment management had, by this time, been the subject of long-standing discussion^{xv}, the Council chose only to cap water extraction from rivers^{xvi}. No controls were mooted on the development of irrigated land, harvesting of floodplain water, construction of levee banks and farm dams, draining wetlands, clearance of native vegetation, or extraction of groundwater – all issues of immediate concern to catchments in water crisis. It should be said, however, that all these issues were under discussion within State water agencies. The important point is that the Council was moving slowly, well behind current science and community concern – in spite of the urgency of the issues.

The Council introduced an interim cap in 1995 and a permanent cap on the diversion of water from the Basin's river system from 1 July 1997. The two primary objectives driving the decision to implement the Cap were:

- to maintain and, where appropriate, improve existing flow regimes in the waterways of the Murray-Darling Basin to protect and enhance the riverine environment; and
- to achieve sustainable consumptive use by developing and managing Basin water resources to meet ecological, commercial and social needs.

The cap was defined as: *"The volume of water that would have been diverted under 1993/94 levels of development."* The cap, as a result, fluctuates from year to year, depending mostly on climate. To implement and monitor the cap, the Basin was divided into 24 'valleys' or allocation units^{xvii}. Each valley is to have an accredited model, applied annually, to determine a valley cap for the year in question. In practice, the total cap varies above and below roughly 11,000 GL/yr (IAG 2007) compared to the river's 'natural' median flow of 11,318 GL/yr (see above). Given that groundwater use was not capped, and that a significant percentage of groundwater was being extracted from aquifers feeding the river, only the most wildly optimistic of the nation's water managers seriously believed that the two primary objectives of the cap would be met.

Groundwater in the CoAG water reform framework:

In the year prior to the Ministerial Council's decision to establish a cap on river diversions in the Basin, these same ministers, together with water ministers from Western Australia and the Northern Territory, had met (with their Premiers) under the auspices of the Council of Australian Governments (CoAG). In February 1994 CoAG adopted "a strategic framework for the reform of the Australian water industry" – to become known as the water reform agenda or the water reform framework. The Framework had two central elements: *economic reform* to increase competition and efficiency within the industry, and *environmental reform* to increase emphasis on sustainable use of natural resources, and protection of environmental (especially biodiversity) values.

The Framework was to evolve over the following decade, through agreements reached both within and subsequent to CoAG meetings. Of immediate interest are the amendments summarized in a public letter from the Prime Minister to State Premiers and Chief Ministers of 10 February 1997. The governments agreed to specific additions then referred to as the 1996 CoAG water reform framework, including agreements focused on groundwater^{xviii}:

- to integrate groundwater and surface water resource management;
- to develop a nationally consistent definition and approach to calculating sustainable groundwater yield;
- to prepare groundwater management plans, policies and strategies;
- to base groundwater allocations on groundwater management plans;
- to ensure that such plans included environmental water provisions in accordance with agreed principles; and
- to address and retrieve over-allocation issues on a plan-by-plan basis.

These agreements made it look as though water management science, consolidated years and decades earlier, now had a good chance of underpinning comprehensive water management across the Basin. Commitments at this level should have prompted rapid implementation action in a Commission committed to “take a visionary approach, provide leadership, and be prepared to make difficult decisions”^{xix}.

Implementation of the cap:

While the cap on river water diversions has been, overall, a limited success, full compliance with the cap has not yet been achieved. After more than a decade, procedures allowing a full audit of cap compliance are still to be finalised. Queensland in particular delayed compliance measures while rapidly expanding water allocations. In an examination of the lower Balonne catchment^{xx} (Queensland), Tan (2000) presents evidence indicating that in the years immediately following the interim cap, the Queensland State Government maintained a casual attitude to increasing development of floodplain water harvesting, allowed catchment farm dams to increase by 90%, and licensed a 50% increase in diversions. The total capacity of off-stream dams in the Lower Balonne increased from 247 GL in 1994 to 827 GL in 1999. The most recent cap audit report draws attention to the lack of agreed measures for assessing Queensland compliance with the cap (IAG 2008), more than a decade after the cap was first imposed. It seems difficult to explain the long delay the MDBC has had in reaching agreement with Queensland without invoking arguments related to incompetence or deliberate intransigence.

Tan also draws attention to other important issues which have pervaded water management in all Australian States: a cavalier attitude on the part of State Government water agencies to both procedure and accountability, political influence on bestowing water allocations, and issues of pervasive non-compliance (on the part of irrigators) with extraction licence conditions. All these have undermined effective management of catchment cumulative impacts across the nation (see for example Nevill (2001b) discussing Victorian arrangements).

As mentioned above, the Commission's estimates of annual average river flow (at the Murray's mouth) and annual median river flow, under natural conditions, are 12,896 GL and 11,318 GL respectively. In 1994/95, diversion entitlements for surface water ran to 14,680 GL, and usage at 12,131 GL. The latest MDBC monitoring report (MDBC 2008:48,60) put total surface water entitlements for 2006/07 at 13,408 GL, and total surface water usage at 5234 GL (the lowest on record). Groundwater usage rose from 1100 GL in 1999/00 to 1703 GL in 2006/07. Total Basin water use was estimated at 6937 GL.

Broad estimates of sustainable groundwater yields currently available are based on rules of thumb, and are likely to be substantially inaccurate (see the discussion of provision for environmental flows to groundwater dependent ecosystems in Nevill 2008). Recent reports (CSIRO 2008, Goesch et al. 2007, Wron Alliance 2007) have highlighted the lack of data (and lack of a coherent national approach) on environmentally sustainable groundwater yields. **This important constraint should be noted when considering the latest Basin water usage audit report** (MDBC 2008:59):

The estimated sustainable yields in Groundwater Management Units (GMU) of the Basin are reported to be 1696 GL (note Victorian SY values are not available). Out of this, 2632 GL was already allocated in 2006/07, which constituted 155% of SY. But this allocation percentage does not take into account Victorian SY values as Victoria does not manage its groundwater on the basis of SY. The total usage of groundwater in the Basin was 1703 GL, which was 65% of allocation and 100% of SY (excluding Victoria's SY). **The groundwater usage was 33% of surface water diversion in the Basin. This reinforces the fact that groundwater is an important resource in which there is a considerable scope for future development within the current allocation. A report by Sinclair Knight Merz (2003) estimated that there is strong linkage between groundwater use and surface water flows, with an average reduction in surface water flow of 600 ML for every 1000 ML of groundwater use.**

Over-allocations in some areas have been reduced during the last decade, however the reductions have been slow, and have not been adequate to provide the environmental flows the river needs (Jones et al. 2002). Table 1 provides a brief summary, showing changes in entitlements and usage since the cap was introduced. Table 1 shows that entitlements for both surface and groundwater far exceeded the capacity of the catchment when the cap was introduced, if any reasonable allowance is to be made for environmental flows. Rather than a cap, urgent reductions in extractive use were needed, particularly with respect to surface water. Imposing the cap was a politically acceptable but scientifically indefensible solution.

Table 1. Annual Basin natural flows, water entitlements and extractive use (median and average natural flows are long-term to 5/08 (>100 yr), estimated by modelling studies).
Source: MDBC (2008), Goesch et al. (2007), Joe Davis (MDBC) 7/1/09. Measurements: GL

Year	long-term median	long-term average	Surface water entitlements	Surface water usage	Groundwater entitlements	Groundwater usage	Total entitlements	Total Usage

	flow	flow						
1994/95	10,657	11,673	14,680	12,131	3250	1200	17,930	13,331
2006/07	10,657	11,673	13,408	5234	2632	1703	16,040	6937

Table 1 also shows that both surface and groundwater entitlements have been reduced since the cap was implemented, as has surface water usage. Total usage is now (2006/07) well below the long-term median natural river flow. Has the cap's objective of "sustainable consumptive use" been achieved? The answer is "no". While usage is now below the long-term median river flow, the modelled 'natural' average river flow over the decade 5/98 to 5/08 was only 6921 GL (pers. comm J. Davis). If this recent flow estimate is an indicator of future flows (which it may be) then the Basin is still in deep trouble. Coupling this simple analysis with other concerns – such as the absence of defensible calculations for groundwater sustainable yield, long delays in addressing water metering (and water theft), and continued poor controls over farm dam construction and the **harvesting of floodplain flows** – produces a dismal prognosis. **It must also be born in mind that the availability of surface water has been over-estimated, and the impacts of groundwater extraction on surface waters under-estimated by a possible 840^{xxi} GL/year or more (CSIRO 2008:47).**

The waters of the Basin remain grossly over-allocated for human use, and the Basin's environments, and human communities, will continue to suffer.

Groundwater reforms stagnate:

Two years after CoAG's groundwater reform policies had been accepted by all Australian Governments, the Council published their *Floodplain wetlands management strategy*. While 'Objective 3' of this document (water allocations) mentions river flows, mention of groundwater management plans, or groundwater environmental flows is entirely absent (MDBMC 1998:11).

Cullen et al. (2000) in a review of CoAG reforms, noted "Generally there appears to be poor integration of the management of groundwater systems and surface water systems despite their acknowledged interconnectedness." Others echoed these views: Nevill (2001a:84) in a major review of State and Commonwealth water policy, recommended the urgent implementation of integrated groundwater and surface water management.

In November 2000, CoAG agreed to support a joint State/Commonwealth initiative, the *National Action Plan for Salinity and Water Quality*. The Action Plan made a seven-year, \$1.4 billion commitment to improving land and water management in 21 stressed catchments across the nation, working largely through 35 regional resource management (NRM) agencies set up under Commonwealth guidelines. The Action Plan provided a mechanism to reinforce earlier commitments to integrated groundwater and surface water management, and to tackle issues of over-allocation^{xxii}. While the action plan *did* reinforce the need for integrated management, in fact **little action was taken**. Moreover, the opportunity to reduce over-allocation was largely missed, in spite of the

availability of funds to buy back licences – **the explanation appears to lie in bureaucratic and political inertia.**

Importantly, the opportunity to extend the concept of comprehensive water management caps was also missed. The Action Plan restricted its recommendations in this regard: “caps [should] be set for all surface and groundwater systems identified as over-allocated or approaching full allocation.” Firstly, this recommendation should have been extended to all moderately and heavily used catchments, not just those approaching full allocation. Inevitably, by the time a catchment is approaching full allocation, some important management options have already been closed. Logically, establishing catchment caps should depend on the availability of knowledge about a catchment’s capacity, not on the extent of commitment of that capacity. Adaptive catchment management will be facilitated by early establishment of the catchment’s limitations. Secondly, the way the recommendation was subsequently interpreted by NRM agencies was restricted to flow caps rather than comprehensive caps covering matters such as farm dams, levee banks, wetland draining, native vegetation clearance, and the development of intensive irrigation areas. Better guidance should have been provided, not just by the Commonwealth.

In 2001 the Council published their *Integrated catchment management in the Murray-Darling Basin 2001-2010*. This was a vehicle which could have emphasised the CoAG groundwater reforms, yet mention of these important policies was (inexplicably) entirely absent. Coherent discussion of the pressing issue of environmental flows was also entirely absent^{xxiii}. Notably absent too was any discussion of the difficult but important issues of addressing over-allocation in both surface and groundwater, as well as caps on water related infrastructure and land developments (MDBMC 2001:12). Rather than take a visionary stand, this document carefully avoided the most contentious (and pressing) issues.

The Wentworth Group of independent scientists (2003:8) in their major report *Blueprint for a national water plan*, called for the development of comprehensive water accounts on a valley catchment basis; a “publicly available set of water accounts for each river valley and groundwater system across Australia, so that all water users, the community and river managers can make informed decisions”. Limits must be established: “If one use consumes more water, another must consume less”. The Group were adamant that “there can be no double counting”. They stressed that linkages between groundwater and surface water must be recognised and accounted for. Here was a statement of plain good sense – ‘visionary’ by comparison with the Council’s inept policy development.

Vision and caution:

In regard to natural resource management, the Commonwealth Government and all State and Territory Governments espoused a strong commitment to the precautionary approach in the early 1990s (through, for example, the *National strategy for ecologically sustainable development* (Government of Australia 1992)). According to the precautionary approach, where there is the possibility

of significant harm, lack of scientific certainty should not prevent prudent action to avoid or mitigate such harm.

The possibility of serious damage to land, water and biodiversity values in the Basin had been clear for years or decades. Uncertainty is a pervasive feature of all water management, especially groundwater management. Application of precaution should increase as either uncertainty increases, or the severity of possible harm increases (Preston 2006). Yet precaution appeared conspicuously absent from the Commission's action program and from its corporate statement. At the State level, Coffey (2001) found an absence of precaution in regard to the Queensland Government's water planning program, and it seems likely similar investigations would draw the same conclusion in other States (see a Victorian example discussed in Nevill 2001b).

Where surface waters and groundwaters are connected, a common-sense precautionary strategy is to apply extraction caps simultaneously to both resources. To my knowledge this has not been done anywhere in Australia. In Victoria for example, the Sustainable Diversion Limits (SDLs) which have been established as caps for surface water basins should have been accompanied (immediately) by caps to limit further groundwater extraction in all but deep confined aquifers. It is hard to understand why this has not been done – given the commitments of all Australian government to precautionary resource management.

According to Cullen (2006:5):

To avoid making further costly mistakes with groundwater I believe we need to reverse the burden of proof. We should assume aquifers are connected to surface water unless proven otherwise, and we should assume any further extraction of groundwater is not sustainable unless demonstrated otherwise.

The immediate and widespread adoption of precautionary target and limit reference points is urgent (see the discussion in Recommendations below).

Another obvious and important precautionary policy regarding integrated management should be to assume, in the absence of a validated local model, a 1:1 ratio between groundwater extraction and surface baseflow reduction – see Box below. This should apply in all cases other than those where zero connection between a groundwater resource and surface waters (no matter how distant) can be clearly demonstrated. There appears to be no evidence that the Commission, or any State water agency, have even considered applying such a policy^{xxiv}.

A precautionary default:

An obvious precautionary policy regarding integrated management would be to assume, in the absence of a validated local model, a 1:1 ratio between groundwater extraction and surface baseflow reduction^{xxv}.

Many groundwater planners would argue that this precautionary 'default' is unduly conservative. However, within a risk assessment framework (the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, ANZECC 2000, provide a good example of a risk-based approach to setting management targets) **the function of a stage-one precautionary default is just that: to consistently err on the conservative side.**

Where there is good evidence which can justify a less conservative default through a connectivity risk assessment, or better still a validated model which can be used to determine a realistic catchment/aquifer water balance, then much less conservative parameters can be determined, and used with confidence by management. **Those who believe that such a precautionary default is inappropriate should justify their position with scientifically sound evidence, taking into account the need to apply the precautionary principle in situations of risk and uncertainty.**

In applying the precautionary principle, "the greater the possible harm, and the greater the uncertainty, then greater should be the caution" (Nevill 2006). Put another way: "The type and level of precautionary measures that will be appropriate will depend on the combined effect of the degree of seriousness and irreversibility of the threat and the degree of uncertainty" (Justice CJ Preston in *Telstra Corporation v Hornsby Council*, New South Wales Land and Environment Court 133, 24 March 2006, para 161.)

In the issue under discussion, very high levels of threat are often combined with very great uncertainty. The threat under discussion (some would argue unlikely) is extremely serious: widespread unsustainable groundwater drawdown can produce, after decades or centuries, parched and denuded landscapes, an absence of ecological and agricultural resilience, and collapsed regional economies. Such damage can be, for all intents and purposes, irreversible once widespread vegetation death occurs and local townships collapse. Bearing in mind this high level of possible harm, the application of a solidly conservative first-stage default is fully justified.

According to Evans (2007:66) "A draft national policy to address the impacts of surface water/groundwater interaction in Australia (SKM, 2006) proposes ten policy principles to be adopted at the national level. Perhaps the most significant principle is that the jurisdictions need to assess the impacts of groundwater abstraction on streams, and if no assessment is undertaken then a 1:1 hydraulic relationship is to be adopted. The adoption of the 1:1 impact is based on the precautionary principle and although, as discussed earlier, this is unlikely to be the norm, there are many situations in Australia where this is the case."

A key aspect of the precautionary principle is that it reverses the 'onus of proof'. Rather than adopting an assumption that a proposed activity will have no environmental impact unless there is already evidence to suggest otherwise, the precautionary principle obliges decision-makers to seek evidence from an activity proponent demonstrating that the activity will in fact have no significant effect.

A first-stage precautionary default of a 1:1 assumption is a logical and prudent approach.

An absence of a precautionary approach is also evident from data on Basin groundwater allocation and use (Figure 5, from Goesch et al. 2007:5):

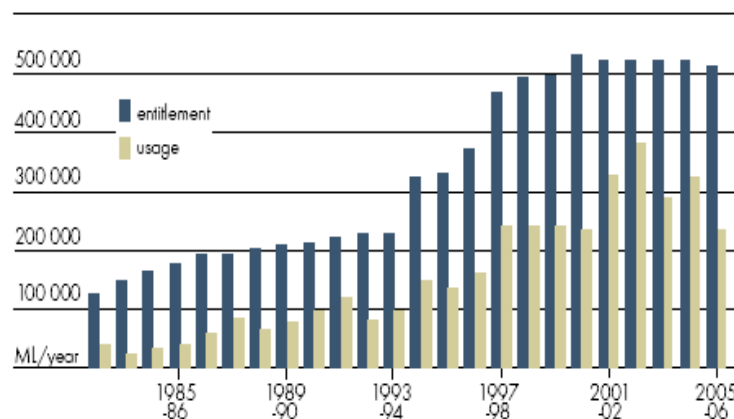


Figure 5. Groundwater entitlements and use in the Lower Murrumbidgee.

At a national level, Australia formally endorsed use of the precautionary principle in natural resource management through the *World Charter for Nature 1982*^{xxvi}, and later through the *Rio Declaration 1992*^{xxvii}. All States endorsed the precautionary principle in 1992, as mentioned above. In spite of these commitments, and in full knowledge that many Basin groundwaters and surface waters were linked, Figure 5 indicates that the NSW State water agency has had a long track-record of issuing groundwater licences far in excess of demand. *This approach is the reverse of precautionary.* It must be noted, however, that the NSW Government has belatedly (2008) placed a moratorium on further development of basin groundwater for agricultural purposes. Nevertheless the impacts of recently issued groundwater extraction permits will play out over the coming decades.

Over the Basin as a whole, 2004/05 groundwater entitlements amounted to 3250 GL/yr, compared with an estimated sustainable yield of only 2450 GL/yr (Goesch et al. 2007:5). To make matters worse, almost all minor groundwater users are unmetered. Goesch et al. (2007:1) estimated that 60% to 80% of major users (across Australia) have not been required to meter their usage^{xxviii}. Unmetered flows make accurate catchment water planning impossible, and foster a culture where compliance with licence

conditions is seen as unimportant^{xxix}. It should also be noted that present assessments of groundwater sustainable yield are substantially inaccurate: Evans et al. (2003) have suggested regular inaccuracies of around 25%, and this estimate may itself err on the conservative side, given the complications in making such estimations (IAHA 2004).

Vision (although some would argue the elements were obvious) can be discerned in CoAG policy documents – in our case-study, related to integrated groundwater and surface water management. CoAG's policy on this issue was clearly stated in 1996 and re-stated in 2000. Vision too can be found in independent reports, such as the Wentworth Groups (2003) call for comprehensive water accounts. Authors such as Nevill (2003) amongst others, called for a comprehensive approach to the management of catchment cumulative effects – in effect a similar argument to that of the Wentworth Group. **The Commission's own Groundwater Technical Reference Group (GTRG) had "a long held view that there should be a cap on total (surface water and groundwater) diversions within the basin and that the water resource should be managed in an integrated manner" (GTRG 2004:ES4).**

Policy without action:

No doubt the 'long held view' quoted above had been communicated to the Commission on a number of occasions – but where was the response? Where indeed was the response on the part of State water management agencies to their long-standing CoAG commitments?

In 2004, the Commission published a report by the GTRG: *Estimated impact of groundwater use on streamflow in the Murray-Darling Basin*.

According to the GTRG (2004:ES4):

- "Each jurisdiction has legislative and policy that allows for the integrated management of surface water and groundwater, but implementation of the integrated approach has not occurred to-date.
- The intended outcomes of the Cap on surface water diversions have been compromised as a result of the increased groundwater use since 1993/94.
- The jurisdictions have identified technical and planning investigations that will be undertaken and investigations that are needed to reduce uncertainty, although the implementation plan for these investigations has not been made clear."

A later report by Land and Water Australia (LWA) stated:

- Australia has no agreed method for assessing the sustainable yield of groundwater (LWA 2007:13).

Comparing these outcomes with the CoAG 1996 policy commitments (see the Prime Minister's letter referenced above) it is clear that, *after nearly a decade, no*

effective action had been taken, either by the Commission or by State agencies, to implement core CoAG groundwater policy.

A survey of all State water agencies, undertaken in late 2007, confirmed this finding (Nevill 2008). This survey focused on conjunctive water balance planning, and delivery of agreed environmental water allocations to groundwater-dependent ecosystems. The survey found no implementation of conjunctive water balance planning, and only one water allocation plan (across the whole nation) in full compliance with agreed environmental flow principles. These two policy elements are essential for the management of cumulative effects across the Basin, and fundamental to any management program aimed at sustainable use of groundwater. This inaction is, apparently, not restricted to the Basin, but appears as a major failure across the whole of Australia. Western Australia, Queensland and South Australia appear the most progressive States in a disappointing field (Nevill 2008).

Recent developments:

2004:

CoAG's commitment to integrated groundwater and surface water management was re-stated again in the development of the National Water Initiative 2004^{xxx}. The *InterGovernmental Agreement on a National Water Initiative*, signed by the Commonwealth and participating States on 25 June 2004, listed "recognition of the connectivity between surface and groundwater resources, and connected systems managed as a single resource" as one of ten core NWI objectives (paragraph 23).

Paragraph 82 required the development of: "water resource accounts that can be reconciled annually and aggregated to produce a national water balance, including ... systems to integrate the accounting of groundwater and surface water use where close interaction between groundwater aquifers and streamflow exist...". Paragraph 83 requires that: "States and Territories agree to identify by end 2005 situations where close interaction between groundwater aquifers and streamflow exist and implement by 2008 systems to integrate the accounting of groundwater and surface water." As discussed above, limiting these actions to situations where "close interaction between groundwater ... and streamflow exists" is not a precautionary approach, given generally high levels of uncertainty regarding groundwater/surface-water interaction.

The *National Water Commission* (NWC) was created as a Commonwealth agency to oversee implementation of the NWI on behalf of the Commonwealth and CoAG. Its activities include overseeing water reform in the States (formerly the role of the National Competition Council - NCC) but it no longer has the ability to penalise the States for non-compliance by withdrawing Commonwealth support payments. Its water reform audit activities also appear less formalised and probably less effective than those of its predecessor (the NCC). The NCC had in fact used its penalty provisions: it had withdrawn the so-called 'trache' payments on a small number of occasions, and had been outspoken in identifying some non-compliance issues – a source of irritation to the States.

In late 2004 the Commonwealth Government (through the Natural Heritage Trust) funded Sinclair Knight Merz (SKM) to survey groundwater and surface water management in all Australian jurisdictions, with a view to recommending a national approach to integrated management. Their report, published in February 2006, proposed 10 core principles on which a national framework for integrated management could rest (SKM 2006). The report recommended actions by the Commonwealth Government to develop the framework in consultation with the States, including actions to establish technical education and public awareness programs. The landmark report contained model water balances, and outlined key elements of integrated water plans. Although the report was considered by the National Water Initiative Committee (reporting to the Natural Resource Management Ministerial Council) the report's recommendations were not formally endorsed, and remain, largely, without implementation.

2006:

The Natural Resource Management Ministerial Council (NRMMC) met in Christchurch on 24 November 2006. Here "Ministers agreed a report for CoAG outlining progress in 2005-06 on implementing the NWI. ... States and Territories will report back to Ministers on progress of arrangements for the management of shared groundwater resources. Ministers noted that where water is being extracted from connected ground and surface water systems, water plans should reflect this connectivity" ^{xxxi}.

The same month a group of senior Australian hydrogeologists released a short statement titled *National Groundwater Reform* (Evans et al. 2006). Their call for better groundwater management reiterated (with a sense of urgency and frustration) many of the policy initiatives dormant over the previous decade. Moving past policy, the group's statement of concern drew attention to serious funding shortfalls related to water infrastructure and data collection, technical and public education, and compliance programs. In brief, the group's main points were:

- **Planning must identify sustainable levels of groundwater extraction and Governments must return over-allocated systems to sustainable levels.**
- **All groundwater use, except low-yielding domestic or stock bores, must be licensed and large users metered.**
- **We must develop a compliance program to stop unauthorized use of groundwater.**
- **All groundwater must be properly priced to pay for the ongoing resource assessment, monitoring and management, and compliance program.**
- **There are opportunities for surface water to be stored in aquifers rather than surface storages which have such high evaporation losses.**
- **Effective management of groundwater cannot be achieved with the current organisational arrangements within Government.**

- **Environmental water allocations must be managed by agencies that are not the same agencies who allocate water.**

These are basic approaches which should have been incorporated into State government water management programs many years ago. While in several cases token commitments have been made, they still remain without enthusiastic implementation across the nation.

In December 2006, an Australian Government Senate Committee report drew attention to the failure of the States and the Commission to address over-allocation of groundwater in the Basin. In particular, the report quoted from the Commission's *Water Audit Monitoring Report 2004/05*: 65:

The estimated sustainable yield ... [of groundwater in] the Basin is reported to be 1534 GL/yr (Victorian SY figures are not available). Out of this, 2950 GL was already allocated in 2004/05, which constituted 192% of the sustainable yield. The total usage of groundwater in the Basin was 1490 GL, which was 51% of the allocation, and 97% of the sustainable yield" (SCRRAT 2006:41).

Groundwater resources, which could have been reserved specifically as a drought buffer in a highly variable climate, have been spent – to the detriment of both human and non-human inhabitants of the Basin.

In a short but important paper, Professor Peter Cullen, a Commissioner in the National Water Commission, made the following comments and recommendations (Cullen 2006:6):

Last century Governments encouraged the development of groundwater with little understanding, and took the view that they could redress any problems through a process of "adaptive management". However, landholders and communities developed expectations, and when the groundwater ran out believed Governments should compensate them for encouraging them to invest in a resource which was illusory. Substantial taxpayer funds are now being invested in Northern NSW to redress these mistakes.

There are still many parts of Australia where groundwaters are neither licensed nor metered. As a first step, there should be a moratorium on any new bores taking groundwater unless it can be shown that the groundwater system is not over-allocated. This is a simple application of the precautionary principle – don't spend without understanding your limits. Any new bore should be licensed and metered, and any theft of water should be treated by withdrawing the entitlements. All existing bores should be registered and metered within 5 years, or should be shut down.

Management agencies need to withdraw groundwater licences that have not been used. The failure to withdraw sleeper licences when

surface water trading commenced saw them activated and traded with serious consequences.

2007:

In January 2007 the Commonwealth Department of Prime Minister and Cabinet published *A National Plan for Water Security*. The Plan proposed a \$10 billion, 10-point plan “to improve water efficiency and address over-allocation of water in rural Australia.” Of immediate interest, the Plan included several points relevant to our discussion:

4. addressing once and for all water over-allocation in the Murray-Darling Basin;
5. a new set of governance arrangements for the Murray-Darling Basin;
6. a sustainable cap on surface and groundwater use in the Murray-Darling Basin; and
10. completion of the restoration of the Great Artesian Basin.

Point 4 repeated historic commitments made in a variety of forums, but never effectively addressed. Point 5 sought to “reconstitute the MDBC as a Commonwealth Government agency reporting to a single minister.” The report pointed out: “the MDBC has known for several years that the cap on diversions needs to be reduced and include groundwater to be effective, but this has not been achieved.” Importantly, the report stressed the need for mandatory metering of licensed water usage (p. 8), and the need to seal free-flowing artesian bores (DPMC 2007).

While these are all commendable goals, so too are the earlier CoAG groundwater reforms, which remain today as empty promises. Australia is not short of good policy, but the nation is short on politicians and bureaucrats willing to implement it^{xxxii}.

Commonwealth Groundwater Action Plan:

In the lead-up to a Federal election, the Commonwealth Government announced a \$52 million *Groundwater Action Plan* (Turnbull 2007a). Fifty million dollars of the Plan’s budget will be spent largely on technical and scientific investigations. Only \$2 million will go towards a capacity building program for groundwater managers – an issue highlighted in the recommendations of the 2006 draft framework document (SKM 2006) discussed above.

To put this in the perspective of the Government’s funding priorities, \$850 million was earmarked (also in the lead-up to the Federal election) just to assist local municipalities repair and upgrade local roads^{xxxiii}, while \$64 million was allocated to assist the South Australian Government in the upgrade of the Port Augusta to Port Wakefield road^{xxxiv}, a minor national highway.

The Government's 2007 "action plan" showed no awareness of the extent of the nation's groundwater problems. The proposed level of expenditure is paltry compared to the sums necessary to tackle even the most pressing of the groundwater industry's problems. Two million dollars would fund only a few annual salaries in addressing capacity building – an urgent need. Well over \$100 million^{xxxv} is needed to address the most urgent of the issues of metering and compliance highlighted by Evans et al. (2006) – and these matters do not even feature in the information published on the action plan. The proposed plan does not progress key elements of the draft management framework (SKM 2006), or address the major concerns of Evans et al. (2006). In particular, the pressing issue of addressing over-allocation through buy-back or compensation appears to be entirely missing from the action plan.

The opposition (Labor) party, perhaps with an eye on rural votes sensitive to water restrictions, offered no better proposals. The difficult issues, and the need for adequate funding, were once again avoided by both major political parties.

NWC First biennial assessment 2007:

In its 2007 biennial assessment of progress against the National Water Initiative, the National Water Commission expressed considerable concern about the management of groundwater throughout Australia: "The assessment identified the over-allocation of water resources, limited recognition of groundwater [values] and lack of a harmonised national approach for monitoring groundwater as areas requiring urgent additional work. The failure to address this issue is having a serious effect on the security of supply to surface water consumptive users, to surface water environmental flows and groundwater-dependent ecosystems" (NWC 2007).

While the NWC expressed concern, its recommendations set no target timelines, and provide no specific incentives (or penalties) aimed at encouraging compliance by the States with long-overdue reforms.

The Commonwealth's Water Act 2007:

Following the Prime Minister's initiative in January 2007, the Commonwealth Government attempted to persuade Basin States to refer their water management powers to the Commonwealth, on the basis of a comprehensive *Water Bill 2007*. The *Water Act 2007* passed through parliament in August 2007, and was subsequently amended by the incoming Labor Commonwealth Government.

The *Water Act 2007* replaced^{xxxvi} the Commission with a Commonwealth agency, the *Murray-Darling Basin Authority*, with the primary responsibility to develop a *Basin Plan*. "The central element of the Basin Plan will be the introduction of a sustainable and integrated cap on groundwater and surface water diversions" (Turnbull 2007b). The Commission will be obliged to act in accordance with the Basin Plan. "The Authority will also be responsible for advising the Minister on the accreditation of state water resource plans for consistency and compliance with the Basin Plan" (Turnbull 2007). **The Plan must develop**

components addressing environmental watering, water quality and salinity management. It will commence operation in 2011.

The new Authority occupies the same building, and carried over most of the staff from the Commission – but with a ‘new’ chief executive officer (Rob Freeman, a Commissioner of the former Murray Darling Basin Commission). The new administrative arrangements are not a guarantee of that the long-standing failures of the Commission will be addressed. As argued above, water extraction caps are not in themselves a solution. Even if they were, State governments have demonstrated reluctance to implement caps designed to help the Basin as a whole. **After over a decade, full compliance with the surface water Basin cap has yet to be demonstrated (IAG 2008). Two years after the Commonwealth Government announced its intention to require a cap on MDB groundwater extraction, CSIRO (2008:47) reported: “future groundwater extraction [in the Basin] could (according to current groundwater management plans) reach 3528 GL/year by 2030”. This level is well above the 2006/07 groundwater extraction level of 1703 GL – perhaps the ‘cap’ envisaged by prime minister John Howard in January 2007.**

By January 2009, NSW was the only Basin State which had moved towards place a ceiling on MDB groundwater extraction (NSW Government Gazette 2008:6848-58, 12941-50). While placing an embargo on new extraction licences, exemptions were provided for town water supply, dewatering, dust suppression and ‘at the minister’s discretion’ (NSW GG 2008:12949). The concept of a true groundwater cap, where an increase in one user’s allocation must be met by a decrease in another user’s allocation, has so far proved beyond the reach of any State water management agency.

The waters of the Basin remain grossly over-allocated to human use, and a wind-back, rather than a cap, is urgently needed – a retreat from development which needs careful thought and much community consultation (if social and financial pain is to be minimized). Without courage and real political will, the new Authority is very likely to (again) adopt a narrow interpretation of ‘comprehensive and integrated planning’, and we may well see a perpetuation of the lack of vision, and the lack of caution, which have dogged management of the Basin for the last 100 years, and left the present Basin community with a dangerous legacy from which they are unlikely to escape.

Conclusion:

There are many Acts of Parliament, as well as important strategic policies, that are based on good intentions and sound logic but which fail at the level of implementation^{xxxvii}. This is particularly the case with respect to attempts to control the cumulative impacts of incremental development occurring over a substantial period of time. Even though a strategy may be put in place to control or prohibit new developments which would (for example) extract additional water from a catchment, it appears to be almost a general rule that the strategy will be subverted by numerous small approval decisions running directly counter to the intent, if not the letter of the strategy (Odum 1982). This tendency is compounded where the costs of resource degradation fall on the community (and future generations) rather than on the individual who benefits from resource exploitation (Hardin 1968).

In spite of the very obvious damage caused by the cumulative impacts of incremental water-related development, catchment management within the Basin remains characterised by both a lack of vision and a lack of caution. Surface waters and groundwaters have been grossly over-allocated for human use. Until very recently, little has been done to remedy this situation, and even now reform is happening far too slowly. Major government initiatives, such as the *National Action Plan 2000* and (to a lesser extent) the *National Water Initiative 2004* have failed to recognise or emphasise the pervasive and intractable damage caused by the cumulative impacts of incremental catchment development. Many major groundwater bores, not only in the Basin but across the continent, remain unlicensed and un-metered, and where compliance programs exist they are often (usually) poorly resourced.

Existing problems relate primarily to failures in governance rather than problems caused by, for example, scientific uncertainty or changing climate (Connell 2007). **The full implementation of CoAG groundwater commitments, long ignored, is now essential – if further environmental and economic damage is to be avoided. It would appear that this will not happen under existing management arrangements and cultures, so these must change. Political will and intelligence must be brought into play immediately.**

This paper is not an attack on the groundwater industry. In many cases good groundwater management results in more efficient storage than damming surface water. Unchecked development of small farm dams across Australia is altering the hydrology of the rural landscape, to the great detriment of stream flows (Finlayson et al. 2008) **What is needed is the integrated and comprehensive management of connected ground/surface water resources, including sound provision of adequate environmental flows. In some cases this may mean increased use of groundwater combined with**

reductions in surface water use. Over-allocation must be addressed, and, where possible, avoided by prudent foresight.

As a matter of urgency, cumulative effects within the water resource industry must be taken much more seriously. ***Catchment management programs must have five critical elements:***

- ***the need to manage cumulative effects through the establishment of strategic development caps on a catchment basis must be formally recognised in water resource legislation and in NRM planning processes, and appropriate procedures must be established to set and implement the caps in consultation with stakeholders;***
- ***caps must be comprehensive and inclusive; stakeholder consultation programs must establish caps covering: water extraction from both surface and groundwaters, the construction of farm dams (number and volume), agricultural drains, impediments to fish passage, and levee banks, the development of intensive irrigation and agroforestry, the clearance of deep-rooted vegetation, and activities (eg: stock access) capable of degrading riparian vegetation essential to the health of river ecosystems;***
- ***passive adaptive management principles (plan, implement, monitor, report, review – as used in the ISO 9000/14000 standards) must be rigorously incorporated within catchment planning processes (noting these principles already form part of Commonwealth NRM guidelines);***
- ***the caps on development must be set well ahead of the point where the catchment enters a stressed or crisis situation; and***
- ***last but not least, the caps must be set in a precautionary way^{xxxviii}, and a precautionary approach must be taken to conjunctive connectivity (as described above, including a default 1:1 assumption, and the use of target and limit reference points – see below).***

Plans to protect catchment ecosystems cannot be effective without adequate knowledge of the relative value and the current condition of these ecosystems. There is an urgent need to develop comprehensive State inventories of inland aquatic ecosystems, incorporating both value and condition data (Kingsford & Nevill 2006) as well as critical dependencies on ground and surface water flows. Such inventories are slowly developing across Australia, but could benefit greatly by the development of a national framework supported by

Commonwealth funding. Collaborative programs within the NWI towards this end are again moving far too slowly.

There have been long-standing calls by Australian groundwater experts for the States to develop a common method for determining necessary environmental flows for groundwater-dependent ecosystems, and a common method for determining aquifer sustainable yields. These are, of course, aspects of the same problem, and need to be addressed within the agreed framework of catchment/aquifer water balance planning.

If the past can be used to predict the future, implementation delays will continue until catchments and aquifers reach a condition of crisis – at which time effective management actions will be both difficult and costly. Australia's farmers and pastoralists, as well as the nation's important groundwater dependent ecosystems, will pay the price for continued government inertia and incompetence.

Recommendations:

Recommendation 1: The importance and intractable nature of the cumulative impacts of incremental water-related development must be recognised through changes to government legislation, policy, and management arrangements. Catchment management programs must be initiated including *all* five key principles outlined above, and such programs must be implemented urgently and enthusiastically.

Recommendation 2: Two of the most pressing practical issues, in implementing CoAG groundwater policy commitments, are to:

(a) develop catchment/aquifer management plans (or water allocation plans) which clearly demonstrate effective integration between ground and surface water management. Such plans must use a realistic catchment/aquifer water balance to produce a water balance account, and use this account in determining allocations in a precautionary way. Plans must use principles of sustainability which acknowledge the long timeframes involved in aquifer response. If groundwater is to be used as a buffer against drought, it is vital that a reserve be left for this purpose, for example by aiming to allocate no more than 50% of the annual sustainable yield in 'average' years.

and

(b) develop integrated surface/groundwater plans^{xxxix} which include a specific allocation for environmental flows (to protect identified values in related groundwater dependent ecosystems) calculated and delivered in a way which meet agreed Commonwealth/State environment flow principles (ARMCANZ 1996a). Note that these principles remain official CoAG policy,

although they have been under review. In line with recommendations in Evans et al. (2006) environmental allocations should be determined by an agency^{xl} separate from the agency immediately responsible for determining water allocations.

Recommendation 3: A recommendation made by Goesch et al. (2007:14) is particularly important: it relates to the *prior* determination of management responses: ie the use of decision rules formulated in advance. The authors, bearing in mind the difficulty of making decisions on water allocation which place farmer's livelihoods at risk recommend that:

"... groundwater managers [should] formalize a set of management actions that would be activated in the event of groundwater stocks falling below some predetermined thresholds.

To implement this type of strategy, it would be necessary to specify the relevant 'reference' points needed to guide management decisions. For example, 'target' reference points would be needed that specified the desired status of stocks and desired extractions. 'Limit' reference points that identify points beyond which the risk to the aquifer and related ecosystems is regarded as unacceptably high would also be required. A set of operational rules would then be required to regulate extractions, so that stocks remained at [or above] target levels. These rules would also specify the action to be taken if the limit reference point was breached."

Example rules would reduce groundwater allocations as a target point (which might be groundwater table level near a connected stream^{xli}) was approached. For example, additional restrictions might apply on pumping volumes or times. Once a target point had been exceeded, heavier restrictions would apply; for example irrigation extractions might be prohibited while still allowing extractions for limited town water and rural stock and domestic uses. Once a limit point was reached, all groundwater extraction in that aquifer should cease. It is important to stress again that such actions *must be discussed and agreed in advance*. This approach also reduces the likelihood of political 'interference' in agreed decision-making processes – see comments by Tan (2000) quoted above.

Factors affecting all recommendations:

It is also important that integrated management should be applied to *all* surface/aquifer systems, not just highly connected systems. As IAHA (2004:14) pointed out: "It has been shown that even in disconnected systems, the use of one resource can affect the other". Precaution should increase as uncertainty increases.

Following the discussion above, State Governments need to agree on a common approach to determining (and applying) aquifer sustainable yields.

Another challenge for management planning is to determine the relative priority of water users (including GDEs) in receiving allocations in a scenario of 'permanent' reductions in rainfall – which climate change appears to be bringing to southern and eastern Australia. How does one compare the water needs of a high value agricultural enterprise with a stygofaunal community which may support fauna found nowhere else (Humphreys 2006)? Among the principles currently supported by COAG is Principle 4, which states:

In systems where there are existing users, provision of water for ecosystems should go as far as *possible* to meet the water regime necessary to sustain the ecological values of aquatic ecosystems, whilst recognising the existing rights of other water users (ARMCANZ 1996b) [emphasis added].

A critical aspect affecting implementation of all three of these recommendations, is the routine use of **independent peer review prior** to finalising plans and associated allocations. It is essential that the plans, their supporting information, as well as the peer reviews be readily available to all stakeholders and interested parties.

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Epilogue:

*Now the stock have started dying, for the Lord has sent a drought
But we're sick of prayers and Providence – we're going to do without
As the drill is plugging downward at a thousand feet of level
If the Lord won't send us water, oh, we'll get it from the devil
Yes, we'll get it from the devil deeper down.*

From 'Song of the Artesian Water' (1896)
by A.B. Banjo Paterson, Australian poet.

References:

- ANZECC Australian and New Zealand Environment and Conservation Council (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Department of the Environment and Heritage, Canberra.
- ARMCANZ Agriculture and Resource Management Council of Australia and New Zealand (1996a) *National principles for the provision of water for ecosystems*, Standing Committee on Agriculture and Resource Management, Canberra.
- ARMCANZ Agriculture and Resource Management Council of Australia and New Zealand (1996b) *Allocation and use of groundwater: a national framework for improved groundwater management in Australia*, Task Force on CoAG Water Reform, Canberra.
- Boulton, AJ, Humphreys, WF & Eberhard, SM (2003) 'Imperiled subsurface waters in Australia: biodiversity, threatening processes and conservation', *Aquatic Ecosystem Health and Management*, vol. 6, no. 1, pp. 41-54.
- Canadell, J, Jackson, RB, Ehleringer, JR, Mooney, HA, Sala, QE & Schulze, E-D (1996) 'Maximum rooting depth of vegetation types at the global scale', *Oecologia*, vol. 108, pp. 583-95.
- Chen, D (2003) *Report on Dumaresq River groundwater model: model development*, Department of Natural Resources and Mines Queensland, Brisbane.
- Coffey, F (2001) 'Assessment of water resource plans under the Water Act 2000 (Queensland) with consideration of ecological outcomes and environmental flow objectives in the context of the precautionary principle and sustainable management', *Environment and Planning Law Journal*, vol. 18, pp. 244-56.
- Connell, D (2007) *Water politics in the Murray-Darling Basin*, Federation Press, Sydney.
- CSIRO (2008) *Water availability in the Murray-Darling Basin*, CSIRO Division of Land and Water, Canberra.
- Cullen, P (2006) 'Flying blind - the disconnect between groundwater and policy', paper presented to the Murray-Darling Basin Groundwater Workshop, Canberra 19 September 2006.
- Cullen, P, Whittington, J & Fraser, G (2000) *Likely ecological outcomes of the COAG water reforms*, Cooperative Research Centre for Freshwater Ecology, Canberra.
- Danielopol, DL, Griebler, C, Gunatilaka, A & Notenboom, J (2003) 'Present state and future prospects for groundwater ecosystems', *Environmental Conservation*, vol. 30, pp. 104-30.
- DPMC Department of Prime Minister and Cabinet Australia (2007) *A national plan for water security*, Department of Prime Minister and Cabinet, Canberra.
- Earth Tech Engineering (2003) *Review of selected factors that may change future flow patterns in the River Murray system*, Murray Darling Basin Commission MDBC, Canberra.
- Evans, R & Clifton, C (2001) *Environmental water requirements to maintain groundwater dependent ecosystems*, Department of the Environment and Heritage, Canberra.

- Evans, R (2007) *The impact of groundwater use on Australia's rivers: technical report*, Land and Water Australia, Canberra.
- Evans, R, Richardson, S, Hillier, J, Bonte, M, Dyson, P, Ross, J & Middlemis, H (2003) *Watermark: sustainable groundwater use within irrigation regions*, Murray-Darling Basin Commission MDBC, Canberra.
- Evans, R., Evans, R., Jolly, P., Barnett, S., Hatton., T, Merrick, N. and Simmons, C. (2006) *National Groundwater Reform*, Sydney, November (www.ncgm.uts.edu.au/media/National_GW_Reform.pdf).
- Finlayson, B., Ladson, A. and Nevill, J. (2008) Managing cumulative impacts on Australia's water resources. Paper presented to the *Water Downunder* Conference, Adelaide 2008.
- GABCC Great Artesian Basin Consultative Council (2000), *Great Artesian Basin strategic management plan*, Department of Agriculture, Fisheries and Forestry Australia, Canberra.
- Goesch, T, Hone, S & Gooday, P (2007) *Groundwater management: efficiency and sustainability*, ABARE Australian Bureau of Agricultural and Resource Economics, Canberra.
- Government of Australia (1992) *National strategy for ecologically sustainable development*, Australian Government Publishing Service, Canberra.
- GTRG Groundwater Technical Reference Group (2004) *Estimated impact of groundwater use on streamflow in the Murray-Darling Basin*, Murray-Darling Basin Commission, Canberra.
- Hafi, A, Brownlowe, N & Welsh, W (2006) *Groundwater and surface water use in the Dumaresq River Valley*, Australian Bureau of Agricultural and Resource Economics ABARE, Canberra.
- Hardin, G (1968) 'The tragedy of the commons.' *Science*, vol. 162, pp. 1243-8.
- Hatton, T & Evans, R (1998), *Dependence of ecosystems on groundwater and its significance to Australia*, Land and Water Australia, Canberra.
- Humphreys, WF (2006) Aquifers: the ultimate groundwater-dependent ecosystems. *Australian Journal of Botany* 54: 115-132.
- IAG Independent Audit Group (2007) *Review of cap implementation 2005/06*, Murray-Darling Basin Commission, Canberra.
- IAG Independent Audit Group (2008) *Review of cap implementation 2006/07: report of the Independent Audit Group*, Murray Darling Basin Commission, Canberra.
- IAHA International Association of Hydrogeologists Australia (2004) *Guiding principles for sustainable groundwater management*, Murray-Darling Basin Commission in collaboration with Resource and Environmental Management SA, Canberra.
- Jones, G, Hillman, T, Kingsford, R, McMahon, T, Walker, K, Arthington, A, Whittington, J & Cartwright, S (2002) *Independent report of the Expert Reference Panel on Environmental Flows and Water Quality Requirements for the River Murray System*, River Murray Project Board, Canberra.
- Kingsford, R & Nevill, J (2006) 'Urgent need for a systematic expansion of freshwater protected areas in Australia: a scientists consensus statement', *Pacific Conservation Biology*, vol. 12, no. 1, pp. 7-14.
- Ladson, A & Finlayson, B (2002) 'Rhetoric and reality in the allocation of water to the environment: a case study of the Goulburn River, Victoria Australia', *River Research and Applications*, vol. 18, pp. 555-68.
- Ludwig, D, Hilborn, R & Walters, C (1993) 'Uncertainty, resource exploitation and conservation: lessons from history.' *Science*, vol. 260, no. 2, p. 17.
- LWA Land and Water Australia (2007) *The impact of groundwater use on Australia's rivers: exploring technical, management and policy challenges*, LWA, Canberra.

- MDBC Murray-Darling Basin Commission (1997) *Water audit monitoring report 1994/95*, MDBC, Canberra.
- MDBC Murray-Darling Basin Commission (2003) *Murray-Darling water resources fact sheet*, MDBC, Canberra.
- MDBC Murray-Darling Basin Commission (2006) *Water audit monitoring report 2004/05*, MDBC, Canberra.
- MDBC Murray-Darling Basin Commission (2008) *Water audit monitoring report 2006/07: report of the MDBC on the cap on diversions*, MDBC, Canberra.
- MDBMC Murray-Darling Basin Ministerial Council (1998) *Floodplain wetlands management strategy*, Murray-Darling Basin Commission, Canberra.
- MDBMC Murray-Darling Basin Ministerial Council (2001) *Integrated catchment management in the Murray-Darling Basin 2001-2010*, Murray-Darling Basin Commission MDBC, Canberra.
- NCC National Competition Council (1999) *Water resource policy as at 30 June 1999*, NCC, Melbourne.
- Nevill, J (2001a) *Freshwater biodiversity: protecting Australian freshwater ecosystems in the face of infrastructure development*, Water Research Foundation of Australia, Canberra.
- Nevill, J (2001b) *Submission: Wy Yung Groundwater Supply Protection Area groundwater management plan draft for consultation Southern Rural Water*. From http://www.tucs.org.au/~cneville/Submission_Wy_Yung_groundwater.doc, accessed 1/3/2007.
- Nevill, J (2003) 'Managing the cumulative effects of incremental development in freshwater resources', *Environment and Planning Law Journal*, vol. 20, no. 2, pp. 85-94.
- Nevill, J (2006) *The precautionary principle in Australian ocean management*, OnlyOnePlanet Australia, viewed August 18 2007, <<http://www.ids.org.au/~cneville/marinePrecautionaryPrinciple.doc>>.
- Nevill, J (2007) 'Policy failure: Australian freshwater protected area networks', *Australian Journal of Environmental Management*, vol. 14, no. 1, pp. 35-47.
- Nevill, J (2008) 'Comment on recent progress in water-balance planning and the supply of environmental flows to ground water-dependent ecosystems', *Ecological Management and Restoration*, vol. 9, no. 2, pp. 145-8.
- NWC National Water Commission Australia (2007) *First biennial assessment of the National Water Initiative*, NWC, Canberra.
- Odum, W (1982) 'Environmental degradation and the tyranny of small decisions.' *Bioscience*, vol. 32, no. 9, pp. 728-9.
- Ponder, WF (2002) *Desert springs of the Australian Great Artesian Basin*, Conference proceedings: spring-fed wetlands: important scientific and cultural resources of the Intermountain Region, viewed 3 March 2007, <<http://www.wetlands.dri.edu/>>.
- Ponder, WF (2004) Endemic aquatic macroinvertebrates of artesian springs of the Great Artesian Basin – progress and future directions. *Records of the South Australian Museum Monograph Series* 7: 101-110.
- Preston, Justice CJ (2006) New South Wales Land and Environment Court, *Telstra Corporation Limited v Hornsby Shire Council*, 133, 24 March 2006.
- Pringle, CM (2001) 'Hydrologic connectivity and the management of biological reserves: a global perspective', *Ecological Applications*, vol. 11, pp. 981-98.
- Pringle, CM (2006) 'Hydrologic connectivity: a neglected dimension of conservation biology', in KR Crooks & M Sanjayan (eds), *Connectivity conservation*, Cambridge University Press, Cambridge.
- SCRRAT Senate Standing Committee on Rural and Regional Affairs and Transport (2006) *Water policy initiatives: final report*, Department of the Senate - Parliament House, Canberra.

- SKM Sinclair Knight Metz (2003) *Projections of groundwater extraction rates and implications for future demand and competition for surface water*, Murray-Darling Basin Commission, Canberra.
- SKM Sinclair Knight Metz (2006) *Towards a national framework for managing the impacts of groundwater and surface water interaction in Australia*, Department of Agriculture, Fisheries and Forestry Australia, Armadale Melbourne.
- Sommer, B & Horwitz, P (2001) 'Water quality and macroinvertebrate response to acidification following intensified summer droughts in a Western Australian wetland', *Marine and Freshwater Research*, vol. 52, pp. 1015-21.
- Sophocleous, M (2000) 'From safe yield to sustainable development of water resources—the Kansas experience', *Journal of Hydrology*, vol. 235, no. 1-2, pp. 27-43.
- Sophocleous, M (2002) 'Interactions between groundwater and surface water: the state of the science', *Hydrogeology Journal*, vol. 10, pp. 52-67.
- SRW Southern Rural Water (2000) *Wy Yung Groundwater Supply Protection Area: draft groundwater management plan for consultation*. SRW, Maffra Victoria.
- SRW Southern Rural Water (2007) *Draft water plan 2008-2013*. SRW, Maffra Victoria.
- Tan, P-L (2000) 'Conflict over water resources in Queensland: all eyes on the Lower Balonne', *Environment and Planning Law Journal*, vol. 17, pp. 545-68.
- Turnbull, M (2007a) *New \$52 million groundwater action plan*. Press release, Parliament House, Canberra. 19 Sept 2007.
- Turnbull, M (2007b) *Water Bill 2007 – second reading speech*. From <http://www.malcolmtturnbull.com.au/news/Article.aspx?ID=898>, accessed 2/9/07.
- Turral, H & Fullagar, I (2007) *Institutional directions in groundwater management in Australia*. In: Giordano M & Villholth, KG (2007) *The agricultural groundwater revolution: opportunities and threats to development*. CAB International, London.
- Unmack, P & Wager, R (2007) 'Threatened fishes of the world: *Chlamydogobius micropterus* Larson, 1995 (Gobiidae)', *Environmental Biology of Fishes*, vol. 80, no. 4, pp. 489-90.
- Wentworth Group of Concerned Scientists (2003) *Blueprint for a national water plan*, WWF Australia, Sydney.
- WRON Alliance (2007) *Australian water resources 2005: a baseline assessment of water resources for the National Water Initiative*, National Water Commission Australia, Canberra.
- Zektser, S, Loaiciga, HA & Wolf, JT (2005) 'Environmental impacts of groundwater overdraft: selected case studies in the southwestern United States', *Environmental Geology*, vol. 47, pp. 396-404.

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This document is paper No.41 at <http://www.tucs.org.au/~cneville/freshwater.htm>.

Dam risk to Murray-Darling wetlands may be underestimated

June 1, 2011

Professor Richard Kingsford □ Computer modelling used to develop the Murray-Darling Basin Plan may have significantly underestimated the effects of building dams and diverting water on the internationally listed Macquarie Marshes wetlands, according to a new study.

"This may have profound implications for the decisions currently being considered by government in relation to the basin plan, certainly for the Macquarie Marshes and elsewhere if there are similar findings," says Professor Richard Kingsford, Director of the Australian Wetlands and Rivers Centre, an author of the study published in the international journal *Environmental Management*.

Kingsford and his colleague, Dr Shiquan Ren, statistically analysed changes in flows to the Macquarie Marshes on the Macquarie River before dams and diversions occurred and then afterwards. They found that the hydrological model used for the Macquarie River for managing the river and underpinning the basin plan, underestimated the average annual impact of reduced flows to the Macquarie Marshes by 16%.

Government hydrological modelling estimated that annual average flows had been cut by dams and river regulation by only about a 27%, but the new modelling estimates the flow reduction at 43%. The Guide to the Basin Plan has recommended that there should be return of about an additional 10% of the flows to the Macquarie River.

To ensure that their analyses were accurate, the researchers also compared outputs from their statistical modelling and the government hydrological models to actual data from flow gauges on the river. The researchers found good agreement between actual data and outputs from their statistical models. According to Kingsford: "The hydrological model used for the basin planning tended to underestimate flows before dams were built and overestimated flows after dams were built. That's the nub of the problem causing the disparity".

These results, the first independent assessment of hydrological modelling anywhere in the Murray-Darling Basin sends a strong warning to governments deciding the future of the basin and how much water should be returned to the rivers, says Professor Kingsford: "If we found similar

results elsewhere, it would mean a significant jump in the amount of flow that we should be returning to basin rivers for sustainability." "Certainly most environmental scientists working in the Murray-Darling Basin over the last 50 years have been struck by the scale of degradation with large areas of dead river red gums, declining waterbird populations, water quality issues and general declining health of the river."

The modelling differences were primarily when the river reached the complex wetland system. According to Kingsford: "The hydrological model used for the basin planning figures in the Macquarie did not cope well with measuring the impact on the wetland but all models line up well in their predictions higher up the river." The study concluded that this reflects the purpose of many hydrological models that underpin the basin plan: they were originally designed to manage the river for irrigation, not for the complexity of large wetland systems. This also has implications for environmental flow management. "We need modelling systems that better mirror the hydrological variability because this is a window into the ecological intricacies of these wetlands which are so important for biodiversity" says Kingsford.

The paper "Statistically *Integrated Flow and Flood Modelling Compared to Hydrologically Integrated Quantity and Quality Model for Annual Flows in the Regulated Macquarie River in Arid Australia*" is online <http://www.springerlink.com/index/U25VK12T571760U8.pdf>

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25th July 2011

Droplet No. 19

Droplets explore ideas and propositions, which if developed further, might improve water use. They develop building blocks that one might consider if not constrained by prior decisions.

Sustainable Diversion Limits: A plan for the Murray-Darling Basin

"I love a sunburnt country, □ A land of sweeping plains, □ Of ragged mountain ranges, □ Of droughts and flooding rains " Dorothea Mackellar

The Murray Darling Basin Authority is about to release a Draft Plan for the management of the Murray Darling Basin's water resources. As with all plans, there will be devil in the detail – especially in the way the Authority chooses to specify Sustainable Diversion Limits (SDLs).

The final version of the Basin Plan is due to be gazetted in 2012 and, once gazetted, the SDLs specified in it will be very difficult to change. Yes, there is a transition period between 2012 and 2019 to allow closure of the gap between existing arrangements and the SDLs set by the Authority but, once

2019 arrives, the SDLs set in 2012 become binding.

When it comes to setting SDLs, section 23 (2) of the Water Act gives the Authority three choices. The Authority can

- cxxxiv. a) set a number – as is proposed in the Guide to the Basin Plan.
- cxxxv. b) use a formula; or
- cxxxvi. c) specify sustainable diversion limits “in any other way that the Authority determines to be appropriate.”

When option a) or b) is used, the Act requires any reduction in an SDL to be implemented via a tortuous Basin-wide review process involving full consultation with MDB states, approval by the Commonwealth Minister and scrutiny by Parliament. If the resultant review results in a reduction in an SDL then the Act requires that a compensating cheque be sent to each entitlement holder adversely affected by the reduction. Option (c) allows the Murray Darling Basin Authority to be as innovative as it wants to be.

Of these three choices, which is the best option?

Options

Paraphrasing Dorothea Mackellar, a good Basin Plan needs to plan for droughts and flooding rains. And given the likelihood of changes in technology and climate, a fixed number based on averages does not seem like a good idea.

Conceptually, a formula sounds better than a number as it can allow for change. But, all the variables in the formula and all the coefficients in the formula would need to be right from day one. Difficult!

Given these limitations, we believe that option (c) is worthy of serious consideration. The Authority could specify SDLs so that continuous improvement in the management of the Basin's resources becomes possible.

An adaptive SDL

If option (c) is chosen, SDLs could be published in the Basin Plan in 2012 but specified as the starting point in a continuous search for better ways to manage and use the Basin's water resources.

To open up this opportunity and set up an adaptive SDL framework, the Basin Plan would need to establish an SDL register and allow this register to be changed as innovation occurs and knowledge improves. Local community representatives could request an amendment of their SDL to account for any initiative they have taken. Initiatives they might consider include investment in so-called “environmental works and measures” and policy changes that enable the more efficient delivery of environmental outcomes.

In practice, the structure of an adaptive SDL register for a regional water

resource would look like this.

Opportunities to adjust an SDL as adaptive improvements are made

$$\begin{aligned} \text{SDL}_t = & \text{SDL}_{2012} + \text{Effects of changes to the} \\ & \text{portfolio of environmental entitlements held after 2019} \\ & + \text{Effects of investments in environmental works and measures made after 2012} \\ & + \text{Effects of policy changes that make environmental water management more effective} \end{aligned}$$

Governance

If option (c) is adopted and the Basin Plan used to establish an SDL register, there would be a need to differentiate between register changes that

- . i) are clearly in the interests of all; and
- . ii) might have adverse impacts on some users.

The process for amendment of the register when a change is “clearly in the interests of all” could be quite simple. The Authority could require such applications to be co-signed by the chairs of the local catchment board, the local water supplier and the regional environmental water manager. If the application is judged by the Authority to be consistent with principles set out in the Plan and not to have unacceptable impacts or implications for other parties, they could agree to amend the register. If this degree of consensus is absent, or if the Authority is concerned that the proposal may have unacceptable impacts on others, then the proposed change would have to go through a full Basin Plan amendment process required by the Act.

Examples of changes worthy of consideration

If an adaptive SDL register, as proposed in this droplet is established, communities would have an incentive to negotiate with one another and continue to search for ways to improve the Basin Plan after 2012.

A South Australian environmental water manager may, for example, be interested in exchanging some high security South Australian environmental

water entitlements for some low security water entitlements held by Victorian irrigators. If all involved, think that this reconfiguration of their respective entitlement portfolios makes sense, then why stop them from benefiting?

Similarly, a local farmer may identify an opportunity to build a control structure enabling water levels to be raised and lowered in a manner that produces better environmental outcomes with less water. Once this structure had been shown to work, local community representatives could apply for “their” SDL to be increased. The relocation of a supply channel could be used to achieve a similar increase in an SDL.

Another example is the possibility that an environmental water manager might be able to negotiate an options agreement with a local irrigation company. Options agreements that make more water available to the environment in very wet years and more water available to irrigators in very dry years are worth careful consideration. If such an options agreement was put in place then, instead of parting with money, those involved could apply to have “their” SDL increased. Potentially, a win-win outcome for all involved.

Under this proposal, local people could be encouraged to search for policy changes that would lead to better environmental outcomes. This might, for example, encourage them to consider changing carry forward arrangements so that it is easier to supply water for the small flood-like events needed to sustain some species and some wetlands.

Another opportunity worthy of consideration is a change to the way “planned” or “rules-based” water is managed. In an average year, over 5,000 GL of MDB water in NSW lies outside the entitlement system and is used to “run the river.” If more of this water can be turned to environmental benefit then it may be possible to increase an SDL.

Under this register approach, any approved sale or purchase of entitlements for the environment would be recorded in the SDL register.

[Where to from here?](#)

When the draft Basin Plan is released, we urge careful consideration of the way that SDLs are specified and how adaptive the Basin Plan should allow management arrangements to be.

If governments want to allow adaptive improvements to the Basin Plan in partnership with communities, then section 23 (2) (c) is the way to go.

If section 23 (2) (a) is chosen, SDLs will be cast in stone in a manner that could stifle improvement, discourage local initiatives and effectively freeze progress.

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References (Access them by clicking on the links embedded in this Droplet.)
[Water Act, 2007 as amended.](#)

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Droplet No. 17

24th May 2009

Droplets explore ideas and propositions, which if developed further, might improve water use. They develop ideas and search for the fundamental concepts and building blocks that one might consider if not constrained by prior decisions.

Water security: Should urban water use, like rural water use, be capped?

[“What’s good for the goose, is good for the gander”](#) – a proverb of unknown origin.

The so-called cap on surface water use in the Murray-Darling Basin is widely acclaimed as a success. This cap is dynamic and designed to limit the amount of surface water that may be taken from rivers in each part of the Basin.

The cap’s main purpose is to keep water use and development within an agreed limit *and* maintain a degree of supply reliability at the individual level. If some want access to more water than is currently allocated to them, others must agree to take less water. In rural areas, this is achieved primarily by letting people trade water on a temporary or permanent basis.

Contrast this with the situation found in most urban water supply systems. Even when severe water restrictions are in place, if someone wants to open up a new business or build a new house, they are allowed to do so. As a direct result, the reliability of everyone else's water supply is eroded.

The reality is that the construction of a new house or the establishment of a new factory is seen as so important that it should be allowed to proceed regardless of its impact on everyone else's lifestyle and property.

Exploring this idea, participants at the recent [Australian Davos Connection Infrastructure 21 Conference](#) proposed that urban people, like their rural cousins, should be required to operate under a cap.

Would it make sense to impose a cap on urban water users? What would happen if city planners were not allowed to grant building approval for a house, factory or shop until adequate water had either been secured or the applicant had made arrangements to off-set the impact of their proposed development on all other water users and the city's environment?

A catchment cap

In Australia, most urban water is sourced from dams, rivers and, in cities like Perth, also from groundwater. In order to impose a cap on water use in a city, the first step would be to work out how much water is needed to keep a minimum flow through the city's rivers and streams and to cover evaporative losses. The remaining water would then be available for sharing between the environment and all users. In effect, the city would be given an entitlement to a share – a right to a proportion - of inflows after enough water had been put aside to keep the system functioning. Under such a regime, the city's right to access water in the catchments that supply it would be capped. Pragmatically, this amount of water would be converted into a number of house equivalents.

If the amount of water that a city could take from its catchment was capped and supplies were short, attention would quickly shift to the supply and demand sides of urban water management.

Alternative supplies

On the supply side, one would expect the city's water-supply managers to pursue groundwater development, stormwater management, waste water treatment, recycling options and the purchase of water from irrigators. Climate-independent opportunities like desalination might be explored. Whenever additional supplies were secured, the resultant increase in the number of house equivalents would be assessed and added to the cap. We suspect water-supply managers might decide to call the resultant number of household equivalents of water "available" the city's "water-security **cap**."

One would expect that the water-security cap would account for the amount of water that following use, was returned to the system. No actions that reduce the amount of water already allocated to downstream users and/or the environment would be allowed – unless, of course, there are no downstream

users and downstream impacts from return flows on the environment are negative.

Reliability

No doubt, a debate about the potential effects of adverse climate change on expected mean water- supply-system reliability would soon emerge. We expect that ultimately, the water-supply potential of a city's catchments would be defined using something like a 10 year moving average of inflows. This would mean that as it got drier, the water-security cap would start to come down.

Demand

Having exhausted cheap supply-side options, attention could then move to the demand side of the equation. Water requirements for each type of house and business would have to be defined and minimum reliability standards set for them. The impact of the current constellation of pricing, regulatory and other policy arrangements would need to be considered. Each standard would then be multiplied by the number of houses and businesses that exist to determine how much water supply infrastructure was needed by the city.

A typical minimum standard might require each and every house to have unrestricted access to a reasonable amount of water for the next 100 years under worst-case climate change assumptions. No more than 2 years of water restrictions in 100 years could be defined as a reasonable standard.



So far, these arguments are fairly traditional. Urban water-supply utilities routinely prepare such analyses and use them, coupled with growth projections, to argue for funding in order for them to invest in water supply-side augmentation. Cities that grow need more water!

Making the cap fit

The main difference between a city with a formal water-security cap and the traditional approach is the cap's commitment to stop development from eroding urban water security. Whenever the water-security cap is reached, a *pre-defined* water-security trigger would go off. Further development would be possible if and only if, supplies are augmented or a water-security off-setting investment is made.

In order to ensure enforcement, a truly independent water-security commissioner would need to be appointed and required to inform the city when it was about to breach its cap. An array of early warning triggers would be appropriate. As suggested in [Droplet 10](#), the Commissioner could be empowered to encourage timely investment by introducing scarcity pricing and requiring the money collected to be used to augment water-supply

security immediately. The Commissioner might also decide to relax third-party access rules and increase opportunities for private firms to compete with traditional water suppliers.

As the situation declined, all developers would come under massive pressure to invest and lobby to ensure that water security was maintained at the household level so that development would not stop.

Offset arrangements

As set out in [Droplet 5](#), offset arrangements are used in the state of Arizona in the United States. In that part of the world, no house may be sold without a statement as to whether or not its water supply is sufficient to supply it for the next 100 years. When considering the best way to source water for a new subdivision, some Arizonan developers have financed groundwater recharge schemes and others have paid for the conversion of single-flush toilets to dual-flush toilets. In a few cases, we understand that factories have been approached to see if they would sell their water and move to another location. The other option, which such actions encourage, is to build houses that demand less water.

Thinking further about the nature of the scarcity signal given, we expect that cities would set up a water- security credit banking system and encourage developers to bank unused water-security credits.

Setting the first water-security cap

We recognise that most governments would probably not be prepared to put in place such a regime until a water-security buffer had been established. In cities where water restrictions are still in place, the first impact of a decision to implement a water-security cap would be a number of catch-up investments.□Once these catch-up investments had been made, it would be interesting to see if a government would be prepared to impose the discipline that a water-security cap creates on future governments.

Where to from here?

As has been demonstrated in rural areas, the introduction of a water-security cap can be expected to bring stronger investment and supply management disciplines to a city. As summarised in a recent [report to the National Water Commission](#), some Australian cities already operate under a catchment cap but, as yet, none have gone as far as to undertake not to allow developments that erode water reliability at the household or business level.

Assuming that water-security caps are well implemented, their introduction would create strong incentives for existing water users to search for and profit from increasing water-use efficiency and search for new ways to supply water to the city. If catchment caps of the type described here were applied to a city, then the incentive to retrofit a city's existing infrastructure would be much stronger than it currently is.

Should your city be prepared to subject itself to the discipline of a water security cap? Once sufficient catch-up investments have been made, most of the pressure would fall on future governments. We think the idea is worth careful consideration. As part of this process, someone would have to work out what water-security standards to put in place. Development of national urban water-security guidelines would be a good start.

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References (Access them by clicking on the links embedded in this Droplet.) □ Stanley, J. (2008) ADC Infrastructure: From incrementalism to transformational change, Conference Proceedings Frontier Economics (2008) Review of urban water entitlements in Australia, National Water commission, Canberra

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Droplet No. 18

26th July 2009

Droplets explore ideas and propositions, which if developed further, might improve water use. They develop ideas and search for the fundamental concepts and building blocks that one might consider if not constrained by prior decisions.

Securing water: What is the best and fairest way to secure water for the environment?

"Change and adjustment is an essential and inevitable outcome of economic growth and is a process without beginning and without end." – Jim McColl

A river can be described as "over-allocated" when its entitlement regime allocates too much water to users and not enough to the river, its aquifers and the wetlands dependent upon it.

One of the essential steps in solving an over-allocation problem is to fix those parts of the allocation system that caused the problem to emerge. Otherwise the problem will re-occur. Fixing the causes of over-allocation commonly involves complex changes to legislation, governance arrangements and water resource plans that inevitably take time to negotiate and implement. It's a lengthy, time-consuming process.

In the meantime and parallel with the reforms necessary to prevent re-occurrence, the existing over- allocation problem has to be solved by a) changing the rules used to determine how much water each entitlement holder gets; and/or b) securing a larger proportion of entitlements for the environment.

In Australia's seriously over-allocated Murray-Darling Basin, new legislation is in place, a new Authority is finding its feet and a new Basin Plan is being prepared. The causes are being addressed. At the same time, an attempt is being made to solve the existing over-allocation problem by purchasing water for the environment from willing sellers and by investing in a suite of infrastructure "modernisation" projects aimed at reducing conveyance and delivery losses and transferring a share of the "net savings" to the environment. Due diligence assessments of savings projects have been promised.

In the case of the Murray Darling Basin, the Commonwealth Government recently announced that it had overspent its budget for the purchase of environmental water by \$193 million. Progress is being made but, as the recent A\$303m purchase of water from one of Australia's largest agricultural companies has shown, not everyone agrees with this approach. Objections include claims that the impact on local communities is too great, that the

wrong types of water entitlements are being purchased, and that water is being purchased in the wrong areas. In response to the last objection, the NSW government announced it would not allow the Commonwealth Government to buy any more water for the environment from NSW – they want more water bought from Victoria. Others want more money invested to improve the efficiency of supply infrastructure and on-farm water use. In short, solving the over-allocation problem in a timely manner is proving to be convoluted and difficult.

To make matters worse, all the above is being undertaken during what is either a prolonged drought or, quite possibly, a step-change to a drier regime. Storages, the river and associated aquifers are at extremely low levels. Future prospects look grim. Unless the Basin has an unexpected run of very wet years, it will take a considerable time to get storages and the river back to a reasonable state.

Given this challenging environment, how long should be taken to solve an over-allocation problem? And, if a government wanted to solve this problem quickly, what is the best and fairest way to do it?

Change and adjustment

Most Australian farmers understand that structural adjustment is the norm – a never-ending process that has no end. In irrigation, as elsewhere, this process favours those best able to adopt new technologies and manage efficiently. The process encourages others, for various reasons, to leave the industry.

As set out in our report, [Managing Change](#), whenever governments step in and give money to the less able managers, the more talented managers can't compete and move to other areas in a manner that can cause regional economies to go backwards. Money follows opportunity, not barriers, to change.

The same process can also occur at the regional level. When one region is given a grant to modernise its water supply infrastructure, other regions and water users who have modernised at their own expense are disadvantaged. Great, for those on the receiving end of the subsidy or “modernisation program.” Awful, for those on the losing end.

As agreed by the Commonwealth and all State Governments when they signed the National Water Initiative, Australia and the irrigation industry as a whole will be better off if and when all water users are required to pay the full cost of providing access to water supply infrastructure and of delivering water. Most professional policy analysts do not recommend subsidies to existing irrigators, but support sensible grants to help facilitate adjustment by those wishing to exit the industry.

The effects of environmental buy-backs

Whenever a new player enters a market, demand increases and the price

goes up or at least remains higher than it otherwise would be. Unfortunately, when a government chooses to solve an over-allocation problem by buying water entitlements, this discourages irrigators from adjusting and innovating in the ways that keep their industry prosperous. To put it bluntly, few irrigators can compete with a government cheque book. Provided the process used is fair, just and efficient, the faster an over-allocation problem is fixed, the more prosperous an irrigation industry can expect its future to be.

What about regional impacts?

Not all the money invested used to buyback water entitlements leaves a region. To the surprise of many, a recent [Monash University assessment of the implications of buying back water](#) in the Southern Connected River Murray system found that “buyback raises rather than lowers aggregate consumption in each region.” Across the system, the impact on regional GDP was less than 1% and in several regions, including Victoria’s Goulburn district, buybacks were found to increase (not decrease) regional GDP. In times like the current one, when many are receiving no or little water, buybacks should be seen as similar to a rapid financial stimulus package.

How much water is needed?

How much water is needed for the environment depends upon on the structure of the entitlement regime and basin-wide sharing regime that is put in place. In our [report on Future Proofing the Basin](#), we argued that managers should differentiate between the water needed to maintain a minimum flow and convey water to users, and that needed for the environment. In the Southern Murray-Darling system, the simplest approach is to aim to a secure a similar percentage of each type of entitlement for the environment – including high security entitlements.

Three options

The real challenge is to find a way to solve the over-allocation problem quickly. One option is to continue to buy water but at a dramatically accelerated rate. This is likely to be administratively very difficult.

Another option is to issue the environment a proportional share of each entitlement type. This approach would solve the over-allocation problem in one single step. Ministers would simply issue a suite of entitlements to the environment. Overnight, the environment would become a shareholder whose status would be equivalent to all other users.

Given past policy commitments, principles of fairness and justice would suggest the need for a compensating payment to all users well in advance of the environmental share being issued. Once made, irrigators would then be well resourced and free to compete and innovate in water and land markets that are about the future of their industry rather than about the cost of past mistakes.

If the above option seems unacceptable, then an alternative approach is to

run a reverse tender and buy all the water needed for the environment in one hit. Reverse tender share buybacks are often used by companies to buyback shares. A range of offer prices are set and participants are invited to indicate how many shares they would sell at that price. A clearing price is determined and all who offered to sell at less than that price are paid the clearing price. Usually, the clearing price is well above market value.

Where to from here?

Ultimately fixing an over-allocation problem means that less water can be used for irrigation. As indicated above, there are a number of possible ways to fix an existing over-allocation problem. The quicker the process, the greater the regional benefits. Every Basin community would be stimulated by the rapid injection of cash into their economy and able to plan for their future with greater confidence. There would be an end to policy uncertainty. Importantly, the water market would be returned to one that is about the value of future opportunities to profit from using water and improving businesses.

Speeding up the process will lead also to considerably better environmental outcomes. Many environmental assets within the Basin need a share of available water now. Some time in the future may be too late. River health is in a perilous state, time is no longer on much of the Basin's side.

Perhaps the best way forward is to continue buying through the rest of this coming irrigation season (if NSW and Victoria will allow the Commonwealth to do this), and then commit to totally resolving the over-allocation problem before the start of the next irrigation season. With the agreement of relevant Basin Governments, this could be done in the period between May and June 2010. Either of the two options presented above – an environmental share issue or a reverse tender – could be used to do this.

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References (Access them by clicking on the links embedded in this Droplet.) □ [Dixon et al, \(2009\) Modelling the Australian Government's Buyback Scheme with a Dynamic Multi-Regional CGE Model. Managing change](#) □ [Young, M and McColl, J, \(2008\) A future-proofed Basin: A new water management regime for the Murray-Darling Basin](#)

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CAMERON, Mr James David Alan, Acting Chief Executive Officer, National Water Commission

KENDALL, Mr Matthew, General Manager, Sustainable Water Management, National Water Commission

[15:19]

CHAIR: Welcome. I remind senators that the Senate has resolved that an officer of a department of the Commonwealth or a state shall not be asked to give opinions on matters of policy and shall be given reasonable opportunity to refer questions asked to a superior officer or minister. The resolution prohibits only questions asking for opinions on matters of policy and does not include questions asking for explanations or factual questions about when or how policies were adopted. Officers of the department are also reminded that they can claim it would be contrary to the public interest to answer a question but it must be made by a minister if that is the case and shall be accompanied by a statement setting out the basis for the claim.

You have made a submission which we have numbered 185. Do you want to make any changes or amendments?

Mr Cameron: No, thank you. □ CHAIR: Do you want to make a brief opening statement? Mr Cameron: We are happy to move straight into questions.

CHAIR: I read a document in the Hansard in Brisbane which the Water Commission authored saying there were a whole lot of unknown propositions around what we are here inquiring about. Would you like to take us through some of the vagaries that you are concerned about on the water side of coal seam mine gas?

Mr Cameron: I think the document you are referring to is a position statement the commission put out in December of last year in relation to coal seam gas. In that document the commission acknowledged the significant economic and other potential benefits from the development of the sector but also noted that there were a range of risks associated with the coal seam gas sector that would apply to water resources

across the country and the sustainable management of those resources. In that document we identified the large volumes of often low quality water that will be co-produced extracted from those developments, which will generally be taking place in aquifers that are at full allocation or overallocation. There are issues associated with the depressurisation of aquifers as a result of that extraction, with the resulting potential for cross-aquifer interaction or contamination, issues associated with potential reductions of surface flows because of the interaction between groundwater and surface water systems and issues associated with subsidence. There are a range of other matters that result from the co-production, including issues associated with the requirement to manage that water which has been extracted, whether it is treated and whether it would be put into surface water systems or otherwise managed more generally. And there are concerns associated with the practice of hydraulic fracturing, or fracking, that has the potential again to cause changes to the aquifer systems and potentially cross-contamination.

CHAIR: When we capped the extraction from our rivers in the Murray-Darling Basin in 1996 farmers, being likeable rogues, getting used to how to survive, suddenly rushed into groundwater extraction. The so-called supervisory science did not understand at that time the interconnectivity between the groundwater and the river water to the point where lower down in the system some of the river flow is 40 per cent groundwater coming into the system. Do you agree with that?

Mr Cameron: Certainly it is true that in many parts of the country there is a high level of connectivity between surface water and groundwater systems and our understanding of the connectedness of those systems is evolving over time. In the National Water Initiative, the agreement made between the federal government and the state and territory governments in 2004 about how our water resources should be managed, all state and territory governments and the Commonwealth government agreed that groundwater resources should be managed sustainably in full recognition of the connectivity between those resources and surface water systems.

CHAIR: So do you agree that some of the coal seam gas mining being talked about in whole areas of states covered would include areas where there is direct connectivity between the groundwater and rivers?

Mr Cameron: There is in many parts of the country a level of connectivity and it is likely that there is a level of connectivity in those areas too.

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CHAIR: Are you aware that in the United States, on our side of the United States, for 20 years they have been litigating in the courts because the groundwater extractors over there actually ceased flow in some of their smaller river systems, that one is blaming the other and that it is a lawyers feast? This could become here, unchecked, with the lack of science in decision-making, a lawyers feast, a river of gold?

Mr Cameron: Certainly I would agree that the US system of water management is a

litigious framework and one which is not replicated here today. As we indicated in our position statement, we think it is important that the production of water for coal seam gas purposes and the use of water in the coal seam gas sector should be managed within that National Water Initiative framework because it is important to understand the interactions between the coal seam gas co-produced water and the water resources more generally used, which are used for consumptive purposes, whether that be for agriculture or town water purposes. The fundamental point is to understand the interaction and to ensure that, to the extent that coal seam gas is extracting water resources from our water systems, it is done in a sustainable way. That should be done in the context of NWI-consistent planning and management arrangements.

CHAIR: So you agree that, within the vagary of the knowledge and according to the CSIRO, there could be 500 gigs drawn out of the Great Artesian Basin by way of stock and domestic. That figure was before the full implementation of the piping and capping. I noted that for their benefit because they said that between 250 and 400 gigs of extraction from the Great Artesian Basin was from coal seam gas mining and 500 for stock and domestic. What they did not include was that it was before we piped and capped. So it did not look as if the coal seam gas people were going to take more than the stock and domestic people. When you put the piping and capping in with a couple of hundred gigs of savings there coal seam gas mining is potentially going to extract more water out of the Great Artesian Basin than stock and domestic. Is that true?

Mr Cameron: I would agree that the estimate of extraction from the Great Artesian Basin is around that 500 giganlitre or 540 giganlitre figure, but that is a figure which is some years old. There are a range of estimates about the likely level of co-produced water coming from coal seam gas developments. In our position statement we indicated a potential average of around 300 giganlitres per year. Regardless of whether that is somewhat less, equal to or somewhat more than consumptive use, it certainly is a very significant number.

CHAIR: One of the figures we were given this morning is that the extraction by the coal seam gas industry is bugging all of the volume held in the Great Artesian Basin. That really is not a sustainable proposition. It is the percentage of the recharge that is more relevant. It is not so much what is in the tank but how much you can take out of the tank without emptying the tank, isn't it?

Mr Cameron: Certainly the sustainable management of a resource requires managing that resource in a way that means you retain a level that approaches an equilibrium. Yes, it needs to be by reference to the recharge rate.

CHAIR: Would you agree that from 1980 to this point in time we have learnt a lot more about our water resources?

Mr Cameron: I would certainly agree that we have learned a lot more about our water resources. From the commission's perspective, we have expressed the view for a long time that our understanding of groundwater resources is not as well developed as surface water resources. So over the life of the commission we have had a program of investing around \$83 million in improving our understanding of groundwater resources. But our understanding of water resources is not perfect and is likely never to be perfect because it reflects a set of natural systems that are changing over time

and our understanding of the relationship between those systems and environmental assets is something that will continue to evolve.

CHAIR: Given the normality of human failure, the increasing use of science to inform ourselves and the experience of the Esso oilfield in Bass Strait, where they got approval in 1969 that did not include reinjection of the water, which now means a metre a year is falling off the water table under the Latrobe Valley recharge in Gippsland, there will be a huge subsidence at sea and possibly up the coast adjoining the Bass Strait oilfield because they did not include the necessity to recharge, because they did not have the knowledge and because Esso have said, 'If we are going to have to do something about that, it will be \$230 million to fix it and recharge it.' Do you think that a decision made in 1980 by way of giving approval to another extraction out of the Great Artesian Basin would need to be updated with present knowledge? I am referring of course to the Olympic Dam extraction.

Mr Cameron: I would not venture to comment on any particular approval but certainly our understanding of the resources evolving over time and an adaptive management approach to water management would suggest that we continually revisit the way in which we manage the resource as a whole as a result of new information that emerges.

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CHAIR: So it would not be unfair to say that perhaps we ought to go back and have a look at some of these earlier approvals and see if those approvals are sustainable. You may not wish to comment on this, but I wish to point out to you that the principal science adviser for the Department of Sustainability, Environment, Water, Population and Communities does not know the answer on any of the sums on the Great Artesian Basin. Do not comment, but I am surprised that a principal science adviser to the peak government organisation does not know the basic propositions of what he is advising about.

Senator GALLACHER: Your submission is in part detailing a precautionary approach to coal seam gas operations, and you have highlighted a number of the issues raised this morning. I note that that report is 2010. Do you see any evidence of any of your precautionary warnings or thoughts coming to fruition?

Mr Cameron: It is fair to say that in the time since we issued our position statement, and I would not suggest it was as a result of the position statement, we have seen some further evolution of the regulatory arrangements in Queensland and we are currently watching the New South Wales government, which is going through a process of reviewing its management of not only coal seam gas interactions with water but coalmining more generally. I think it is fair to say that the arrangements that are being put in place certainly have the intent of being adaptive and in the view of the relevant governments representing a precautionary approach. We would also acknowledge that in the case of New South Wales their movement towards requiring the licensing of the extraction of water for coal seam gas purposes we would hope

would more closely align their arrangements with National Water Initiative principles. If that were to be the case then that would be a positive development.

Senator GALLACHER: Where did you draw the information from? Was it evidentiary or scientific or an American experience that gave you these precautionary provisions that you have publicised?

Mr Cameron: The principles that we articulated in our position statement represented the view of our commissioners. The National Water Commission is an independent body established under Commonwealth statute. It has seven members who are experts in a range of water related matters. They developed that position statement drawing on a range of sources of advice—some work that the commission itself has done, consultations that they and staff have undertaken with parties in Queensland and elsewhere that have interests and concerns about coal seam gas developments, and other publicly available information.

Senator GALLACHER: That board of commissioners would include a broad representation from the community including people following agricultural pursuits, or at least who have experience in the area?

Mr Cameron: That is correct. As I said, we have seven commissioners. Two of those commissioners are in the farming business, in the agricultural business—one from southern New South Wales and one from up in the north.

Senator GALLACHER: So the precautionary statement that you have put out has been improved upon, I think you are saying, in the regulatory framework?

Mr Cameron: The commission continues to watch closely developments in the regulation of coal seam gas. As I said, there are current reviews under way in New South Wales. They have not yet been completed. We have not yet seen the release of some of their proposed regulatory structures. I think it is also fair to acknowledge that, while in Queensland they have developed a series of new regulatory structures and imposed a range of conditions on the development of coal seam gas projects, in our view neither New South Wales nor Queensland has arrangements that represent a full implementation of the NWI principles, and we would encourage both parties to apply those sorts of arrangements so that those interactions between the production of water for coal seam gas purposes and the broader management of our water resources can be much better aligned.

Senator GALLACHER: I do not like asking questions when I do not know something about the answer, but do you have a view on this solution with brine—sodium bicarbonate, the sodium that is produced? Is there a person in the National Water Commission who has an idea about how that is going to be resolved?

Mr Cameron: We do not have a person in the commission who has investigated in detail the mechanisms or the potential arrangements for managing brine resulting from the treatment of co-produced water. We are aware that there are a number of companies that have developed proposals that might involve some commercial use of the brine. There are clearly a range of regulatory conditions that have been put in place in Queensland for the management of those arrangements. But we are not in a position to comment in detail on the specific matters.

Senator GALLACHER: Would you be comfortable with it being re-injected in a similar saline basis back into the aquifers, which is what is happening at the moment, 1,700 metres down?

Mr Cameron: The potential for re-injection is real, but it is important to understand that there are different issues associated with the potential re-injection of co-produced water as a whole and with co-produced water that

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has been treated, with the potential for re-injection of the resulting brine from that sort of treatment. In any of those cases there is a need for a careful understanding of the receiving aquifer, the quality of the water in those areas and a very much case-by-case judgment about the potential impacts of a re-pressurisation of those aquifers as a result of the re-injection.

Senator EDWARDS: What inquiries have you got going on now into coal seam gas mining?

Mr Cameron: At this point we do not have specific inquiries underway in relation to coal seam gas mining. We have a report that is likely to be released in the near future that looks at the estimates of the potential amount of co-produced water and some of the management arrangements. But that is the extent of our investigations in that area.

Senator EDWARDS: Who is the ringmaster in all of this? We have heard from the department of sustainability and the CSIRO and we are now hearing from the National Water Commission. We also have the Queensland government coming in. Who is in charge?

Mr Cameron: States and territories are responsible for management of water resources. The National Water Commission's perspective on these issues is very much in terms of the water management issues. So, the primary responsibility for managing the water related impacts of coal seam gas developments lies with state agencies. As you hear from the Commonwealth department earlier this afternoon, where those developments have an impact on environmental assets of national significance, there are mechanisms for the Environment Protection and Biodiversity Conservation Act to apply. And in the case of the Murray-Darling Basin, the Water Act does provide mechanisms for the MDBA's basin plan and other independent investigations to occur. So, there is a combination of mechanisms there. But, fundamentally, the primary role sits with state and territory governments.

Senator EDWARDS: When is the report being handed down? The report you referred to earlier. Mr Cameron: We expect to release that in the next few weeks. □ Senator EDWARDS: Will it be available to us? □ Mr Cameron: We would be happy to provide it to you in that time frame.

Senator EDWARDS: I refer you to an article on 4 December in the Sydney Morning

Herald that stated: □ The federal government's chief water adviser says the booming coal seam gas industry could inflict a 'significant, long-

term and adverse' toll on the nation's water supplies if it is not properly regulated.

It goes on to say:

Despite growing concerns over the impact of coal seam gas on the environment, the Commission—

you—said there had been 'little progress' in integrating the sector with broader water planning processes.

It further states:

The industry body said it was already aware of the Commission's concerns, highlighted by the lengthy approval processes required for liquefied natural gas projects.

'The National Water Commission appears to have been asleep at the wheel,' the chief executive of the Australian Petroleum Production and Exploration Association, Belinda Robinson, said.

'The industry knows these are important matters and so, too, do the state and federal governments that have specifically addressed them with the 1500 conditions attached to recent environmental approvals, and with regulations for the industry's ongoing operations.'

Do you share that view? If you do share that view, what have you done in the last six months to change APPEA's opinion of the National Water Commission?

Mr Cameron: We would not share the view of APPEA in relation to their statement of the National Water Commission. Our view is that the regulation of coal seam gas developments remains a work in progress, as I mentioned before. We are seeing regulatory review arrangements in place in relation to New South Wales. Since the development of our position statements, certainly for the developments in Queensland, it is not surprising that APPEA has its set of views about the regulatory structures in relation to their sector. From the commission's perspective, as the guardian of the National Water Initiative, it remains the case that we see that there is room for a greater alignment of the regulation of coal seam gas, co-produced water and the broader National Water Initiative consistent planning and management arrangements. That is important for ensuring that we have sustainable management of those resources more generally.

Senator EDWARDS: How do you implement that?

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Mr Cameron: We have put forward a set of principles that we think should be applied. We believe that those principles include that, wherever possible, the production of water should be licensed within NWI consistent arrangements, that regulatory approval processes for the development of projects should take account of and be closely related to the water planning and management arrangements in the relevant area. We believe that there needs to be a high level of transparency and clarity about the accountabilities that would apply for circumstances in which impacts actually arise, so that when we are managing these developments in an adaptive way there is a very clear understanding of who is responsible for dealing with those charges.

Senator EDWARDS: Everybody has a good understanding of what the issues are, but how do you actually transfer that on the ground? How do you get a change in behaviour? The industry has been very critical of the National Water Commission which is a worry. How do you get the rubber on the road? I know you must have an insight into what your report is going to say otherwise you have not been going to work because it is due out in a couple of weeks. Can you give us three or four headlines for the initiatives that we can expect?

Mr Cameron: The report is a document designed to provide a greater level of information about the potential volume of water extracted and some of the technical ways of managing the resources; it does not make policy recommendations. The policy views that we have expressed are those in the position statement.

CHAIR: Don't worry; we will be pleased to get a few facts for a change.

Mr Cameron: What we see in Queensland, for example, is that the extraction of water for coal seam gas purposes is not managed fully under the Water Act—it is not subject to water planning and licensing arrangements—and that there is a need for a high level of clarity about the accountability arrangements and the bearing of the costs associated with any impacts as a result of those developments.

CHAIR: From my experience, a lot of ministers for water would not know their arse from their elbow. It is certainly the case in Queensland where we have gone through the Cubbie experience. We are pleased to hear the Water Commission, unlike some of the representative bodies, having factual input into an argument at a political level that does not appear to have logic.

Senator WATERS: Thank you. My apologies, I have been a little distracted. We have the Queensland government coming on next and I have to leave a little early. So please excuse me if I am going over some old ground. I will keep it short. I want to ask you about the issue of clean water pollution or changed environmental flows from putting the treated associated water into, sometimes ephemeral, streams and creeks. Can you talk us through what you see the impacts of that being? It is in these

Mr Cameron: There is a range of ways in which water produced by coal seam gas developments can be used. Certainly, a number of those involve examining the treating the water so it can be used for consumptive purposes, either replacing other sources of water, whether they be aquifers, or for town water purposes. One option which has been discussed at times is to use the water for environmental purposes, that is, putting it into surface water systems to replicate environmental flows. The observation that we would make, and that we made in our position statement, is that it

is important to understand the circumstances in which that would be used. The quality of water is important. As you indicate, many of the surface water systems in the relevant regions are ephemeral or at the very least have significant periods of low flows, and the nature or the quality of the water within those systems and the quality of the water that the environmental assets would benefit from within those systems are of a particular set of characteristics and if coproduced water is used for environmental purposes there needs to be a careful management of those arrangements to ensure that there are no unintended or negative impacts on those systems.

Senator WATERS: Thank you. On reinjection, what is your view on whether it would be safe? When I say safe, I mean whether the water that is reinjected is going to stay there given our lack of knowledge about permeability and connectivity of aquifers.

Mr Cameron: It would be very much a case-by-case basis, which is not an easy answer to provide. The aquifer systems that we are talking about are quite complex and quite different across the regions that are being developed. So the circumstances in which reinjection is used needs to be based on a clear understanding of the individual aquifers themselves, the quality of the water within those aquifers and the understanding of the existing or potential crossover and interaction between those.

Senator WATERS: Do you believe we have enough understanding to be able to make that call that reinjection is going to be appropriate in those instances?

Mr Cameron: We have observed that reinjection is a real option and it is an option that should be considered alongside the range of other circumstances. We believe that in many cases aquifer reinjection will be a useful way

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of managing the coproduced water. The caveat that I make is that that needs to be done with a solid understanding of the particular circumstances in the location that you are talking about. That requires a careful assessment and careful study of those particular circumstances. I think it is fair to say that that is a view that would be reflected within the industry as well.

Senator WATERS: Thank you. I think that is enough from me.

CHAIR: Regarding the legal ownership of the water, the New South Wales government is proposing that the water in New South Wales extracted through the industry coal seam extraction will be licensed. It is not, and there are no plans to do so, in Queensland. Where does that leave the legal responsibility, in the Water Commission's view, for the water and the capacity to sell the water that is extracted without a licence for fodder farms or whatever? Aren't there some things that need to be thought through on that side of it?

Mr Cameron: I would not like to make a legal comment because I do not have that

advice. But what I would observe is that water is a public asset. The legal rights which are conferred by either water licence extraction or other arrangements is a right to make use of the water. We believe that there are options for coproduced water appropriately treated to be used for consumptive purposes and that a useful way of managing that is to licence that water and enable it to be traded or otherwise acquired through NWI assisted arrangements.

CHAIR: So the licensing would be a baseline consideration, surely? □ Mr Cameron: Licensing is an important mechanism in managing those arrangements. We have argued that

wherever possible the licence and the arrangements should be put in place.

CHAIR: Let us take, to the best of your knowledge, stock and domestic water that is extracted from wherever—it could be the Great Artesian Basin—so it is for stock and domestic purposes, so you do not actually pay for it. In extracting stock and domestic water through the stock and domestic arrangements of the government, are you able to sell something that does not cost you, because it is out of the stock and domestic system, into a commercial system?

Mr Cameron: Generally, stock and domestic, is, as you say, an unlicensed right and therefore it is not for sale; that is correct.

CHAIR: Say one of the ploys of getting happy farmers to put their face on TV, in ads and other things is a commercial-in-confidence arrangement where a farmer generously sells his water at a generous price out of a stock and domestic system to a third party. Would that be a legal vagary?

Mr Cameron: Again I think it is probably best that I not comment on the legalities of something that I do not know the details of.

Senator GALLACHER: I refer to the expansion of the coal-seam gas operations in New South Wales and Queensland. Does that increase your precautionary stance or are you satisfied with the level of precautionary comments that you make?

Mr Cameron: I think that our comments remain valid. As I said, I think there has been some further development since they have been made, but we think the underlying challenge is still live.

CHAIR: We thank the National Water Commission. I offer my congratulations on the great work that you do. We are relying on you to keep us as part of the 50 per cent of the world by 2050 that is not short of water.

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Environmental water allocations in Australia

Alex Gardner*

Australian policy and law on environmental water allocation have come a long

way since the Council of Australian Governments agreed on a framework for water reform in 1994. The 2004 Council of Australian Governments' Intergovernmental Agreement on a National Water Initiative (NWI) has given significant impetus for further development across the coming decade, defining principles that are being addressed in legislative reforms to varying extents in different States. This article distils the national policy principles on environmental water allocation and reviews the law of three States, New South Wales, Victoria and Western Australia, to ascertain the legal enforceability of environmental water allocations. It argues, in particular, that their enforceability is dependent on the key NWI proposition that a water access entitlement for consumptive use is only a right to a share of the consumptive pool of water available in a resource from year to year and not a right to take a fixed maximum volume.

INTRODUCTION

Over the past 15 years, there has been a growing recognition in Australian water policy and law that management of water resources needs to provide better for environmental water allocation (EWA). Allocating water to the natural environment protects surface and ground water systems and their dependent ecosystems. As Australians confront the increasing realisation of the scarcity of the water that is diverted from natural systems for human consumptive uses, policy-makers have also begun to appreciate that *adequate* natural flows of water must be secured to sustain streams, rivers, aquifers and estuaries and their dependent ecosystems. This appreciation rests not only on the economic claims of industries such as tourism and fisheries that depend on the “in-stream” uses of water but also on social values and the recognition that relating to a healthy natural environment sustains the human spirit.

At the outset, it should be acknowledged that the allocation of water to the environment will usually involve a balance between human consumptive and non-consumptive uses of water resources. When the author says that an “adequate” natural flow of water must be secured for the environment, it is acknowledged that there is no standard formula for the proportion of water that can be taken from a water resource without causing harm to the water dependent ecosystems. As one New South Wales water manager has commented: “the environment needs every drop of rain that falls in a catchment”.¹ So, whenever governments authorise the diversion of water from its natural situation for human consumptive uses, the natural environment is harmed to some extent.² The decisions that governments make to allocate water to consumptive uses in compromise of natural ecosystems are necessarily societal choices about what will be an acceptable sustainable use of the water resources.³ In some cases, the decision may be to maintain a river in its pristine state as an icon of natural heritage. In other cases, the legacy of past decisions may mean that some water resources will be managed almost

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¹ Personal communication to Alex Gardner from an anonymous officer of the Department of Infrastructure, Planning and Natural Resources (NSW), December 2003.

² Schofield N, Burt A, and Connell D, *Environmental Water Allocation: Principles, Policies and Practices* (Land and Water Australia, Commonwealth of Australia, 2003) p 15ff, discussing “spare water” and other assumptions of environmental allocations; available online at http://www.lwa.gov.au/products_details.asp?pc=PR030541&pn=8&method=display&browse=0 (viewed 2 May 2006).

³ Schofield et al, n 2, p 18.

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entirely for human consumptive purposes with little or no environmental flow to sustain the natural ecosystem. Some public water supply catchments may fall into this latter category. There will be many allocation decisions that fall between those two ends of the management spectrum. For this reason, it is difficult to conceive of the terms of general water resource management legislation mandating an overall standard for executive government determinations of EWAs. Specific purpose legislation may be required to achieve that goal for water resources with particular values.⁴

If executive government decisions under water resources legislation are to reflect societal choices about the sustainable uses of water resources, then some core principles need to apply. The decisions must be made on the basis of the best scientific information available and the best procedures of public consultation possible. The allocation decisions should be widely and freely published to the community. The implementation of allocation decisions should be carefully monitored and assessed against performance indicators that permit an evaluation of whether the objectives of allocation decisions are being met. The information gathered from the monitoring and evaluation should be published in an easily accessible form that ordinary people can comprehend. Finally, these core principles and the resultant allocation decisions need to be certain and efficient to administer, and they need to be enforceable.

There are a number of factors that go to the enforceability of EWAs, and of water allocations generally. The main principles and procedures pertaining to the making and implementation of EWAs should be defined in legislation (either statutes or subsidiary legislation) and be enforceable by persons with public as well as private interests. There are differences of opinion about the desirable extent of legislative definition of the framework for EWAs.⁵ There are also uncertainties in the science and its interaction with social and economic values that make detailed legal prescription of EWAs problematic.⁶ Further, a more legally defined framework for EWAs will require greater expenditure on gathering scientific information, water accounting and regulatory administration. Nevertheless, the national water policy (see below) outlines elements of an effective framework for legislation.

One of the key propositions of the national water policy about the nature of water access entitlements is also central to achieving enforceable EWAs. This is the proposition that an entitlement to take water for consumptive use is only a right to a

share of the consumptive pool of water available in a resource from year to year and not a fixed maximum volume. This form of entitlement involves the institution of a system of annual ministerial determinations of water available to be allocated to human consumptive uses in that year. This system should, at least, apply to all water resources that are over, at, or near full allocation. Equally, current moves around Australia to provide for long term water entitlements must be premised on this concept of an access entitlement.

This article argues for enforceable EWAs. First, EWAs and their purposes are defined (including by reference to national water policy). Secondly, it reviews key aspects of the relevant law of New South Wales, Victoria and Western Australia that affect the legal enforceability of EWA provisions. Specifically, this section asks: is there a statutory duty to make an EWA, including at a particular level and in priority to the allocation of water for consumptive uses; is an EWA legally binding on Government and other persons; and are there effective duties to monitor and report on the implementation of an EWA. Finally, the article summarises the progress made over the past decade of water reform in respect of EWAs.

DEFINING “ENVIRONMENTAL WATER ALLOCATIONS” – SCIENCE AND POLICY

In 1994, the Council of Australian Governments (CoAG) Water Reform Framework Agreement⁷ gave impetus to defining EWAs by providing that, in relation to water entitlements, State governments

⁴ For example, the *Heritage Rivers Act 1992* (Vic) and the *Wild Rivers Act 2005* (Qld). ⁵ Schofield et al, n 2, p 34. ⁶ Schofield et al, n 2, pp 31-33.

⁷ Council of Australian Governments, *Communique* (February 1994) Attachment A, “Water Resource Policy”. A copy of Attachment A can be found on the website of the National Competition Council, in the *Compendium of National Competition Policy Agreements (Second Edition 1998)*, p 103 at <http://www.ncc.gov.au/publication.asp?publicationID=99&activityID=39> (viewed 3 March 2006).

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“would [where they had not already done so] give priority to formally determining allocations or entitlements to water, including allocations for the environment as a legitimate user of water”.⁸ The 2004 *Intergovernmental Agreement on a National Water Initiative* (NWI)⁹ relaunched the efforts to define and manage EWAs by renewing the commitments to the 1994 Framework Agreement and setting a new schedule of actions with the objective of providing “greater certainty for investment and the environment”. By June 2005, all States and Territories except for Western Australia had signed up to the NWI. Although Western Australia was a signatory to the 1994 Framework Agreement, it refused to sign the 2004 NWI until April 2006.¹⁰ These policy agreements propound important principles for EWA. Before discerning them, however, we need to identify the scientific and practical propositions about EWA.

Scientific and practical propositions

The goal for providing water for the environment is to sustain and where necessary restore ecological processes and biodiversity of water dependent ecosystems.¹¹

This goal and various scholarly definitions of “environmental water” or “environmental water allocation” confine the definition of an EWA to water that is set aside for the environment in order to maintain or restore water-dependent ecosystems.¹² Thus, the distinction is made between environmental water and water provided for other in-stream uses of the community, such as water quality and recreation. This distinction is adopted in the NWI, which employs the term “environmental and other public benefit outcomes”, and defines:¹³

environmental outcomes as maintaining ecosystem function, biodiversity, water quality and river health targets; and

other public benefits as mitigating pollution, public health, indigenous and cultural values, recreation, fisheries, tourism, navigation and amenity values.

Provision of water for environmental outcomes may benefit other in-stream uses of water and vice versa. As with the NWI, the author acknowledges the distinction but seeks to address provision of water for both the environment and for other in-stream uses that are of public benefit.

In allocating water for the environment, two important concepts have been enunciated: Ecological Water Requirements and Environmental Water Provisions.¹⁴

Ecological Water Requirements (EWR's) are the water regimes *needed* to maintain ecological values of water dependent ecosystems at a low level of risk. EWRs are determined on the basis of the

⁸ Council of Australian Governments, n 7, para 4(b).

⁹ A copy of the NWI is available on the website of the Council of Australian Governments <http://www.coag.gov.au/meetings/250604/#nwi> (viewed 3 May 2006) and on the website of the National Water Commission <http://www.nwc.gov.au/NWI/index.cfm> (viewed 3 May 2006).

¹⁰ It appears that the State government's refusal to sign up to the NWI related mainly to financial considerations; namely, that the Commonwealth government was not promising any funding to assist with State implementation of the NWI and because one of its principles, in para 67, called for the inclusion in water pricing of the cost of planning and managing water resources, which was a principle that the State government had rejected in late 2003. See, Western Australia, Legislative Assembly, *Debates* (Thursday 1 July 2004), comments of Dr G Gallop, the Premier, and Dr J Edwards, the Minister for the Environment; available from the Parliament of Western Australia website: <http://www.parliament.wa.gov.au/web/newwebparl.nsf/iframewebpages/Hansard+-+Daily+Transcripts> (viewed 3 May 2006).

¹¹ Agriculture and Resource Management Council of Australia and New Zealand and Australian and New Zealand Environment and Conservation Council, *National Principles for the Provision of Water For Ecosystems* (July 1996) p iii.

¹² Young WJ, *Water Allocation and Environmental Flows in Lake Basin Management* (Lake Basin Management Initiative, Thematic Paper, 22 June 2004) available at <http://www.worldlakes.org/uploads/Water%20Allocation%20and%20Env.%20Flow%201July04.pdf> (viewed 3 May 2006); Schofield N et al, n 2, p 5; Allan J and Lovett S, *Impediments to Managing Environmental Water Provisions* (Bureau of Resource Sciences, Commonwealth of Australia, 1997) p 81.

¹³ Australia, National Water Commission, *National Water Initiative*, Sch B(i) and (ii).

¹⁴ Agriculture and Resource Management Council of Australia and New Zealand and Australian and New Zealand Environment and Conservation Council, 1996, n 11, p 4. These concepts have also been applied by the Water and Rivers Commission of Western Australia in *Statewide Policy No 5, Environmental Water Provisions Policy for Western Australia* (2000) p 2.

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best scientific information available or through the application of local knowledge. In view of the introductory comments about the adequacy of natural flows of water for the environment, it is important that EWRs are clearly described to relate to particular ecosystem features or characteristics.

Environmental Water Provisions (EWP's) are the water regimes that are *provided* as a result of the water allocation decision-making process taking into account ecological, social and economic impacts. EWRs are the primary consideration in the determination of EWPs, but it may not possible to achieve the EWRs that have been set out because of social and economic factors. EWPs may entail:¹⁵

- cxvii. unregulated flows in rivers and water in wetlands and aquifers;
- cxviii. specific volumetric allocations and/or releases from storages;
- cxix. water levels maintained in wetlands; and
- cxl. water in transit for other uses, the pattern of flow of which may be defined to meet an environmental need. The term EWA is used to refer to EWPs. EWA provisions of "environmental flow" in rivers and lakes are usually concerned with water quantity and the temporal patterns of specific flow events, including their reliability and variability.¹⁶ Thus, EWAs for rivers are typically volumes of water purposefully left in, or released into, rivers, lakes or reservoirs, to maintain or restore particular ecological values.¹⁷ However, this does not mean that a constant flow or level of water must somehow be artificially maintained in a waterway; rather, environmental flows should mimic natural/seasonal flow regimes as much as possible.¹⁸ These concepts of "environmental flow" associated with surface water are insufficient to identify the concerns with allocating ground water for conservation of the environment. In considering the dependence of ecosystems on ground water, one or more of four basic ground water attributes may be relevant:¹⁹
 - . flow or flux – the rate and volume of supply of groundwater;
 - . level – for unconfined aquifers, the depth of the water table below the ground surface;
 - . pressure – for confined aquifers, the potentiometric head of the aquifer and its expression in groundwater discharge areas; and/or

quality – the chemical quality of groundwater expressed in terms of pH, salinity and/or other potential constituents, including nutrients and contaminants. EWAs may also be concerned with water quality attributes (such as physical, chemical and microbiological characteristics), though these factors tend to be considered less.²⁰ For example, it may be mistaken to provide a higher quantity of water for environmental flow to achieve water quality objectives by diluting pollution because this would not solve the source of the pollution.²¹ On the other hand, water temperature is being increasingly recognised as an important characteristic of environmental flows because releasing very cold water from the lower levels of large reservoirs can be very harmful for riverine biota. Similarly, declining ground water levels can lead to problems of acid sulphate soils and the acidification of wetlands with harmful consequences for the wetland ecosystem.²² Managing EWAs and measuring their success or otherwise is not confined to gathering and assessing hydrological information. It is also crucial to gather and assess ecological information in ¹⁵ Agriculture and Resource Management Council of Australia and New Zealand and Australian and New Zealand Environment and Conservation Council, 1996, n 11, p 4. ¹⁶ Allan and Lovett, n 12, pp 7-9. ¹⁷ See Young, n 12. ¹⁸ Woodfield, “Environmental Flows: Not Just Water Under the Bridge” (Dec 2001) 279 *The Tasmanian Conservationist*. ¹⁹ Schofield et al, n 2, p 13. ²⁰ Allan and Lovett, n 12, p 7. ²¹ Schofield et al, n 2, p 21. ²² Environmental Protection Authority of Western Australia, *Environmental Management of Groundwater Abstraction from the Gnamangara Mound: July 2000 – June 2003: Triennial Report* (Bulletin 1139, June 2004) p 3.

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order to draw the links between the hydrological regime and the health of the water-dependent ecosystem. Thus, information should be gathered about terrestrial and aquatic flora and fauna, as well as the riverine geomorphology. If an EWA relates to ground water, it may also be necessary to gather information about subterranean fauna, such as stygo-fauna. In order to measure the success of EWAs, the criteria adopted as performance indicators should relate to water levels and flows as well as to the biodiversity of the dependent ecosystem. Unfortunately, there are gaps in the knowledge and understanding of the “links between changes to existing flow regimes and the potential effects on key environmental attributes”.²³

Another complicating factor in the management of EWAs is the effect of climate change. In Western Australia, the Water and Rivers Commission, now incorporated into the Department of Environment (DoE), has argued that a significant cause of the non-compliance with EWAs has been the result of climate change. For example, the Water and Rivers Commission’s report to the Environmental Protection Authority (EPA) on the environmental management of ground water abstractions from Gnamangara and Jandakot Ground Water Mounds (the major sources of Perth’s water supply) during the period 2000-2003 argued that the primary reason for non-compliance with the EWA water level criteria was climate change. As the EPA explained:²⁴

One clear example of where compliance has been difficult is in the East Gnamangara

area. When the proposed Lexia wellfield was approved in 1997, water levels in a number of significant wetlands had already been declining since at least 1994. By the time the Lexia wellfield commenced pumping in 2000/01, some wetland water levels were already in non-compliance and have remained so during this triennial period.

However, the EPA has also said that there is a limit to how far this argument of climate change can be taken in explaining non-compliance with EWAs. In its most recent report on the non-compliance with EWAs on Gngangara Mound, the EPA said:²⁵

The DoE's response to declining rainfall and recharge on the Gngangara and Jandakot Mounds over the past eight years has been to state that this is beyond the regulator's control. While this may be a relevant point in relation to the cause of climatic variation, it is inadequate in relation to management of resultant impacts and regulatory responses that are available. The current approach to management is placing increasing and unacceptable stress on many of the ecological and social values of the Gngangara Mound, and are [sic] clearly beyond those approved under the existing conditions. To see on-going and increasing levels of non-compliance with environmental conditions while levels of groundwater abstraction for public and private purposes remain unchanged raises questions about the DoE's response under the existing conditions. Changing abstraction rates is likely to be necessary in the short-term but *a more adaptive and responsive management* [sic] *water allocation regime* is essential in the longer-term.

NATIONAL WATER POLICY PRINCIPLES

What, then, are the national water policy principles that can be brought to bear on the determination and implementation of EWAs? In particular, what are the principles for “*a more adaptive and responsive ... water allocation regime*”?

The principles have been developed through three documents: the 1994 Framework Agreement;²⁶ the 1996 National Principles for the Provision of Water for Ecosystems;²⁷ and the 2004 NWI.²⁸ The summary given here is a synthesis of the core principles of environmental water allocation that could be given legal expression. Not surprisingly, it is drawn mostly from the NWI. Some of the principles

²³ Schofield et al, n 2, p 31. ²⁴ Environmental Protection Authority of Western Australia, n 22, p 12.

²⁵ Environmental Protection Authority of Western Australia, *Environmental Management of Groundwater Abstraction from the Gngangara Mound: July 2003 – June 2004 - Annual Compliance Report* (Bulletin 1187, August 2005) pp 7-8.

²⁶ Council of Australian Governments, n 7. ²⁷ Agriculture and Resource Management Council of Australia and New Zealand and the Australian and New Zealand

Environment and Conservation Council, *Occasional Paper SWR No 3* (July 1996). (“1996 National Principles”).

²⁸ Council of Australian Governments, n 9.

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are further articulated by the National Competition Council (NCC), which has been reporting its assessment of the States' implementation of the 1994 Framework Agreement.²⁹ The national water policy principles pertaining to EWAs are as follows:

- EWAs should be given statutory recognition and have at least the same degree of security as water access entitlements for consumptive use and be fully accounted for.³⁰
- From 1994, any future allocations of water should only be made after appropriate assessments are conducted to ensure that ecological values are sustained.³¹
- EWAs should be determined through statutory water plans on the basis of the best scientific information available on the water regimes necessary to sustain the ecological values of water dependent ecosystems, with socio-economic analysis and community input.³² The State will determine whether a plan is prepared, the area it covers, the level of detail required, its duration or frequency of review, and the amount of resources devoted to its preparation on the basis of an assessment of the level of development of the resource and projected future demands.³³
- A water plan should provide for:³⁴
 - (a) Ecological outcomes and define appropriate water management arrangements to achieve those outcomes, which may include environmental water provided on a "rules basis or held as a water access entitlement"; if the latter, it may be available to be traded on the temporary market when not required for the environmental outcome;³⁵ and
 - (b) Resource security outcomes by determining the shares in the consumptive pool and rules to allocate water during the life of the plan.
- States should monitor the implementation of water plans and provide regular public reports.³⁶
- The States have agreed to provide a better water balance for all over-allocated river systems and ground water resources, including by appropriate allocations to the environment and adjustment of water access entitlements. This initial general commitment, under the 1994 CoAG *Water Reform Framework*,³⁷ was defined by tripartite implementation agreements in respect of each State during the 1999 NCC assessment, which agreements were supposed to be substantially completed by 2005.³⁸ The NWI affirms these current commitments and expresses new

²⁹ The National Competition Council's Policy Assessments are available online at <http://www.ncc.gov.au/> (viewed 4 May 2006). These assessments are part of the Commonwealth's administration of the National Competition Policy payments to the States. Pursuant to cl 10 of the *National Water Initiative*, the Commonwealth has established a National Water Commission to take over this function from the NCC, see <http://www.nwc.gov.au/> (viewed 4 May 2006).

³⁰ Council of Australian Governments, n 7, para 4(b); the Agriculture and Resource Management Council of Australia and New Zealand et al, n 27, principle 3; Australia, National Water Commission, n 9, para 35(i).

³¹ Council of Australian Governments, n 7, para 4(f) and the Agriculture and Resource Management Council of Australia and New Zealand, et al, n 27, principle 6.

³² Council of Australian Governments, n 7, para 4(d); the Agriculture and Resource Management Council of Australia and New Zealand, et al, n 27, principle 2; Australia, National Water Commission, n 9, para 36.

³³ Council of Australian Governments, n 9, para 38.

³⁴ Council of Australian Governments, n 9, para 37.

³⁵ Council of Australian Governments, n 9, para 35(ii) and (iii).

³⁶ Council of Australian Governments, n 9, para 40.

³⁷ Council of Australian Governments, n 7, para 4(d). See also the Agriculture and Resource Management Council of Australia and New Zealand, et al, n 27, principles 4 and 5.

³⁸ For example, see Agreement with Western Australia in, National Competition Council, *Second Tranche Assessment of Governments' Progress in Implementing National Competition Policy, Volume Two, Water Reform: Western Australia* (June 1999) pp 59-69 available online at <http://www.ncc.gov.au/publication.asp?publicationID=56&sectorID=7> (viewed 4 May 2006). The Western Australian implementation plan was modified during the 2002 National Competition Council assessment, see National Competition Council, *Assessment of Governments' Progress in Implementing the National Competition Policy and Related Reforms: Volume Two: Water* (2004) p 5.18.

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commitments to make substantial progress by 2010 in addressing any other over allocated and/or overused surface or ground water systems not covered by the NCC endorsed implementation programs.³⁹

- The NWI also proposes a new risk assignment framework to apply to any future reductions in the availability of water for consumptive use additional to those to be made under the 1994 CoAG Framework by 2005 and under the NWI by 2010. The new framework assumes that the new share-based water access entitlements (as proposed by the NWI) will have been established and water plans meeting the NWI criteria will be in the course of implementation. The new risk assignment framework features the following propositions:
 - (a) Water access entitlement holders are to bear the risk of any reduction in entitlement arising from reductions in the consumptive pool as a result of seasonal or long-term changes in climate, and periodic natural events such as bushfires and drought.
 - (b) Water access entitlement holders are to bear the risk of any reduction in entitlement arising from a bona fide improvement in the knowledge of water systems up to 2014.

- (c) Risks arising under comprehensive water plans commencing or renewed after 2014 are to be shared over each 10-year period on the basis that water access entitlement holders bear the first 3% reduction in entitlement, State Governments and the Commonwealth Government share one-third and two-thirds respectively reductions between 3 and 6%, and State Governments and the Commonwealth Government share equally reductions greater than 6%.
 - (d) Governments are to bear the risks of any reduction in entitlements not previously provided for that arises from changes in government policy (eg new environmental objectives).
 - (e) Alternatively, the governments may adopt a different risk sharing formula where all affected parties (including entitlement holders and environmental stakeholders) agree.
- The NWI proposes the establishment of environmental water managers with the necessary authority and resources to achieve the environmental and other public benefit outcomes, including the ability to trade water on temporary markets.⁴⁰ These managers should periodically audit, review and publicly report on the achievement of the environmental and other public benefit outcomes to ensure that they are accountable.
 - The NWI proposes the development of principles for environmental water accounting, the establishment of a register of new and existing environmental water, and annual reporting of the operation of environmental water rules.⁴¹
 - Land use changes (eg farm dams, storage of over land flows and large-scale plantation forests) intercepting significant volumes of water that could jeopardise water entitlements and environmental objectives should be recorded and all such proposed land use changes over a threshold level should require the issue of a water access entitlement.⁴² The NWI does not appear to address the other issue of land use changes destroying water dependent ecosystems that may be the object of an environmental water allocation. □The implementation of these national principles is proceeding across the various states, though

possibly most advanced in New South Wales and least advanced in Western Australia. The principles provide a general context against which to review the laws and policies of New South Wales, Victoria and Western Australia to compare how each of these States is providing for enforceable EWAs.

LEGAL ENFORCEABILITY OF ENVIRONMENTAL WATER ALLOCATIONS

It is not feasible to compare the various States' laws and policies directly against all the itemised principles. Rather, it is proposed to address three specific questions about the legal provisions for EWAs:

³⁹ Council of Australian Governments, n 9, paras 41-44. ⁴⁰ Council of Australian Governments, n 9, paras 78-79.

⁴¹ Council of Australian Governments, n 9, paras 84-85. ⁴² Council of Australian Governments, n 9, paras 55-57.

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- Is there a duty to make EWAs – in any locations, at any level or at all, and in priority to the determination of allocations for consumptive uses?
- If an EWA is made, is it binding on government agencies and all other persons?
- If an EWA is made, is there a duty on the responsible agency to monitor and report on the ☐ implementation of the EWA? ☐ The water resources legislation of New South Wales and Victoria has been amended in late 2005

with significant effect on these issues.⁴³

A DUTY TO MAKE EWAS

The fundamental questions regarding the legal requirement to provide EWAs are whether the legislation creates enforceable legal duties to make EWAs, to make them at a certain level, and to make them in priority to the allocation and delivery of water to consumptive purposes. No State maintains legislation to create a general duty to make an EWA of a certain level in priority to allocation for consumptive uses for every water source in the State. However, New South Wales has experimented with, and resiled from, a statutory duty on the Minister to make EWAs to maintain fundamental ecosystem health in priority to allocating water for consumptive uses. Victoria has legislated to establish an “environmental water reserve” that is to be defined by executive discretion. Western Australia has created no statutory requirement at all.

New South Wales

The *Water Management Act 2000* (NSW) created “duties” to establish EWAs for all water sources in the State. The Act states Parliament’s intention that, within one year of the new Act coming into operation, certain “special” water resources were to be identified and management plans containing EWAs made in respect of them.⁴⁴ For water resources generally, EWAs “are to be established for all of the water sources in the State as soon as practicable after the commencement of this section”.⁴⁵ These “duties” contain the following elements.

Within 12 months of the date of assent to the Act, all water sources within the State were to be classified according to:

- the extent to which they are at risk;⁴⁶
- the extent to which they are subject to stress;⁴⁷ and
- the extent of their conservation value.⁴⁸ ☐ Furthermore, within the same 12-month period, the Minister was to prepare a “water sharing management plan” containing a “bulk access regime” for each of the “special water resources”, ie

those “classified high risk, high stress or high conservation value”.⁴⁹ A bulk access regime is the part of a management plan that provides for the extraction of water under access licences in a management area.⁵⁰ In the case of special water resources, a bulk access regime was to be made by means of a “Minister’s Plan”,⁵¹ which employs an expedited process of plan making.⁵²

□⁴³ *Water Management Amendment Act 2005* (NSW), which was assented to on 7 December and commenced operation on 1 January 2006. The *Water (Resource Management) Act 2005* (Vic), was assented to on 7 December and commences on declaration. □⁴⁴ *Water Management Act 2000* (NSW), s 7(4), which commenced on 1 January 2001. ⁴⁵ *Water Management Act 2000* (NSW), s 8(3), which commenced on 1 January 2001. □⁴⁶ *Water Management Act 2000* (NSW), s 7(3)(a): this refers to the extent to which harm to the water source or its dependent ecosystems is likely to occur. □⁴⁷ *Water Management Act 2000* (NSW), s 7(3)(b): this refers to the extent to which harm to the water source or its dependent ecosystems has occurred or is occurring. □⁴⁸ *Water Management Act 2000* (NSW), s 7(3)(c): this refers to the extent to which their intrinsic value merits protection from risk and stress. □⁴⁹ *Water Management Act 2000* (NSW), s 7(4)(b). ⁵⁰ *Water Management Act 2000* (NSW), s 20(1)(e). ⁵¹ *Water Management Act 2000* (NSW), s 7(5). □(2006) 23 EPLJ 208 215 ©

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A water sharing management plan, including a Minister’s Plan,⁵³ must establish environmental water rules creating an EWA for the area or water source, but the defined content of these rules was amended in 2004 and 2005. As originally enacted, the environmental water rules were required to include “water that is committed for fundamental ecosystem health at all times, and may not be taken or used for other purposes”, which was called “environmental health water”.⁵⁴ After amendment in 2004, the environmental water rules under a management plan were required to commit water for “fundamental ecosystem health or other specified environmental purposes ... that cannot to the extent committed be taken or used for any other purpose”, which is called “planned environmental water”.⁵⁵ It is arguable that the original terms of the Act created a statutory prescription of a basic EWA that was to be maintained at all times, which the 2004 amendment repealed in favour of a mere requirement that a management plan commit water for fundamental ecosystem health at a level that the Minister saw fit.

However, it was still arguable that an EWA had to be set in priority to the allocation of water to consumptive purposes and that it would limit the water available for human consumptive uses under a bulk access regime. The basis of this argument was the statutory requirement that a bulk access regime “must recognise and be consistent with any limits to the availability of water that are set (whether by the relevant management plan or otherwise) in relation to the water sources to which the regime relates”.⁵⁶ Further, a bulk access regime must be consistent with the water management principles of the Act,⁵⁷ which include, in s 5(3), the water sharing principles that:

24. the “sharing of water from a water source must protect the water source and its dependent ecosystems”; and
25. the sharing or extraction of water under any access licence must not prejudice

this first principle.⁵⁸ □ All persons exercising functions under the Act have a duty “to take all reasonable steps to do so in accordance with, and so as to promote, the water management principles of the Act”, and to give priority to the water sharing principles in the order in which they are stated in s 5(3).⁵⁹ This duty would apply to the Minister making a water sharing management plan. □ What is the legal force of these statutory provisions? The New South Wales Court of Appeal has held that they do not have the purpose of making invalid a management plan that was inconsistent with them: *Nature Conservation Council of NSW Inc v The Minister Administering the Water Management Act 2000* (2005) 137 LGERA 320; [2005] NSWCA 9 at [90]-[95] (The *Gwydir River Case*).⁶⁰ In that case, the inconsistency with the original form of the Act was found in the provisions of the management plan that established the EWA as the residue of water left after the identification of the “long term extraction limit” instead of setting the EWA first as required by the Act. The court rejected the Minister’s argument that the Act did not require the identification of any actual volume of water, and that an “abstract concept” of water available for fundamental ecosystem health would suffice. The court said (at [65]-[66]): □⁵² *Water Management Act 2000* (NSW), s 50. □⁵³ *Water Management Act 2000* (NSW), s 50(2). □⁵⁴ *Water Management Act 2000* (NSW), ss 8(1)(a), (2) and 20(1)(a), as originally enacted. Section 20(1)(a) required a management plan to establish environmental water rules “in relation to each of the defined classes of environmental water referred to in section 8(1)”. □⁵⁵ *Water Management Act 2000* (NSW), ss 8(1)(a), (2) and 20(1)(a), as amended by the *Water Management Amendment Act 2004*. The new definition of the classes of environmental water and the 2005 amendments are discussed below. □⁵⁶ *Water Management Act 2000* (NSW), s 20(2)(a). □⁵⁷ *Water Management Act 2000* (NSW), s 20(2)(e). □⁵⁸ *Water Management Act 2000* (NSW), s 5(3)(a) and (c). □⁵⁹ *Water Management Act 2000* (NSW), s 9. □⁶⁰ The decision was based on the pre-2004 terms of ss 8 and 20(1)(a), which affected the court’s decision as to the necessary content of the EWA but not the duty to make one: see [79]-[89].

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The idea of “commitment” is quite inconsistent with any abstract or theoretical concept of water. What must be identified is actual water. The words “establish” and “maintain” are not suggestive of anything other than actual water.

What is required is water that is constantly provided for and which, absent acute drought conditions, will in fact be available to protect “fundamental ecosystem health”. To the extent water is present at all, priority is to be given to fundamental ecosystem health.

Having found that the plan was inconsistent with the original provisions of the Act, the court determined whether this particular inconsistency spelt invalidity of the plan. The Court of Appeal applied the test of invalidity defined by the High Court of Australia in *Project Blue Sky Inc v Australian Broadcasting Authority* (1998) 194 CLR 355; 72 ALJR 841; [1998] HCA 28, to conclude that the Parliament did not intend the particular inconsistency with the Act to result in invalidity of the management plan. In *Project Blue Sky*, the High Court explained (at 389) that this intention “is ascertained by reference to the language of the statute, its subject matter

and objects, and the consequences for the parties of holding void every act done in breach of the condition”. Courts are reluctant to hold that Parliament intends an act done in breach of legislation to be invalid if serious public inconvenience would result.⁶¹ The risk of public inconvenience here should not have been significant because a statutory time limit of three months in which to challenge a management plan ensured there would be no delay in addressing legal challenges.⁶² Moreover, the express statutory time limit acknowledges that Parliament did anticipate judicial review of the validity of plans. Indeed, the court held that, on balance, the textual indications in the Act supported the view that the inconsistent provisions of the water management plan would be invalid. However, the court said the “factual context of the water source, rather than the textual context of the legislative scheme” was determinative in that case. The court noted that, as “the long term extraction of 388,000 mega litres [per annum] is only 56% of the estimated long term average annual flow of 875,000 mega litres”,⁶³ there was still a substantial flow of water (44%) committed to the EWA, which would, in substance, satisfy the Parliament’s intention for the EWA. The court appears to say that the plan under challenge was valid, but that another plan providing much less water for an EWA may be invalid. It is not clear on what basis the court made this assessment, as there is no discussion in the case about the adequacy of the level of the EWA.⁶⁴ With respect, the Court of Appeal may have found too easily that the inconsistency of the plan with the Act did not result in its invalidity.

The High Court granted the Nature Conservation Council special leave to appeal the Court of Appeal decision.⁶⁵ The central issues in the appeal would have been the priority to be given to determining the EWA and the application of the principles in *Project Blue Sky*. However, the *Water Management Amendment Act 2005* (NSW) has redefined environmental water and inserted a validating provision for management plans, leading to the termination of the appeal.⁶⁶ Nevertheless, it is useful to review the amended statutory provisions for the future of EWAs in water management plans and the potential significance of *Project Blue Sky*.

The *Gwydir River case* shows that there was, under the original provisions of the *Water Management Act 2000* (NSW), a tentative duty to make an EWA committing an actual volume of

⁶¹ See *Project Blue Sky Inc v Australian Broadcasting Authority* (1998) 194 CLR 355 at 392.

⁶² *Water Management Act 2000* (NSW), s 47.

⁶³ *Nature Conservation Council of New South Wales Inc v Minister Administering the Water Management Act* (2005) 137 LGERA 320; [2005] NSWCA 9 at [94]. Spiegelman CJ may have made an error here. At [19], the plan is quoted as saying that approximately 56% of the long-term average annual flow in this water source (estimated to be 875,400 megalitres per year) will be preserved and will contribute to the maintenance of basic ecosystem health, thus leaving 44% of the water allocated to human consumption.

⁶⁴ See also Millar I, *Testing the Waters: Legal Challenges to Water Sharing Plans in NSW* (Paper presented to Water Law in Western Australia conference, hosted by the Environmental Defenders Office of Western Australia, 8 July 2005).

⁶⁵ *Nature Conservation Council of New South Wales Inc v Minister Administering Water Management Act* [2005] HCA Trans 668 (2 September 2005).

⁶⁶ Environmental Defenders Office (NSW), eBulletin No 442 (11 January 2006), available online at

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water for fundamental ecosystem health *before* determining the allocation of water for consumptive uses.⁶⁷ However, it is doubtful that the Act, as amended in 2004 and 2005, still imposes such a duty. As explained above, the 2004 amendment redefined “environmental water” to include “planned environmental water”, which is water committed under a management plan for “fundamental ecosystem health or other specified environmental purposes ... that cannot to the extent committed be taken or used for any other purpose”.⁶⁸ The rules for planned environmental water “do not need to specify that a minimum quantity of water is required to be present in the water source at all times”.⁶⁹

The 2005 amendments, enacted in response to the *Gwydir River case*, have further weakened the concept of a priority determination of an EWA.⁷⁰ A management plan must now commit planned environmental water by referring to at least 2 of the following:

(a) the physical presence of water in the water source; (b) the long-term average annual commitment of water as planned environmental water; and (c) water that is not committed after allowing for commitments of water for extraction rights.

Paragraph (c) of this amendment endorses the technique of providing for EWAs as a residue of water after allocation to consumptive uses. Simultaneously, though, the management plan is required to specify environmental water either as an abstract concept or actual physical volume. The amendment’s authorisation of an EWA as a residue of water after allowing for commitments of water for consumptive uses is, arguably, inconsistent with the duty to observe the s 5(3) principle that “sharing of water from a water source must protect the water source and its dependent ecosystems” in priority to the extraction of water under any other right.⁷¹ However, the location of these duty propositions in association with the objects and principles of the Act may suggest that the courts would be reluctant to invalidate a water management plan on the basis that the EWA was determined as a residue of allocations to consumptive uses and at a level that may be argued is inadequate to sustain the water dependent ecosystems.⁷² The conflicted scheme of the Act now favours executive discretion rather than statutory standards for the determination of EWAs. The only remaining statutory requirement is that a management plan must define an allocation of water for both environmental and consumptive purposes.

Where does this leave the operation of the principles in *Project Blue Sky*? The reasoning in that case leaves open the argument that, although an existing management plan may not be invalid for non-compliance with the statutory provisions, the non-compliant method of making the EWA could still be unlawful in the future. As the High Court said (at 393), a person with sufficient interest would be entitled to sue for a declaration that the government body was acting in breach of the

Act and, in an appropriate case, obtain an injunction restraining that body from taking any further action based on its unlawful action. A court would be less reticent to restrain future administrative action, especially if it is the approval of a management plan that fails to define an allocation of water for both environmental and consumptive purposes.

In summary, in New South Wales, there are legal duties on the government to make water management plans for special water resources in a short period of time (now fulfilled) and for other

⁶⁷ The court held that the 2004 amendments did not apply to a management plan made before they came into operation so as to alter the requirements of the environmental water rules: see *Nature Conservation Council of New South Wales Inc v Minister Administering the Water Management Act* (2005) 137 LGERA 320; [2005] NSWCA 9 at [89].

⁶⁸ *Water Management Act 2000* (NSW), ss 8(1)(a), (2) and 20(1)(a), as amended by the *Water Management Amendment Act 2004*. Environmental water also includes provision in s 8(1)(b) for “adaptive environmental water”, which is water committed by the conditions of access licences for specified environmental purposes, either generally or specifically. While a management plan must provide for access licences to be issued with conditions relating to adaptive environmental water, it is clear that the issue of such licences remains a matter of ministerial discretion: *Water Management Act 2000* (NSW), s 63.

⁶⁹ *Water Management Act 2000* (NSW), s 8(2).

⁷⁰ *Water Management Amendment Act 2005* (NSW), inserting s 8(1A). There are also new provisions (ss 8A – 8E) governing the exercise of ministerial discretion in relation to adaptive environmental water and in relation to converting water under access licences to planned environmental water. The amendments are due to come into operation on 1 January 2006.

⁷¹ *Water Management Act 2000* (NSW), ss 5(3)(a) and 9(1)(b). ⁷² *Project Blue Sky v Australian Broadcasting Authority* (1998) 194 CLR 355 at 391, para 95.

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water resources as soon as practicable. A plan must establish environmental water rules for an EWA that protects the water source and its dependent ecosystems but may do this by defining an EWA, simultaneously, as a residue of water after allowing for commitments of water for consumptive uses and as either an abstract concept (a long term average annual commitment of environmental water) or an actual physical volume. The judicial interpretation of the duties thus far suggests that it will be difficult to enforce these duties in proceedings that seek to invalidate a water management plan, but leave open the potential to enforce the duties prospectively.

Victoria

The 2005 amendments to the *Water Act 1989* (Vic) have established an “environmental water reserve”⁷³ as the means of giving effect to the first national water policy principle that EWAs should be given statutory recognition and have at least the same degree of security as water access entitlements for consumptive use. The essential objective of the environmental water reserve is that it be maintained “so

as to preserve the environmental values and health of water ecosystems”.⁷⁴ As will be shown, there are various associated provisions that provide for the assessment of water resources and the creation of EWAs in various ways that ultimately make the content of the environmental water reserve a matter of executive discretion rather than statutory duty. Despite the statutory objective, the Act does not require that an EWA be determined and implemented in priority to the satisfaction of consumptive uses of water.

The *Water Act 1989* (Vic) obliges the Minister to ensure that a continuous program of assessment of the State’s water resources is undertaken, including by long-term water resources assessments every 15 years.⁷⁵ In conducting the long-term assessment, the Minister may investigate whether or not the environmental water reserve is being maintained in accordance with its objective. The Minister may also require the preparation of a “Sustainable Water Strategy” for a region, the contents of which may identify ways to maintain and improve the environmental water reserve.⁷⁶ However, the Act leaves the allocation of the water resources to the environmental water reserve or for consumptive purposes to the exercise of ministerial discretion under various related powers, including powers that authorise the Minister to set aside water for the environment.⁷⁷

The most significant of those powers, enacted in 2005, is the authority of the Minister administering the *Water Act* to allocate to the environment Minister an environmental entitlement to water in a waterway, ground water resource, or in the works of an Authority or water entitlement holder.⁷⁸ The power to issue an environmental entitlement may be exercised on the Minister’s own motion or at the request of the environment Minister and is to be exercised having regard to any adverse effect that the allocation or use of under the entitlement is likely to have on existing authorised uses of water as well as to the maintenance of the environmental water reserve in accordance with its objective. The Minister may confer on Catchment Management Authorities the responsibility for managing environmental entitlements.⁷⁹

The second most significant power is the authority of the Minister to declare an area to be a water supply protection area (for ground water or surface water resources),⁸⁰ which triggers the preparation of a management plan for the area. The approval of a draft management plan is at the Minister’s discretion, though an approved plan must be tabled in Parliament and is subject to disallowance by

⁷³ *Water Act 1989* (Vic), s 4A. See also, the 2nd reading speech on the *Water Resource Management Act 2005* (Vic), Victoria, Legislative Assembly, *Debates* (6 October 2005) p 1334.

⁷⁴ *Water Act 1989* (Vic), s 4B.

⁷⁵ *Water Act 1989* (Vic), ss 22(1)(a) – (ab) and 22K – 22V.

⁷⁶ *Water Act 1989* (Vic), ss 22B & 22C.

⁷⁷ *Water Act 1989* (Vic), ss 4A and 22(1)(b).

⁷⁸ *Water Act 1989* (Vic), Pt 4, Div 1A – Environmental Entitlements, especially s 48B. The former s 52 provision for in-stream use licences has been repealed by s 26 of the *Water (Resource Management) Act 2005* (Vic).

⁷⁹ *Water Act 1989* (Vic), ss 186A and 189. ⁸⁰ *Water Act 1989* (Vic), s 27.

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either house of Parliament. The object of a management plan is to ensure that the water resources of the area are managed “in an equitable manner and so as to ensure long term sustainability of those resources”.⁸¹ The main way in which a management plan may set aside water for the environment is that it *may* prescribe restrictions to be imposed on the taking of water to prevent decline of ground water levels below a specified level or to ensure that surface water flows are maintained at specified levels.⁸² In other words, a management plan may set a cap or limit on abstractions of water for consumptive uses by specifying the amount of water to be retained in a water resource system. There is also, arguably, a second way in which a management plan *may* set aside water for the environment; namely, by imposing restrictions on the taking of ground or surface water to prevent a “permissible consumptive volume” from being exceeded.⁸³ The Minister has the related power to declare a permissible consumptive volume of surface and/or ground water that may be taken from a specified area or water system during a specified period.⁸⁴ The permissible consumptive volume will cap or limit the amount of water that may be taken by all water entitlement holders who draw from the water resource. In this way, the plan may set aside water for the environment even though it does not specify the amount of water to be retained in the resource or allocated to the environment. There is a third provision by which a management plan *may* prescribe restrictions on the taking of ground or surface water “to ensure that the environmental water reserve is maintained in accordance with the environmental water reserve objective”.⁸⁵ It is debatable whether this third plan mechanism amounts to another means of setting aside water for the environment or merely of ensuring the proper management of water otherwise set aside.

The third method of setting aside water for the environment is by the operation of conditions on any bulk entitlement (issued to a Water Authority) or other water entitlement.⁸⁶

What is evident about these Victorian statutory provisions is that, notwithstanding the statutory proclamation of an environmental water reserve and its objective, there is no duty to provide any EWA in a management area or any other part of the State. The Minister’s power to issue an environmental allocation is entirely discretionary and exercised having regard to the competing considerations of existing water uses and the environmental water reserve objective. The management plan provisions appear, at best, to be neutral in the priority given to the allocation of water to EWAs or consumptive uses. A management plan is made in pursuit of a general sustainability goal and there is no statutory statement that a management plan must first provide for an EWA before providing for the allocation of water for consumptive uses. Restrictions that may be imposed by a management plan on the taking of water create an EWA that is only an incidental residue of the restrictions on consumptive use. Similarly, the setting aside of environmental water by operation of conditions on water entitlements operate only as a residue of the consumptive uses allocated by the entitlement.

Western Australia

Whilst the protection of water dependent ecosystems is one of the objectives of the *Rights in Water and Irrigation Act 1914* (WA) (RWI Act) that administrators are “to seek to ensure are achieved”,⁸⁷ it is juxtaposed with the competing goals of sustainable use and development⁸⁸ to meet the needs of current and future users of water. The objects create only justiciable obligations of process; that is, an obligation on the part of administrators to consider the objects in their decision-making and not any

⁸¹ *Water Act 1989* (Vic), s 32A(1).

⁸² *Water Act 1989* (Vic), s 32A(3)(f) and (g).

⁸³ *Water Act 1989* (Vic), s 32A(3)(f) and (g)(ii).

⁸⁴ *Water Act 1989* (Vic), s 22A.

⁸⁵ *Water Act 1989* (Vic), s 32A(3)(f) and (g)(iii).

⁸⁶ *Water Act 1989* (Vic), s 4A(1)(b) and Pt 4, Divs 1 and 2.

⁸⁷ *Rights in Water and Irrigation Act 1914* (WA), s 4(3).

⁸⁸ “Use and development” is defined in such a way as to focus on human uses: *Rights in Water and Irrigation Act 1914* (WA), s 4(2).

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substantive duty of environmental conservation.⁸⁹ The State’s Environmental Water Provisions Policy restates similar objectives without giving a policy commitment to the level or extent of EWAs.⁹⁰

The RWI Act clearly does not mandate EWAs either generally or in any particular location. The only express statutory mechanism in the RWI Act for making EWAs is through the making of water management plans, provisions for which were inserted in 2001. Although plans have the purposes of defining the environmental values of water resources and determining how water is to be allocated to meet the needs of the environment, the making of plans under the RWI Act is entirely within the discretion of the Government.⁹¹ To date, none have been made, though the National Competition Council appears not to have recognised that in its 2004 assessment of Western Australia’s progress in implementing national competition policy reforms in relation to water.⁹² There are a number of non-statutory water management plans, which have since 1995 generally included EWAs.

It is possible to make EWAs in three other ways:

28. by setting licence conditions;⁹³
 29. pursuant to the environmental impact assessment provisions of the *Environmental Protection Act* 1986 (WA) (EP Act), by the imposition of “ministerial conditions” on the issue of licences or the making of plans, even non-statutory plans;⁹⁴ and
 30. by making local by-laws specifying a whole range of matters applicable to water resources management in a particular locality, including a scheme for licensing with basic rules that allocate environmental water.⁹⁵ The first two of these methods have been employed, and the third is proposed for adoption in the south-west of Western Australia. It is clear, however, that the statutory provisions for each of these three methods create no duty to make EWAs in any place or at any level.
- LEGAL EFFECT OF AN EWA** Once an EWA is made, are government agencies and all other persons bound by it? Is the taking of water for consumptive use bound to respect the EWA? Two features of the water access entitlement framework have emerged as important for giving legal respect to EWAs: defining water access entitlements as only a share of the water resource available from time to time; and creating environmental entitlements of a similar legal status to access entitlements.
- New South Wales** The *Water Management Act 2000* (NSW) gives effective legal force to an EWA in a number of ways, but particularly by defining a water access entitlement under a licence as *a share of an available resource*⁹⁶ that is determined from time to time and by strengthening the provisions for “adaptive environmental water” entitlements to be held under access licences. An access licensee’s share of the water resource is determined from time to time by the Minister exercising statutory power to make “available water determinations” either for categories of access licences or for individual access licences in relation to specified water management areas or water ⁸⁹ Gardner A, “Water Resources Law Reform in Western Australia – Implementing the CoAG Water Reforms” (2002) 19 EPLJ 6 at 15. ⁹⁰ *Environmental Water Provisions Policy for Western Australia* endorsed by the Commission in late 2000, was due for review in 2005. The Policy can be found at the Department of Water website for “Policy” available online at http://portal.water.wa.gov.au/portal/page?_pageid=1318,5446640&_dad=portal&_schema=PORTAL (viewed 24 May 2006) ⁹¹ *Rights in Water and Irrigation Act 1914* (WA), s 26GU. ⁹² National Competition Council, n 38, pp 5.18-5.20. The report is available at: <http://www.ncc.gov.au/publication.asp?publicationID=201&sectorID=7> (viewed 5 May 2006). ⁹³ *Rights in Water and Irrigation Act 1914* (WA), Sch 1, cl 15, and the Appendix to the Schedule, items 2 and 9. ⁹⁴ Gardner, n 89 at 20. For example, this has been done for Jandakot and Gnangara Water Mounds: see discussion above regarding the EPA’s auditing of EWAs on Gnangara and Jandakot Mounds. ⁹⁵ *Rights in Water and Irrigation Act 1914* (WA), ss 26L – 26N. ⁹⁶ *Water Management Act 2000* (NSW), s 56. (2006) 23 EPLJ 208 221 ©

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sources.⁹⁷ The bulk access regime for a water resource must establish rules for the making of available water determinations,⁹⁸ which must be made in accordance with the bulk access regime and the management plan.⁹⁹ Further, there is the general duty

of the Minister, when exercising these functions under the Act, to “take all reasonable steps to give effect to the provisions of any management plan and, in particular, to ensure that any environmental water rules established by the plan are observed”.¹⁰⁰ In normal climatic circumstances, the Act requires that the management plan give the EWA first priority in making the available water determinations, as discussed above.¹⁰¹ However, if there is a severe water shortage, the Minister may make a special order to suspend the normal rules of priority and give second priority to the EWA after the taking of water for human domestic purposes and essential town services.¹⁰² In either situation, third priority goes to the holders of access licences taking water for commercial and industrial activities.

EWAs can also be secured by the issue of water access entitlements for “adaptive environmental water” (AEW), which is defined as “water that is committed by the conditions of access licences for specified environmental purposes, either generally or at specified times or in specified circumstances”.¹⁰³ For example, AEW can be released from a dam to supplement high rainfall flows that contribute to flooding and enhance bird breeding events. A management plan must provide for AEW,¹⁰⁴ but there was no statutory guidance as to the extent of provision. The 2005 amendments have now elaborated on the ways in which water management plans may provide for the exercise of ministerial discretion to allocate water in this way.¹⁰⁵ In essence, AEW conditions may be imposed on a licence:

30. at the request of the licensee (which can facilitate trade in environmental water);
31. to allocate water savings made by improvements to the water infrastructure system; and
32. to re-allocate water savings made by a licensee. □ Access licences with AEW conditions may be granted or transferred to the Minister, a catchment management authority or another public body, who then act as the managers of the environmental water.¹⁰⁶ Even then, an access licence for AEW may only be granted if it is consistent with a management plan, which the Minister may amend to provide for AEW.¹⁰⁷ □ **Victoria** □ Although the *Water Act 1989* (Vic) did, prior to the 2005 amendments, provide for a water access entitlement to be defined as *a share of an available resource*, the amendments have more comprehensively established this concept by adapting the existing provisions governing plans and entitlements and by introducing a new Pt 3A for the allocation of “shares”. The 2005 amendments have also introduced the new “environmental entitlements”, as discussed above. □⁹⁷ *Water Management Act 2000* (NSW), s 59. □⁹⁸ *Water Management Act 2000* (NSW), s 20(2)(b). □⁹⁹ *Water Management Act 2000* (NSW), s 60(1). □¹⁰⁰ *Water Management Act 2000* (NSW), s 48. □¹⁰¹ *Water Management Act 2000* (NSW), ss 5(3) and 9(1), discussed above in relation to the duty to make an EWA, would apply equally to the administration of the water management plans and the making of available water determinations. □¹⁰² *Water Management Act 2000* (NSW), s 60(2) & (3). □¹⁰³ *Water Management Act 2000* (NSW), s 8(1)(b). □¹⁰⁴ *Water Management Act 2000* (NSW), s 8(4) and 20(1)(a). □¹⁰⁵ *Water Management Amendment Act 2005* (NSW) has inserted, relevantly, ss 8B – 8E. □¹⁰⁶ *Water Management Act 2000* (NSW), s 65(3) and (4). □¹⁰⁷ *Water Management Act 2000* (NSW), ss 63(2) and 45(2).

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The foundations for defining access entitlements as a share of an available resource are the Minister's power to declare "permissible consumptive volumes" (PCVs)¹⁰⁸ and the separate power under the management plan provisions to cap water allocations. Although a management plan may restrict the taking of water to prevent a PCV from being exceeded,¹⁰⁹ there is no requirement that a management plan does so, or that the Ministerial determination of a PCV is consistent with a management plan. On the other hand, a PCV gains legal force from an approved management plan, which is binding on every person (including every public statutory authority) except to the extent otherwise specified by the Minister in a notice.¹¹⁰ It is an offence to contravene a management plan.¹¹¹

What constraints do a PCV or a management plan place on the grant of the established forms of water entitlements, either a bulk entitlement or a licence?¹¹² A management plan may restrict or prohibit the grant or renewal of water licences.¹¹³ There appears not to be a provision relating to the Governor's grant of bulk entitlements that expressly requires compliance with a relevant management plan, because a management plan will only be used on unregulated rivers (ie rivers with no dam or reservoir). There is an instruction that the Governor in Council must not approve a bulk entitlement application "unless he or she considers that the allocation of water ... is not likely to have any significant impact in respect of the matters to be considered under s 40", which includes the PCV for the area, the maintenance of the environmental water reserve and the need to protect the environment.¹¹⁴ In addition, the 2005 amendments have qualified the Crown's right to water itself by the requirement that the need to maintain the environmental water reserve be considered before conferring any right to water (eg a bulk entitlement), any licence to take and use water and any approval for works or activities that affect the use, flow or control of water.¹¹⁵

Once granted, a bulk entitlement or a licence may, but need not, confer the access entitlement as *a share of an available resource*; whether as a share of inflow, storage or releases under a bulk entitlement¹¹⁶ or as a maximum amount of water that may be taken in particular periods or circumstances under a licence.¹¹⁷ In addition, a bulk entitlement or licence may contain conditions for the protection of the environment and any other requirements for the maintenance of the environmental water reserve.¹¹⁸ The holder of a bulk entitlement or licence must comply with its terms.¹¹⁹ Finally, in respect of unallocated water in a water storage, the Minister must be satisfied that any water flowing from the storage is adequate to maintain the environmental water reserve before selling the surplus as "sales water".¹²⁰

Irrigation district "water rights" are a separate form of entitlement conferring on landholders registered in an irrigation district the right to receive from the Water Authority delivery of the specified volume of water recorded against their landholdings in return for the payment of the

¹⁰⁸ *Water Act 1989* (Vic), s 22A(1) substituted by *Water Resource Management Act 2005* (Vic). The previous provision to declare a "permissible annual volume" for an area of surface or ground water has been replaced by

this very similar power.

¹⁰⁹ *Water Act 1989* (Vic), s 32A(3)(f) and (g).

¹¹⁰ *Water Act 1989* (Vic), s 32A(11).

¹¹¹ *Water Act 1989* (Vic), s 32A(13).

¹¹² Irrigation District water rights under Pt 11 of the *Water Act 1989* (Vic) are discussed below.

¹¹³ *Water Act 1989* (Vic), s 32A(3)(d) and (e). See also s 53, which requires the Minister considering a licence application under s 51 to give effect to an approved water management plan.

¹¹⁴ *Water Act 1989* (Vic), ss 42(2) and 40(1)(ba), (d)(iv) and (g). There may be an intention to permit the Minister or Governor-in-Council to grant a Bulk Entitlement that departs from an established or approved management plan because it is a later exercise of discretionary authority.

¹¹⁵ *Water Act 1989* (Vic), s 7(4). ¹¹⁶ *Water Act 1989* (Vic), s 43. ¹¹⁷ *Water Act 1989* (Vic), s 56(1)(iii). ¹¹⁸ *Water Act 1989* (Vic), ss 43(i)(iii) and (v) and 56(1)(v) and (va). ¹¹⁹ *Water Act 1989* (Vic), ss 47A and 63. ¹²⁰ *Water Act 1989* (Vic), s 47D.

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appropriate charges.¹²¹ Whilst the water right is recorded as a specific volume, the Water Authority may reduce or discontinue the supply of water if, because of a shortage of water or some other unavoidable cause, it is unable to supply the normal volume or if it believes that this is necessary to avoid a future water shortage.¹²² Any reduction in supply must be proportionate unless extreme circumstances warrant otherwise. Thus, although the water right is not expressed as a share of available water, it may be administered in this way.

The 2005 enactment of the new Pt 3A of the *Water Act* pertaining to “water shares” has added a new version of a water entitlement that is specifically defined as a share of the available resource.¹²³ The new water shares regime is designed to replace the existing regimes of take-and-use licences and irrigation water rights by offering conversion to the “unbundled” set of entitlements comprising the water shares, water use licences and delivery rights or obligations.¹²⁴ The new regime only applies to a “declared water system”, but within such an area it is an offence to take water without authority under a water share.¹²⁵ The essence of the new regime is that the Minister may issue water shares in relation to declared water systems, but must do so consistently with any relevant management plan, PCV or bulk entitlement. A share is expressed as a maximum volume of water available from the water system over a defined period and with a defined class of reliability. The share authorises the taking of water under a “water allocation” during the water season for which the allocation is made. The Minister must make water allocations during a water season to each water share in respect of a declared water system for which a “seasonal determination” of water availability has been made.¹²⁶ The seasonal determination may be made by a Water Authority in respect of a declared water system. It determines the water that is

available for each class of water shares, for each bulk entitlement and for each environmental entitlement in that system.¹²⁷ If no seasonal determination is made, then the water allocation will be the maximum volume assigned to the water share. In summary, each water share holder will, in any water season, be entitled to take only their share of water available in the water system.

As mentioned above, the 2005 amendments have also created environmental entitlements as a means of conferring secure allocations to the environment. An environmental entitlement may be quantified either as a specific volume, a level of flow at a specified point or as a share of a resource calculated in various ways.¹²⁸ It may also be given a class of reliability, and receive a water allocation consistent with a seasonal determination of available water. The allocation will be tradable. Thus, some of its basic legal features will be similar to a water share. An exception to this similarity is that the Minister's power to amend an environmental entitlement may not be exercised to reduce the volume or reliability of the water allocated under the entitlement.

In summary, a Victorian water access entitlement and environmental entitlement may, but need not, be defined as a share of an available resource. The 2005 enactment of the new water shares regime will permit holders of existing water licences and irrigation rights to convert to water shares, which are explicitly an entitlement defined as a share of an available resource.

¹²¹ *Water Act 1989* (Vic), Pt 11, especially ss 222 and 230. ¹²² *Water Act 1989* (Vic), s 141. There is also a power to reduce or discontinue supply because of contamination: s 222(1A). ¹²³ Inserted by *Water (Resource Management) Act 2005* (Vic), s 41.

¹²⁴ Victoria, Legislative Assembly, *Debates* (6 October 2005) p 1337 ff, second reading speech for the *Water (Resource Management) Act 2005* (Vic). Section 71 inserts Sch 15, which provides for the rate of conversion from the old water entitlements to the new. The water use licences authorise the location of taking and using water. The delivery right or obligation assures the rate at which water may be delivered by irrigation infrastructure or taken under the water use licences by self-suppliers.

¹²⁵ *Water Act 1989* (Vic), ss 6A and 33F. The declaration is made by Order of the Governor in Council. ¹²⁶ *Water Act 1989* (Vic), s 33AC. ¹²⁷ *Water Act 1989* (Vic), Pt 4, Div 5, inserted by s 52 *Water (Resource Management) Act 2005*. ¹²⁸ *Water Act 1989* (Vic), s 48I.

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Western Australia

The RWI Act gives no binding legal force to a management plan and omits any description of a water access entitlement as a share of an available resource. There is no provision for allocating a water entitlement to the environment. In the absence of these features, the author has reviewed the enforceability of the regulatory means employed to create EWAs.

A statutory water management plan under the RWI Act has the legal force of being only a relevant consideration in the exercise of the power to grant water licences.¹²⁹ The RWI Act does not prevent the grant of a water licence in derogation of an EWA

under a statutory plan. On the other hand, it does authorise the DoE to amend, suspend or cancel a licence unilaterally to accord with a management plan, or temporarily to restrict the exercise of licence entitlements; both for the purposes of protecting the environment.¹³⁰ The long term variation of a licence is subject to potential duties to compensate the licensee.

In respect of the other three methods of making an EWA, there is varying legal force. First, licence conditions set under the RWI Act bind the licensee but are quite situation-specific and do not constrain the discretion of the agency administering the licence. Secondly, local by-laws made under the Act would bind the agency administering the licensing scheme and the licensees, but they would not constrain the Minister's discretion to change the by-laws. The legal effect of the current practice in using the environmental impact assessment process to set EWAs is discussed more below.

Importantly, there is no statutory statement that a licence confers only an entitlement to a share of available water. Licence entitlements are typically granted as a maximum volume of water that may be taken each year. Nevertheless, it is not inconsistent with the RWI Act for regulations to prescribe a standard condition that a licence confers only a share of an available resource or to insert conditions in individual licences stating that the entitlement is to a share of an available resource. The DoE has applied this practice of allocating shares in available water in relation to major dams from which the Water Corporation and irrigators are entitled to take separate entitlements. This is reflected in the policy on the *Use of operating strategies in the water licensing process*, which states:¹³¹

Licences will still include a number of general conditions such as the annual water entitlement, or their *allocated share of the available water*. [emphasis added]

However, the notion of allocated shares of available water has not been used in relation to groundwater in respect of the Water Corporation or other licensees due to a lack of information on the ground water resources.¹³²

This may be about to change. The Western Australian Government's recent response to the *Final Report of the State Water Strategy Irrigation Review* has endorsed the proposal that entitlements will be allocated as a share of the available resource issued annually as a volumetric allocation to the holder of a medium term (25-40 years) rolling entitlement.¹³³ The government's endorsement, however, is hedged with the need to review certain issues involved in the implementation of the concept, including issues involving metering, the preparation of water plans and the determination of annual allocations.

There are, however, other important concerns about the enforceability of existing EWAs imposed as licence conditions or under EP Act ministerial conditions. First, there are a number of observations to make about the implementation of EWAs set as licence conditions.

¹²⁹ *Rights in Water and Irrigation Act 1914* (WA), Sch 1, cl 7(2)(g). Gardner, n 89 at 18-19.

¹³⁰ *Rights in Water and Irrigation Act 1914* (WA), Pt 3, Div 3A, and Sch 1, cll 24 and 25, discussed above.

¹³¹ Western Australia, Water and Rivers Commission, Statewide Policy No 10, *Use of Operating Strategies in the Water Licensing Process*, (May 2004) p 9, available online at the Department of Water website for “policy”: http://portal.water.wa.gov.au/portal/page?_pageid=1318,1&_dad=portal&_schema=PORTAL. (viewed 24 May 2006)

¹³² Personal communication from Jeff Camkin, Water and Rivers Commission of Western Australia (2nd September 2005).

¹³³ Western Australian Government, Irrigation Review Steering Committee, *Final Report on the Irrigation Review* (July 2005), see Key Direction 3. The Government’s response accepts the idea for further “implementation review”; *Government Response to the Irrigation Review Steering Committee* (August 2005). Both of these documents are available online at <http://www.statewaterstrategy.wa.gov.au/index.cfm?event=waterReform> (viewed 5 May 2006).

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36. Licence conditions are supposed to be legally binding; the contravention of a licence condition in the management of the water resource would be an unauthorised taking of water pursuant to s 5C of the RWI Act, which is an offence. A person who contravenes s 5C is also liable in a civil action for a breach of statutory duty at the suit of another water rights holder or a person “directly affected by the degradation of the water resource”.¹³⁴ While the common law right of any person to prosecute a criminal offence has recently been repealed by the Western Australian Parliament,¹³⁵ any person with legal standing would have the right to seek the exercise of the Supreme Court’s extraordinary jurisdiction to injunct a criminal offence.¹³⁶
37. At the time of writing, there is no public notice of licence conditions. The register of instruments to be maintained under the RWI Act is not required to record the conditions imposed on a licence, so a search of the register will not reveal the licence conditions.¹³⁷ This is a significant omission from the regulatory framework. It has been objected that it would be cumbersome to include in the electronic form of the register items like licence conditions. Whilst that may be true for substantial elements like the operating strategy, that objection is easily overcome by including the text of the basic conditions on the register with a notice that a copy of any operating strategy can be obtained upon request. This way, it would be possible to provide, upon request, an up-to-date copy of an operating strategy.
38. The licensing regime contains no legislative provision that monitoring reports should be published. Whilst the provisions of the RWI Act do not directly authorise the imposition of licence conditions requiring the licensee to publish monitoring results, there would appear to be no obstacle to such a requirement being imposed by regulation or by local by-law.¹³⁸ □ It is likely that the terms of licence conditions, including any operating strategy and monitoring

reports could be obtained under the *Freedom of Information Act*, but it would be

better for the licensing regime to be more open about matters of fundamental public interest.

Secondly, and of even more concern, is the enforceability of the EP Act “ministerial conditions”. The author has recently conducted a study of the implementation of EWAs through EP Act ministerial conditions; the EWAs with, ostensibly, the strongest legal force. The EWAs reviewed included those established by EP Act ministerial conditions for the Jandakot and Gnambarra Mounds that supply water to Perth.¹³⁹ These allocations were set in the form of ground water levels to be achieved in relation to key wetlands and areas of vegetation and other ecological systems dependent on groundwater levels.¹⁴⁰ Further, it is a requirement of these ministerial conditions that the proponent (Water

¹³⁴ *Rights in Water and Irrigation Act 1914* (WA), s 5E.

¹³⁵ The common law proposition is that any person may prosecute a criminal offence. There is no provision in the *Rights in Water and Irrigation Act 1914* (WA) that derogates from that common law proposition, as s 74 of the Act simply provides that prosecution proceedings shall be dealt with in a court of summary jurisdiction. However, the *Criminal Procedure Act 2004* (WA), s 20 has repealed the common law right to prosecute criminal offences.

¹³⁶ See discussion of this proposition above in relation to the enforcement of *Environmental Protection Act 1986* (WA), s 47. ¹³⁷ *Rights in Water and Irrigation Act 1914* (WA), Pt III, Div 3E and *Rights in Water and Irrigation Regulation 2000* (WA),

reg 48.

¹³⁸ *Rights in Water and Irrigation Act 1914* (WA), Sch 1, cl 15 and Appendix to Sch 1 do not directly authorise such conditions, but cl 15 would authorise regulations to achieve this effect, and so would ss 26L and 26M.

¹³⁹ The ministerial conditions for Jandakot Mound are based on *Ministerial Statement No 253* published on 29 April 1992, though the actual environmental water allocation criteria appear to have been set in an environmental management and monitoring program made pursuant to the ministerial statement and not published. The ministerial conditions for Gnambarra Mound are based on *Ministerial Statements 438* (6 February 1997) and *496* (17 February 1999). Only in *Statement 496* are the environmental water allocations for East Gnambarra actually published; *Statement 438* relies on a reference to the publication of the allocation criteria in the proponent’s proposal document.

¹⁴⁰ Water and Rivers Commission, *Environmental Management of Groundwater Abstraction from the Gnambarra Mound July 2000 – June 2003: Triennial Report to the Environmental Protection Authority* (March 2004) p 5 and Tables 1 and 2 at pp 27-28, available online http://portal.environment.wa.gov.au/portal/page?_pageid=55,763515&_dad=portal&_schema=PORTAL (viewed 5 May 2006).

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Authority/Water and Rivers Commission) must operate or manage water abstraction within the limits of the EWAs.¹⁴¹ Subject to the comments below, the EWAs on the Gnambarra and Jandakot Water Mounds seem enforceable.

Besides the Gnambarra and Jandakot Mounds water supply schemes, the author located seven other water supply projects approved with EP Act ministerial conditions since

1990; five of which have requirements for EWAs.¹⁴² The EP Act ministerial conditions for the following proposals require some form of provision for an EWA: the North Dandalup Dam (1990); water supply to Kemerton Industrial Park (1996); the extensions to the water supply bore field for the Town of Exmouth (1997); the Stirling-Harvey Redevelopment Scheme (1999); and the Harris River Dam project (2000). The ministerial conditions for the Harris River Dam even require that the EWA be given priority over other releases or diversions from the dam.¹⁴³

Regrettably, the basic legal commitment for the first three schemes and for the Harris River Dam project is only in the form of a duty to prepare an environmental management plan to meet some generally stated environmental objective; such as, that there be no environmentally significant change downstream of the off-take site (Kemerton) or that the environmental objectives are met, including the protection of stygofauna populations (Exmouth), or that the proponent shall release sufficient water to meet the water needs of the environment of the river (Harris).¹⁴⁴ In respect of the Stirling-Harvey Redevelopment Scheme, there is no EWA from below the new Harvey Dam, but the ministerial statement of conditions contains a commitment to study the adequacy of this and to determine the environmental water requirements above the Harvey Reservoir and below the Stirling Dam. Typically, the ministerial conditions also oblige the proponent to implement commitments that it undertakes in the environmental management plan prepared in fulfilment of the condition. However, it was not easy to ascertain what steps have been taken to prepare the environmental management plans in fulfilment of the primary obligations or to fulfil the further commitments in those environmental management plans.

The author obtained from the DoE library copies of various documents that the ministerial conditions required to be prepared, but none of them contained an authoritative statement of the terms of an EWA. There appears to be no public record of the environmental management plans that have been made, and the EP Act ministerial conditions do not expressly require one. Further inquiries of the Water Corporation¹⁴⁵ elicited further information about the internal understanding of the performance of these commitments, some reporting to the DoE and some records of fulfilment of conditions. The author was not able to ascertain the actual terms of the EWAs and how a member of the public may check on their fulfilment. From a practical perspective, the EWAs are unenforceable.

Even from a legal perspective, this seems to be the result too. EWAs under the EP Act ministerial conditions have the apparent force of law. Non-compliance with a ministerial condition is an

¹⁴¹ See *Ministerial Statement No 253* published on 29 April 1992 (Jandakot) cl 3; *Ministerial Statements 438* (6 February 1997) cl 3 and 4; and *496* (17 February 1999) cl 2 (Gnangara & East Gnangara, respectively).

¹⁴² See Western Australia, Department of Environment, *Environmental Conditions (Ministerial)* online at http://portal.environment.wa.gov.au/portal/page?_pageid=193,186707&_dad=portal&_schema=PORTAL (search “environmental conditions”) (viewed 24 May 2006). The seven relevant ministerial statements are: (1) No 111, 3 October 1990 re: North Dandalup Dam; (2) No 190, 31 October 1991 re: Ten Mile Brook Reservoir, for town of Margaret River water supply; (3) No 337, 24 January 1994, re: Water Catchment and Dam, Mt Hampton, Southern Cross; (4) No 427, 6 September 1996 re: water supply for Kemerton Industrial Park; and (5) No 459, 13 October 1997, re: extension of bore field for Town of Exmouth water supply, 13 October 1997; (6) No 525, 29 October 1999, Stirling-Harvey Redevelopment Scheme; (7) No 532, 19 June 2000, Harris River Dam Project. The Kemerton Industrial Park proposal was never implemented (personal communication from Mr Guy Watson, Water Corporation, 17 June 2005).

¹⁴³ *Environmental Protection Act 1986* (WA); *Ministerial Statement No 532* (19 June 2000), Harris River Dam Project, condition 4.3.

¹⁴⁴ It is arguable that conditions in these terms are invalid for uncertainty: *Mison v Randwick Municipal Council* (1991) 23 NSWLR 734; 73 LGRA 349; and *Re Lawrence; Ex parte Goldbar Holdings Pty Ltd* (1994) 11 WAR 549; 84 LGERA 113.

¹⁴⁵ Email communications from Dr Miles Dracup, Water Corporation, 12 August 2005.

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offence.¹⁴⁶ Compliance with a ministerial condition is, therefore, a public duty that may be enforceable by judicial review proceedings by a person with legal standing, even though the authority under the EP Act to prosecute is limited to the Chief Executive Officer of the DoE or an authorised person.¹⁴⁷ The circumstances in which the public duty could be enforced have been explained in a Supreme Court case relating to the enforcement of EP Act ministerial conditions against logging activities being proposed by the Department of Conservation and Land Management, which was itself the proponent subject to the conditions.

[W]hilst the capacity to prosecute may be so restricted, it does seem that a private litigant who has standing to sue in respect of the subject matter generally ... will have standing to seek by injunction to prohibit conduct which would amount not only to an unlawful act but also to an offence of a criminal or quasi-criminal character. The grant of such relief is, of course, discretionary, but it has been recognized that it is a discretion which will only be exercised by a court at the suit of a plaintiff who has standing to bring the action in extraordinary or exceptional circumstances, which clearly call for the intervention of the court, rather than leave the process of enforcement of the obligation to the ordinary application of the criminal law and the prosecution process. The sort of case which may be appropriate for the grant of relief by injunction in such circumstances is where there is a continuing offence which may be established, or a clearly threatened intention to do acts or make omissions which would constitute the commission of an offence in circumstances where the effect would be to cause irreparable damage or irreversible harm.¹⁴⁸

In that case the court declined to intervene for two reasons. First, it was held that the pleadings did not establish the extraordinary circumstances for the exercise of the court's discretion to intervene. Secondly, one judge held that the terms of one of the conditions showed that the Environmental Protection Authority (EPA) and, if necessary, the Minister, were responsible for verifying compliance with the conditions contained in the ministerial statement; the court could not determine that an offence had been committed until the EPA or the Minister had come to the conclusion that there had not been compliance.¹⁴⁹ With respect, this last proposition strains constitutional principle because it opens the possibility that the executive can, by the terms of a condition, empower itself to determine after the fact when a condition is breached. Such a condition could be challenged as invalid for uncertainty, unless it were seen to be a procedure for giving effect to s 116 of the EP Act,¹⁵⁰ which is not likely. However, there is now an almost ubiquitous practice in the

drafting of EP Act ministerial conditions that purports to make compliance with a ministerial condition a matter of departmental or ministerial determination. Take, eg the following provisions from the Gngangara Mound statement of ministerial conditions (1997):

The proponent [Water and Rivers Commission] shall submit periodic Performance and Compliance Reports, in accordance with an audit programme prepared by the Department of Environmental Protection in consultation with the proponent.

Procedure

1. Unless otherwise specified, the Department of Environmental Protection is responsible for assessing compliance with the conditions contained in this statement and for issuing formal clearance of conditions.

¹⁴⁶ *Environmental Protection Act 1986* (WA), s 47.

¹⁴⁷ *Environmental Protection Act 1986* (WA), s 114. The section was amended in 2003 to remove the requirement that the Minister consent to any prosecution, though it is still likely that the Minister could direct the Chief Executive Officer in the exercise of their powers.

¹⁴⁸ *Bridgetown-Greenbushes Friends of the Forest v Executive Director of Conservation and Land Management* (1997) 18 WAR 126 at 141-142 (per Murray J); 94 LGERA 380.

¹⁴⁹ *Bridgetown-Greenbushes Friends of the Forest v Executive Director of Conservation and Land Management* (1997) 18 WAR 126 at 142 (per Murray J) and 179-181 (per Templeman J); 94 LGERA 380.

¹⁵⁰ This section provides that any dispute between the EPA and a public authority with respect to the performance of any rights or functions by either or both of them may be finally and conclusively determined by the Governor.

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2. Where compliance with any condition is in dispute, the matter will be determined by the Minister for the Environment.¹⁵¹

Unless the Supreme Court's view of the effect of this type of provision is overturned, it means that the setting of EWAs under EP Act ministerial conditions merely perpetuates a process of management by executive discretion rather than by enforceable legal duties.

DUTIES TO MONITOR AND REPORT

Once an EWA is made and implemented, is there a duty on the responsible agency to monitor and report on its implementation? If so, what are the requirements of the duty?

New South Wales

In New South Wales, the Minister is to ensure that a management plan is audited at least every five years.¹⁵² The criteria for the audit are to be stated in the management plan itself; and include:¹⁵³

42. a vision statement;
43. objectives consistent with the vision statement;
44. strategies for reaching those objectives; and
45. performance indicators to measure the success of those strategies.¹⁵⁴ □ A periodic audit of this sort should enable the Minister to determine whether a management plan is achieving its objectives, including with respect to an EWA. The recently established Natural Resources Commission will assist with these reviews.¹⁵⁵ However, these provisions do not actually create separate legal duties to monitor and report on the implementation of an EWA from year to year or to keep an account of EWA water that is released or taken. □ The accounting of the water actually allocated to the environment from year to year will, to some extent, be reflected in the maintenance of water accounts for licensees. The Act requires the Minister to maintain a register of available water determinations and water allocation accounts for each licence, crediting water allocations made pursuant to available water determinations and debiting water allocations that are taken or assigned (transferred).¹⁵⁶ “Adaptive environmental water” taken under licences should be recorded in this way. However, EWAs released under the terms of a management plan will not be accounted in this way, and would appear to be recognised only as the residue of surface water flow or available ground water. One would expect that EWAs released from dams would be measured and recorded, even if not pursuant to an existing water accounting mechanism under the Act. The author did not have the opportunity to ascertain what, if any, of this information is published. □ The real accounting and monitoring of EWAs in New South Wales will be performed by catchment management authorities. They may, under authority from the Minister:¹⁵⁷ □¹⁵¹ *Environmental Protection Act 1986* (WA); *Ministerial Statement 438, Gngangara Mound* (5 February 1997) condition 12.1. Similar provisions appear in the other statements of ministerial conditions for environmental water allocations. □¹⁵² *Water Management Act 2000* (NSW), s 44. □¹⁵³ *Water Management Act 2000* (NSW), s 35(1). □¹⁵⁴ The New South Wales Court of Appeal has held that the “performance indicators” do not need to be expressed in the form of a “target” or “standard”, at least not in a Minister’s Plan: *Nature Conservation Council of New South Wales Inc v Minister Administering the Water Management Act* (2005) 137 LGERA 320; [2005] NSWCA 9 at [38]–[52]. As mentioned above, the appeal to the High Court has been terminated. □¹⁵⁵ The Natural Resources Commission is established under the *Natural Resources Commission Act 2003* (NSW). See also Ministerial Statement, *NSW Water Reforms: A Secure and Sustainable Future* (June–August, 2004) available online at <http://www.dipnr.nsw.gov.au/water/> (viewed 5 May 2006). □¹⁵⁶ *Water Management Act 2000* (NSW), ss 84 – 85. Water allocation accounts are to be maintained in accordance with the *Water Management*

General Regulation 2004 (NSW), reg 16. There may also be pertinent licence conditions that require licence holders to report to the Minister the quantity of water taken from an approved water supply works, which conditions may be imposed under management plans, see ss 20(2)(e) and 66(1). ¹⁵⁷ *Water Management Act 2000* (NSW), s 389A. Such authorities are constituted under the *Catchment Management Authorities Act 2003* (NSW), and may by s 14(2) exercise functions conferred upon them under any other Act.

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46. assist the Minister or a management committee under the Act in the development of, consultations about or implementation of management plans;
47. manage adaptive environmental water under access licences; including by acquiring, holding and dealing with access licences;¹⁵⁸ and
48. monitor water quality and other environmental health objectives of management plans (including in connection with a review or audit of any such plan). ¹⁵⁹ These statutory provisions seem to meet the terms of principle 8 (above) for the establishment of environmental water managers. However, we have been unable to assess the extent to which catchment management authorities have taken up these functions of monitoring and reporting on the implementation of EWAs. Further, we did not have the opportunity to ascertain whether or not there are provisions that meet the terms of principle 9 for the establishment of environmental water accounting and reporting. **Victoria** ¹⁶⁰ The *Water Act 1989* (Vic) confers significant powers on the Minister to collect information in pursuit of monitoring or assessing the state of water resources on public and private land.¹⁵⁹ However, there was no express power to investigate the implementation of an EWA, though this has been remedied by amendment in 2005.¹⁶⁰ Further, there was, until recently, no duty to publish the information gathered, although a “report on the water resources assessment program must be included in each annual report of the Department”.¹⁶¹ ¹⁶² The 2005 amendments, especially the provisions for “Long-term Water Resources Assessments”, ¹⁶² have also now created a thorough public process for evaluating and responding to the results of water resources monitoring every 15 years. The long-term assessment is required to identify whether or not there has been a decline in the long-term availability of surface or ground water and whether the decline has fallen disproportionately on the allocation of water to the environmental water reserve or for consumptive purposes, as well as any deterioration in waterway health for reasons related to flow. If the Minister believes that the assessment has identified a problem with water allocations, including in a particular area, the Minister must undertake a further review to determine the action required to restore the balance between the environmental water reserve and the allocation of water for consumptive purposes or to restore waterway health. Upon endorsement of this review report, the Minister must publish a statement of the

implementation of the actions, including any qualification of rights. A major omission from the statutory framework for making this assessment is the duty to prescribe performance indicators against which to measure water resource management.¹⁶³ □ In addition to the functions of the Minister, an important part of monitoring and reporting is the water accounting framework. The Act provides that a management plan for a water supply protection area *may* prescribe requirements for “metering, monitoring and accounting for groundwater or surface water or both”.¹⁶⁴ As a management plan is binding on every person,¹⁶⁵ a prescription of these requirements would create legal duties on the persons nominated to perform the various functions. The administration and enforcement of an approved management plan is conferred on a water authority,¹⁶⁶ which must report annually on the performance of its duties to the Minister and to every catchment □¹⁵⁸ *Water Management Act 2000* (NSW), s 389A(2). Such licences may be allocated under s 65. ¹⁵⁹ *Water Act 1989* (Vic), s 23. □¹⁶⁰ *Water Act 1989* (Vic), s 23(1)(ca). □¹⁶¹ *Water Act 1989* (Vic), s 26. □¹⁶² *Water (Resource Management) Act 2005* (Vic), s 11 inserts a new Div 1C in Pt 3 of the *Water Act 1989* (Vic). □¹⁶³ Even the new Pt 3, Div 1B, of the *Water Act 1989* (Vic), Sustainable Water Strategies, does not require performance □ indicators. □¹⁶⁴ *Water Act 1989* (Vic), s 32A(3)(a). ¹⁶⁵ *Water Act 1989* (Vic), s 32A(11). ¹⁶⁶ *Water Act 1989* (Vic), s 32B.

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management authority whose catchment region is wholly or partly within the water supply protection area.¹⁶⁷ The report must also be made available to the public.¹⁶⁸ In summary, although a management plan will require annual public reports on its implementation, it does not expressly require monitoring and reporting about the implementation of an EWA and does not require that the plan specify performance indicators against which the success of the plan may be evaluated.

An entitlement may likewise impose metering requirements. There are metering obligations on a water authority holding a bulk entitlement¹⁶⁹ or a person holding a take-and-use licence.¹⁷⁰ There is no explicit mention of a power to require a water authority to report publicly the results of metering under its bulk entitlement, which may be a significant omission given that a bulk entitlement may provide for an EWA. One may assume that all licensees could be required to report metering results to a water authority. Under the 2005 amendments, the new water use licence may contain conditions that require monitoring and reporting, which would appear to be the means for metering the water taken under authority of a water share.¹⁷¹ Although there is no specific provision to set conditions on environmental entitlements that require monitoring and reporting on their implementation, one suspects that such conditions would be within implied authority to set conditions.¹⁷² On the other hand, there is an express duty on the environment Minister to report annually on the total volume of

assignments of environmental water allocations to consumptive uses that are approved.¹⁷³

How will all this water accounting information be recorded and published? A new Pt 5A of the *Water Act* establishes the Victorian Water Register for the purposes of being a centralised system of records for all water-related entitlements, including environmental entitlements, and for facilitating the monitoring and reporting of information about those entitlements. A water authority is responsible for maintaining records in the water register with respect to the services it delivers in an irrigation district and any water allocation made, assigned, and consumed in a water system for which it has supply responsibility. The Minister has other recording responsibilities, including for bulk and environmental entitlements. However, the details of what the Minister should record and many of the register details that are to be publicly available are yet to be prescribed by regulations. It is not yet possible, therefore, to say whether a member of the public will be able to ascertain from the register the seasonal fulfilment of terms of an environmental entitlement.

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Although the *Water and Rivers Commission Act* imposes certain general legal duties on that body to manage the State's water resources, there is a very broad discretion in the execution of those duties, and the fulfilment of them has to be considered in the light of the constraints on human and financial resources.¹⁷⁴ There are no other general statutory statements of duty that pertain to the monitoring and reporting of water resources management, except for the RWI Act provision that water allocation plans must "specify the monitoring and reporting (which is to occur at least once in every seven years) to be carried out by the Commission to ensure, as far as is practicable, that the objects of this Part are achieved in the implementation of the plan".¹⁷⁵ The RWI Act does not require management plans to provide for performance indicators to measure compliance with the terms of the plan. It is strongly arguable that the RWI Act does not specify an adequate regime of monitoring and reporting. In any

¹⁶⁷ *Water Act 1989* (Vic), s 32C. ¹⁶⁸ *Water Act 1989* (Vic), s 32D. ¹⁶⁹ *Water Act 1989* (Vic), s 43(h). ¹⁷⁰ *Water Act 1989* (Vic), s 56(xii). ¹⁷¹ *Water Act 1989* (Vic), s 64Z. ¹⁷² *Water Act 1989* (Vic), s 48J.

¹⁷³ *Water Act 1989* (Vic), s 48Q. ¹⁷⁴ Roberts A and Gardner A, "Challenges for the Management of Water Resources in Western Australia: A Legal Response to

Findings of the Public Sector Performance Report, 2003", (2005) 22 EPLJ 40 at 52-53. ¹⁷⁵ *Rights in Water and Irrigation Act 1914* (WA), ss 26GW(3), 26GX(3) and 26GY(3).

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case, no plans have been made and, even if they were made, the RWI Act imposes no legal obligation on the agency to manage water resources in accordance with a plan.¹⁷⁶

The non-statutory management plans made in the past decade have gradually become more stringent in the monitoring requirements specified.¹⁷⁷ However, two factors have raised doubts about the effective implementation of the monitoring programs they have proposed. First, the effectiveness of monitoring and reporting requirements is hindered by the general failure of the current management plans to provide details about what is to be monitored and against what performance indicators the monitoring data are to be evaluated. Secondly, given the strain placed on human and financial resources available to the DoE for water resources management, it must be doubted whether all the monitoring programs proposed in the plans have actually been implemented. The Auditor General's *Public Sector Performance Report 2003* stated that Western Australia's "ground and surface water monitoring program has been progressively reduced", making it difficult for the agency to determine accurately the sustainable level of use in many areas of the State.¹⁷⁸ A significant source of the problem was a lack of the human and financial resources to perform the monitoring functions. This is changing, with the recent announcement of a significant groundwater investigation program.¹⁷⁹ There also needs to be a clearer legal duty on the Minister to ensure that adequate monitoring is undertaken.

An improvement in the monitoring regime needs to be accompanied by an improvement in the reporting regime. One of the statutory functions of the Water and Rivers Commission is "publishing information and material relating to water resources".¹⁸⁰ There is no statutory duty to publish any specific information and, as explained above, no statutory plans have been made to define any reporting requirements. Despite the lack of legal duties on the Department to publish the results of Departmental and licensees' monitoring, what has been the agency practice? The following observations can be made:

52. The Water and Rivers Commission Annual Reports of 2002-2003 and 2003-2004¹⁸¹ contain limited statements on the state of some water resources, including reports on the non-compliance by the Commission with the EWAs for Gngangara and Jandakot Mounds. The Reports do not actually give the monitoring results nor refer the reader to a place where they are published.
53. The DoE maintains a very good website titled "Water Information, Monitoring & suring".¹⁸² The website provides a useful interface for persons who must meet regulatory requirements for the submission of data to the Department and for members of the public who may request specific

¹⁷⁶ Compare the legal duty of the CEO of the Department of Conservation and Land Management to manage public lands in accordance with a management plan: *Conservation and Land Management Act 1984* (WA), s 33(3)(a), which was considered by the Supreme Court in *Bridgetown Greenbushes Friends of the Forest Inc v Executive Director of the Department of Conservation and Land Management* (1997) 18 WAR 126 at 137-138, 153 and 166ff; 94 LGERA 380.

¹⁷⁷ Gardner A and Chung V, *The Law and Policy of Environmental Water Allocations in Western Australia*, Report to the State Water Strategy Group of the Department of Premier and Cabinet of Western Australia by the Environmental Defenders Office (WA) (September 2005).

¹⁷⁸ Auditor General of Western Australia, *Second Public Sector Performance Report 2003: Report No 7* (September 2003) p 4 available online at http://www.audit.wa.gov.au/reports/report2003_07.html (viewed 5 May 2006). See Roberts and Gardner, n 174 at 41-42.

¹⁷⁹ Western Australia, Department of Environment, *Groundwater Investigation Program in Western Australia (2005-2020)*, (23 June 2005) and available online (follow link to "Water Publications") at <http://www.environment.wa.gov.au/> (viewed 5 May 2006).

¹⁸⁰ *Water and Rivers Commission Act 1995* (WA), s 10(2)(h).

¹⁸¹ Western Australia, Water and Rivers Commission, *Annual Report 2002-03* (Water and River Commission, 2003) pp 21, 92-94; and Western Australia, Department of the Environment, *Annual Report 2003-04* (Department of the Environment, 2004), pp 28-29 and 96-98. For example, the Reports discuss the declining water levels on the Gngangara and Jandakot water mounds, noting the declining ground water levels and the pressure this is putting on the ground water dependent ecosystems, and how the Department is responding. The reports are available from the Department of Environment website, searching "Annual Reports" <http://www.environment.wa.gov.au> (viewed 24 May 2006).

¹⁸² See http://portal.environment.wa.gov.au/portal/page?_pageid=55,34517&_dad=portal&_schema=PORTAL (viewed 8 May 2006). The same information is also now available on the website of the new Department of Water: http://portal.water.wa.gov.au/portal/page?_pageid=1318,5490187&_dad=portal&_schema=PORTAL (viewed 24 May 2006).

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water resource data. There is also access to useful general data on water resources in the State. The only information provided in relation to EWAs is basic data on the monitoring of water levels on the Gngangara and Jandakot water mounds, including comparisons of the actual water levels with the levels required under the EP Act ministerial conditions. However, the website displays no monitoring data of any other EWAs in the State, whether made under the EP Act or not. There is, apparently, no public reporting on the monitoring of other EWAs.¹⁸³

57. The only other potential source of monitoring data for EWAs are the proponent reports prepared under the environmental impact assessment provisions of Pt IV of the EP Act. Those reports may be of two basic types; public reports for the purposes of obtaining the grant or amendment of a ministerial approval; or reports on the monitoring of the implementation of a proposal under ministerial conditions or pursuant to the Department's authority to monitor the implementation of a proposal. Whilst the first type of public reports may be detailed, they are typically presented with particular management goals in mind and may not represent a neutral interpretation of the monitoring data.¹⁸⁴ For this reason, these public reports need to be read in conjunction with the EPA's corresponding public assessment reports.¹⁸⁵ The EP Act EWAs for the Gngangara and Jandakot Mounds have received significant public and regulatory attention in this manner because the ministerial conditions require the reports to be published. However, it would appear that the regular monitoring reports under ministerial conditions to the DoE are not published. The EWA ministerial conditions pertaining to other water supply schemes do not require the proponent to report publicly on the monitoring of the EWAs.¹⁸⁶

58. It would generally be possible to obtain under the *Freedom of Information Act 1992* (WA) copies of the monitoring data and reports generated or received by the DoE. □ In summary, the public reporting of monitoring is generally deficient, though good in respect of

the Jandakot and Gngangara Mounds. There is no comprehensive system of reporting

on the monitoring of EWAs. Legislative reform is needed to implement the NWI objectives of establishing a register of new and existing environmental water, and annual reporting of the operation of EWAs; see national principle 9 above.

To complete the picture on monitoring and reporting, the legal requirements on individual licensees to monitor (meter) and report their water use need to be examined. Such legal requirements were very weak in the late 1980s and early 1990s. At that time, there was no general requirement that water licensees record and report their water use, let alone the impacts of that water use on the associated ecosystem or environment. Licence conditions began to require recording and reporting of water extraction in the late 1980s, but only as a matter of administrative discretion.¹⁸⁷ However, these

¹⁸³ A search of the website of the new Department of Water produces no other reporting of EWA monitoring data.

¹⁸⁴ For example, the Department of Environment report for the *Section 46 Review of Environmental Conditions on Management of the Gngangara and Jandakot Mounds, Stage 1 Proposal for Changes to Conditions* (August 2004) and the triennial reports on compliance with those conditions. See also, Western Australia, Water and Rivers Commission, *Environmental Management of Groundwater Abstraction from the Gngangara Mound 2000-2003: Triennial Report to the Environmental Protection Authority* (March 2004) available online at the Department of Environment website: <http://www.environment.wa.gov.au> by searching “Gngangara Mound” (viewed 24 May 2006).

¹⁸⁵ For example, Environmental Protection Authority, *Review of Environmental Conditions on the Gngangara and Jandakot Mounds: Section 46 Report* (Bulletin 1155, November 2004); and *Environmental Management of Groundwater Abstraction from the Gngangara Mound July 2000 – June 2003 – Triennial Report* (June 2004) available online at http://www.epa.wa.gov.au/docs/1814_B1139.pdf (viewed 8 May 2006).

¹⁸⁶ See the references to ministerial conditions, n 142.

¹⁸⁷ *Rights in Water and Irrigation Regulations 1941* (WA), as amended in 5 July 1985, *Government Gazette* (WA) (5 July 1985) pp 2405-2407, reg 18 and Appendix 1. The form of the licence provided that conditions could be imposed but did not prescribe a condition that required monitoring and reporting.

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conditions were not enforced or fulfilled because water allocation was administered more by purpose than by volume, even though licences stated the maximum annual volume of water that could be taken as well as the purpose of its use.¹⁸⁸

It was not until the enactment of the *Rights in Water and Irrigation Amendment Act 2000* that the government agency was given express authority to require a licensee to install and maintain a meter on any bore or other facility that is subject to a licence to take water.¹⁸⁹ The same amendments also authorised the agency to impose licence conditions that require the licensee to monitor any water resource and its ecosystem and regularly to report the information to the agency.¹⁹⁰ The agency has begun to exercise those powers systematically in the last couple of years, especially on the Gngangara Mound.

CONCLUSION: ASSESSMENT OF A DECADE OF PROGRESS

Australian policy and law on EWAs have come a long way since all members of the Council of Australian Governments agreed on a framework for water reform in 1994. In every jurisdiction, though illustrated here in respect of only three, allocating water to protect the natural environment is now a fundamental aspect of allocating and managing entitlements to take water for consumptive uses. The 2004 NWI has given significant impetus for further development across the coming decade, defining principles that are being addressed in legislative reforms to varying extents in different States. The recently established National Water Commission will oversee the States' implementation of those principles.¹⁹¹

The courts have begun to interpret the new legislation. Fundamental legislative propositions about the priority determination of an EWA were to be argued before the High Court of Australia in the *Gwydir River case*, which has now been terminated because recent New South Wales legislative action has retrospectively validated the definition of the EWA as the residue of water left after the identification of the "long term extraction limit". Other cases, not considered here, are also contributing to the legal understanding of the new water allocation regimes.¹⁹²

Australia has made significant progress over the last decade in allocating water to protect the natural environment. That progress has encountered some of the fundamental policy and legal issues regarding the enforceability of EWAs, namely:

63. the central goal of EWAs as the maintenance of ecosystem function, though other public benefits (eg. water quality, public health, cultural values, tourism, etc) may also be relevant;
64. the duty to make EWAs in any particular locations, at any level or at all, and in priority to the allocation of water for consumptive uses;
65. the binding legal effect of EWAs on governments and all other persons; and
66. the duty on responsible administrative agencies to monitor and report publicly on the □implementation of EWAs. □The concept that is most important to the enforceability of EWAs concerns the nature of an

entitlement to take water for consumptive use; namely, that an entitlement is only a right to a share of the consumptive pool of water available in a resource from year to year and not a fixed maximum volume. That consumptive pool is to be determined from time to time consistently with the EWA and seasonal allocations under water access entitlements are to be determined accordingly. As the experience with the Gnamangara Mound in Perth has shown, even legally defined EWAs will not be respected if the entitlements to consumptive use are not required to be adjusted to the seasonal

¹⁸⁸ *Payne v Water and Rivers Commission*, report of the decision of the Appeal Tribunal under the *Rights in Water and Irrigation Act 1914* (WA), 20 December 2004, reference W06/2003, paras 2-3. Report of decision available online at http://203.20.251.100/appeals/documents/W06_03Payne_Tribunal_report_201204.pdf (viewed 8 May 2006).

¹⁸⁹ *Rights in Water and Irrigation Act 1914* (WA), Sch 1, cl 46. The Amendment Act came into operation on 10

January 2001.

¹⁹⁰ *Rights in Water and Irrigation Act 1914* (WA), Sch 1, cl 15(3) and Appendix to Sch 1, paras 9 and 10.

¹⁹¹ *National Water Commission Act 2004* (Cth), s 7. The website of the NWC is <http://www.nwc.gov.au/> (viewed 8 May 2006).

¹⁹² *Upper Namoi Water Users Association Inc v Minister for Natural Resources* [2003] NSWLEC 175; *Murrumbidgee Groundwater Preservation Association Inc v Minister for Natural Resources* (2005) 138 LGERA 11; [2005] NSWCA 10.

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availability of water. Governmental powers under the RWI Act to make ad hoc variations to fixed water entitlements seem not to be exercised because of political inertia. It is far better to base water entitlements on the concept of a share of the seasonal determination of available water.

The parallel emergence of environmental entitlements is also important, though they should only supplement the EWAs reserved by management plans for fundamental ecosystem health. These entitlements will usually exhibit similar legal features as access entitlements for consumptive uses, including being defined as a share of the available resource.

Two particular challenges remain for implementing an enforceable regime of EWAs. The first challenge is the institution of a sophisticated regime of water accounting. This is a practical issue; the legal regime for water accounting cannot be imposed until there is the commitment of financial and human resources to do the water accounting. Secondly, can our legislatures define a general statutory priority for the determination and implementation of EWAs over the allocation and abstraction of water for consumptive uses? New South Wales has experimented with, and resiled from, a statutory duty on the Minister to make EWAs to maintain fundamental ecosystem health in priority to allocating water for consumptive uses. Victoria has established an “environmental water reserve” that is to be defined by the exercise of executive discretion to achieve a balance between the environmental water reserve objective and the allocation of water for consumptive purposes. Yet the issue remains alive. Ultimately, the legislative response to both of these challenges will depend upon the social and political perceptions of the scarcity of water resources and the value of the ecosystems they support.

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Managing and protecting environmental water: Lessons from the Gwydir for ecologically sustainable water management in the Murray Darling Basin

Anita Foerster*

This article considers one example of the environmental water regimes negotiated as part of Water Sharing Plans under the New South Wales Water Management Act 2000: The Gwydir Regulated River. The early implementation of the Gwydir environmental flow rules highlights the importance of building an accountable, appropriately skilled and well-resourced management framework for environmental water. It also provides a chance to assess the extent and effectiveness of the legal protection offered to environmental water under the New South Wales legislation as it plays out on the ground. Without a strong framework for implementation, the value of an environmental water regime, even if it is of appropriate magnitude and character, will be undermined. The lessons learnt to date in New South Wales can inform current and ongoing discussion about achieving sustainable water management in the Murray Darling Basin in the context of increasing water scarcity under climate change scenarios, and the expansion of federal government involvement in environmental water management.

INTRODUCTION

A case study of the environmental water regime negotiated under the Water Sharing Plan for the Gwydir Regulated River provides an opportunity to distill important lessons regarding the management and institutional structures in place for delivering environmental flows, and the extent and effectiveness of the legal protection provided to environmental water. These insights have wide application to ongoing discussion about sustainable water management in the Murray Darling Basin (MDB), particularly how best to improve the management of environmental water in the context of increased Commonwealth involvement in this area,¹ and in light of potential climate change scenarios.² The article does not address the adequacy of current provision for environmental water in New South Wales, apart from the preface that there is general scientific consensus that far greater levels of water recovery are required generally across the Basin to contribute to ecologically

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¹ An historic take over of the constitutional powers to manage the water resources of the Basin from the States by the federal government was proposed and legislated in late 2007. As a result, Commonwealth involvement in planning environmental water and environmental water management in the Basin will increase. See: Commonwealth of Australia, *A National Plan for Water Security* (2007) p 11, and *Water Act 2007* (Cth), Parts 2 and 6.

² Jones R, Whetton P, Walsh K, Page C, *Future Impacts of Climate Variability, Climate Change and Land Use Change on Water Resources in the Murray Darling Basin: Overview and Draft Program of Research* (CSIRO Atmospheric Research, 2002). This paper describes recent projections of climate change over the timeframes to 2030 and 2070 for the MDB and more specifically for the Macquarie catchment (which neighbours the Gwydir to the south). Generally these projections include: decline in winter and spring rainfall, uncertainty about summer rainfall; overall temperature increase with associated increases in potential evaporation, affecting wetlands and water storages. In the Macquarie results of modeling indicated significant decreases in streamflow into key storages.

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sustainable water management,³ and that Water Sharing Plans in New South Wales have been widely criticised for not delivering adequate provision for environmental water.⁴

By way of introduction the article will firstly outline the legal and institutional framework for environmental water in New South Wales, and describe the way in which this has been applied to the Gwydir Regulated River. It will then raise a series of issues surrounding the management of and legal protection accorded to environmental water under this regime in the Gwydir. Finally, lessons learnt from the experience to date in the Gwydir will be used to suggest important improvements to the treatment of environmental water in the MDB as discussions about climate change and increased federal involvement in water management evolve.

LEGAL AND INSTITUTIONAL FRAMEWORKS FOR ENVIRONMENTAL WATER Legal regime

In 2000, comprehensive new water management legislation was introduced in New South Wales as part of the ongoing COAG-driven national water reform process.⁵ The *Water Management Act 2000* (NSW) (the WM Act) provided the first specific legal framework for the negotiation and implementation of environmental flow rules for rivers in New South Wales.⁶ The Act articulates certain legislative priorities and duties for the recognition of and provision for environmental water, and employs the mechanism of water management planning to realise these priorities and share water between competing consumptive and environmental demands.

Priorities and duties for environmental water

The Act contains a series of general water management principles with a strong focus on ecological sustainability.⁷ These principles also provide specifically for various areas of water management including water sharing between competing users.⁸ They state that the sharing of water from a water source *must* firstly protect the water source and its dependent ecosystems, and secondly basic

³ It is generally accepted that progress to date in allocating water to the environment in the MDB has been insufficient to properly protect ecological processes and aquatic biodiversity. The evidence of ecosystem decline, water scarcity and declining water quality continues to mount. See for example: Chandler J, "If Storm Boy's Coorong is Dead, What's Taking its Place?" *The Age* (Melbourne), 21 January 2006, p 9, for an account of the destruction of the Coorong wetland ecosystem at the mouth of the River Murray; and Murray Darling Basin Commission, *Native Fish Strategy for the Murray-Darling Basin 2003-2013* (2003), for an account of the massive decline in populations of native fish; S E Bunn and A H Arthington, "Basic Principles and Ecological Consequences of Altered Flow Regimes for Aquatic Biodiversity" (2002) 30 *Environmental Management* 492, for a discussion of water quality and quantity implications of river regulation and extraction for consumptive use.

⁴ See eg the critique of Water Sharing Plans prepared by New South Wales environment groups: Inland Rivers Network and Nature Conservation Council of NSW, *Water Sharing Plan Report Card – Inland Regulated Rivers* (2003); Inland Rivers Network and Nature Conservation Council of NSW, *Water Sharing Plan Report Card – Inland Unregulated Rivers* (2003).

⁵ Extensive reform of water management in the MDB has been coordinated through the Council of Australian Governments (COAG) since 1994. See: Council of Australian Governments, *Council of Australian Governments' Communique: 25 February 1994* (1994); Council of Australian Governments, *Intergovernmental Agreement on a National Water Initiative* (2004); Council of Australian Governments, *Intergovernmental Agreement on Addressing Water Overallocation and Achieving Environmental Objectives in the Murray Darling Basin* (2004).

⁶ In the 1990s environmental flow rules were negotiated for key rivers in New South Wales, however these were without legislative basis. For discussion see: Poh-Ling Tan, "Water Law Reform in NSW – 1995 to 1999" (2003) 20 *Environmental and Planning Law Journal* 165.

⁷ *Water Management Act 2000* (NSW), s 5. These include principles such as: "water sources, floodplains and dependent ecosystems should be protected and restored" (s 5(2)(a)); and "habitats, animals and plants that benefit from water or are potentially affected by managed activities should be protected, and in the case of habitats restored" (s 5(2)(b)). The principles aim to minimise the cumulative impacts of water management decisions on water sources and their dependent ecosystems (s 5(2)(d)), and promote adaptive management to ensure management is responsive to monitoring and improvements in understanding of ecological water requirements (s 5(2)(h)). Despite the ecological focus, they do also state that the social and economic benefits of water management to the community should be maximised (s 5(2)(g)).

⁸ *Water Management Act 2000* (NSW), s 5(3). There is also provision for the following management areas: water use, drainage management, floodplain management, controlled activities, aquifer interference activities.

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landholder rights to water⁹ over and above the sharing or extraction of water under any other right.¹⁰ Thus, at this level of principle, they establish a clear priority for the provision of water to protect water sources and dependent ecosystems, over the provision of water for consumptive uses such as irrigation.

The Act then establishes a duty for those exercising functions under the Act to take all reasonable steps to do so in accordance with, and to promote, these water management principles, and to give priority to the protection of water sources and their dependent ecosystems over all other uses of water,¹¹ with the only exception being during times of severe water storage when basic landholder rights take precedence.¹²

Water management plans

Water Management Plans are the key mechanisms under the Act to give effect to the principles and priorities noted above. These plans may be prepared on any aspect of water management,¹³ however, to date only water sharing plans (WSPs) have been prepared.¹⁴

WSPs must contain environmental water rules that provide for environmental water requirements.¹⁵ According to the priorities established for environmental water through the principles and duties noted above, rules relating to the bulk access regime which deals with the extraction of water under licence, must have regard to the rules for environmental water and the provisions for basic landholder rights in that order.¹⁶ Thus, environmental water rules are accorded a different status to rules addressing the extraction of water under the bulk access regime.

The Act provides for two classes of environmental water:¹⁷

- cxli. *Planned Environmental Water*¹⁸ – is committed by management plans for fundamental ecosystem □health or other specified environmental purposes, whether generally or at specified times or in specified circumstances, and cannot, to the extent committed, be taken or used for any other purpose. This includes both volumetric allocations, such as Environmental Contingency Allocations, and operational rules to provide for environmental water needs, such as protection for certain levels of flow at certain times.
- cxlii. *Adaptive Environmental Water*¹⁹ – is committed by the condition of access licenses for specified environmental purposes, either generally or at specified times or in specified circumstances. It is a volumetric allocation that is re-allocated from previous consumptive use to environmental purposes. □A management plan must contain provisions for both these types of environmental water;²⁰ however it seems that it is only the first category – planned environmental water – which classifies as □⁹ *Water Management Act 2000* (NSW), Dictionary – Basic landholder rights are defined to include stock and domestic rights, native title rights and the rights of local water utilities. □¹⁰ *Water Management Act 2000* (NSW), s 5(3). ¹¹ *Water Management Act 2000* (NSW), s 9(1). □¹² *Water Management Act 2000* (NSW), s 60. This exception has implications for the status of environmental water in light of climate change scenarios. □¹³ *Water Management Act 2000* (NSW), s 15. This includes water sharing, water source protection, drainage management and floodplain management. □¹⁴ Water Sharing Plans establish rules for the allocation of water for basic rights such as stock and domestic use, consumptive uses such as irrigation, and for the environment. They have been prepared at the scale of regulated and unregulated river reaches. □¹⁵ *Water Management Act 2000* (NSW), ss 8 and 20. □¹⁶ *Water Management Act 2000* (NSW), s 20(1)(f) and 20(2)(f). □¹⁷ *Water Management Act 2000* (NSW), s 8(1). The Act originally provided for three classes of environmental water, however amendments passed in 2004 collapsed these into two classes: see *Water Management Amendment Act 2004* (NSW). □¹⁸ *Water Management Act 2000* (NSW), s 8(1)(a). □¹⁹ *Water Management Act 2000* (NSW), s 8(1)(b). □²⁰ *Water Management Act 2000* (NSW), s 8(2) and (4). □(2008) 25 EPLJ 130 132 ©

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the environmental water rules which are given the priority status described above.²¹ Adaptive environmental water will be of similar status and nature to the original access license from which it is sourced.²²

To date, 31 plans have been commenced under the WM Act for regulated, unregulated and groundwater sources.²³ This covers the vast majority of water extraction in New South Wales.²⁴ The WSPs for regulated rivers all contain long term extraction limits, which limit annual water extractions. They also include provisions to protect or restore the natural variability in flows including low and moderate flows, freshes and floods.²⁵ These vary between catchment according to operational circumstances, ecological priorities, and other factors, and include: transparent dam releases;²⁶ translucent dam releases;²⁷ limits on taking high flows when the dam spills or high flows enter the regulated river from unregulated tributaries;²⁸ limits on taking low flows that enter the river from unregulated tributaries;²⁹ and Environmental Contingency Allowances (ECA), that create a volume of water stored in the dam which can be released for environmental purposes

such as supporting bird breeding or fish spawning events.³⁰

Institutional framework

In New South Wales, the management of water resources in rural areas,³¹ including the elements of policy development, regulation, and the physical operation of regulated river systems, has until

²¹ *Water Management Act 2000* (NSW). This is achieved by the combination of s 8(2) which refers to planned environmental water as the environmental water rules, and the provisions relating to the priorities and duties attached to the environmental water rules discussed above. Additionally, the dictionary refers to environmental water rules as the rules referred to in s 8(2), and does not include reference to adaptive environmental water.

²² Important characteristics of water entitlements in terms of their value as part of an environmental water regime include: the reliability of the entitlement, which is the likelihood of receiving the full entitlement in any given year; and measures which allow some flexibility in management such as the ability to carry over an entitlement in storage to enable it to accumulate so that sufficient volumes may be released at appropriate times to achieve the desired ecological impact.

²³ See <http://www.naturalresources.nsw.gov.au/water/plans.shtml> (viewed 22 June 2007).

²⁴ A process of macro-planning spanning larger regions is currently underway to complete the Act's coverage. See: NSW Department of Natural Resources, *Overview of Macro Water Plans*, http://www.naturalresources.nsw.gov.au/water/macro_overview.shtml (viewed 16 June 2006).

²⁵ See discussion of the types of environmental flow provisions in WSPs in: NSW Department of Natural Resources, *Water for the Environment – Environmental Rules for Rivers*, <http://www.naturalresources.nsw.gov.au/water/rivers.shtml> (viewed 16 June 2006). Evaluation of the WSPs for inland regulated rivers in New South Wales by peak State environment groups was particularly critical of their provision for environmental water requirements. Criticism focused on the inappropriateness of using long-term average annual extraction limits as the basis for environmental water rules and the inadequacy of the other rules to protect and restore aspects of the natural flow regime, particularly the volume of ECAs. See: Inland Rivers Network and Nature Conservation Council of New South Wales, n 4.

²⁶ Inland Rivers Network and Nature Conservation Council of New South Wales, n 4. These require all dam inflows occurring at certain times to be passed immediately downstream. This maintains natural flow variability for that part of the year, and is usually applied in winter months when dam releases would otherwise be minimal. Such rules are used for the Murrumbidgee River in Southern New South Wales.

²⁷ Inland Rivers Network and Nature Conservation Council of New South Wales, n 4. These require a proportion of dam inflows occurring at certain times to be passed immediately downstream. This can be used to restore the variability associated with specific flow ranges usually freshes and minor floods, and is used in the Lachlan and Macquarie rivers.

²⁸ Inland Rivers Network and Nature Conservation Council of New South Wales, n 4. This protects either some or all of these naturally occurring high flows which are important for flooding of wetland areas, and is used in the Lachlan and Namoi rivers.

²⁹ Inland Rivers Network and Nature Conservation Council of New South Wales, n 4. This ensures there is sufficient water is retained in the river to main ecological processes, and is used in the Gwydir river.

³⁰ Inland Rivers Network and Nature Conservation Council of New South Wales, n 4. These are provided for the Gwydir, Macquarie, Lachlan, Murray, Murrumbidgee, and Hunter rivers. The volume set aside for the environment differs between rivers, and there are varying objectives which will justify a release with some plans focusing primarily on water quality management purposes (eg Lachlan where the ECA focuses on reducing salinity levels or mitigating algae outbreaks), and others on broader ecological objectives (eg Gwydir).

³¹ This does not include the areas of operation of the Sydney Catchment Authority, Sydney Water Corporation, Hunter Water Corporation, and the operation of a water supply authority.

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recently been conducted within one government department.³² An important component of the government's recent water reforms has been the separation of the operational water delivery function from its regulation.³³

State Water was established as a State-owned corporation in 2004, and incorporates into a single business all of New South Wales's bulk water delivery functions in rural areas. State Water's role is primarily operational and commercial in nature. This involves the ownership and management of most dams, weirs and regulators; delivery of water to customers such as irrigation corporations and individual farmers, including the metering and billing thereof; the provision of water for stock and domestic use and delivery of environmental flows on regulated rivers.³⁴ Despite the restructure, corporatisation and redefinition of functions – specifically the emphasis on environmental flow responsibilities, and tightening of compliance and accountability accompanying corporitisation – the institutional history of the organisation lies in servicing water users. Indeed, at the level of river management State Water does not specifically employ staff with a unique focus on implementing environmental water rules.³⁵

Regulatory and policy functions relating to water management have been, until very recently, the responsibility of the Department of Natural Resources (DNR), with some overlap between the functions of DNR and State Water, particularly in relation to compliance and enforcement.³⁶ Since the water reform process began in the mid-1990s, this department has undergone numerous restructures, amalgamations and name changes.³⁷ Following the conclusion of the water sharing planning process, there was a severe reduction in departmental expertise and capacity in the area of water resource management, which cannot but have compromised its ability to fulfill its range of responsibilities effectively.³⁸ Recent developments following the 2007 State election have seen further changes: DNR no longer exists, and the majority of its water related functions have been taken on by the new Department of Water and Energy (DWE).³⁹ For the purposes of this article, the author will continue to refer to DNR, as it was the key player in environmental water management at the time of research, and it is anticipated that the DWE will continue to play a similar role. The extent to which the new arrangements may change the management framework is not yet evident.

³² For a brief overview of the institutional history in this area see: Independent Pricing and Regulatory Tribunal of NSW, *Review of the Operating Licence for State Water Corporation* (2004), p 3; NSW Department of Land and Water Conservation, *Water Sharing – the Way Forward: NSW Progress on the Water Reforms 1995-1998* (1998), p 16.

³³ NSW Department of Land and Water Conservation, *Water Sharing – the Way Forward: NSW Progress on the Water Reforms 1995-1998* (1998), p 16. This is consistent with obligations under the National Water Policy. See: Council of Australian Governments, *Council of Australian Governments' Communique: 25 February 1994* (1994) cl 6 (c) and (d); Council of Australian Governments, *Intergovernmental Agreement on a National Water Initiative* (2004) cl 74.

³⁴ State Water, *About Us*, http://www.statewater.com.au/about_us.htm (viewed 6 October 2006).

³⁵ Although not strictly within the operational brief of State Water, it is arguable that a greater focus on environmental expertise at the level of river management in the form of a specific role of environmental water delivery, would help to build the kind of institutional capacity necessary to guarantee support for and full implementation of the environmental water regime by responsible water authorities. This is a new area of water management for water authorities, and institutional capacity needs to be developed.

³⁶ For example, State Water controls the metering of water extractions, the key point at which compliance issues occur. Nonetheless, DNR has the ultimate responsibility to ensure that water is being allocated correctly to users and the environment, and there is no fraudulent extraction of water from the system. The specifics of the respective roles and responsibilities regarding compliance and enforcement are defined by protocols between the relevant agencies, the operating licence for State Water (and prospectively by the Implementation Programs for the Water Sharing Plans when completed). See: Independent Pricing and Regulatory Tribunal of NSW, *Review of the Operating Licence for State Water Corporation* (2004).

³⁷ Since water reform began in the 1990s, the agency with responsibility for the implementation of key water management legislation has had five different configurations: Department of Land and Water Conservation, Department of Infrastructure, Planning and Natural Resources, Department of Natural Resources, and currently the Department of Energy and Water.

³⁸ Comments made in interviews with water managers, conservation officers, and community members involved in the negotiation and implementation of the Gwydir environmental water regimes, conducted in August 2006. Delays and difficulties in implementation, such as with the preparation of the implementation programs for WSPs, are attributed to this decline in staff and expertise.

³⁹ New South Wales Department of Water and Energy, <http://www.dwe.nsw.gov.au> (viewed 22 June 2007).

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With respect to the implementation of the environmental water rules negotiated through WSPs, these institutional arrangements mean that State Water is the body responsible for the operational implementation of the rules including release of flows, flow measurement and reporting on their delivery. DNR has been responsible for overseeing the implementation of the water management plan, and ensuring compliance with the operating rules, by eg checking State Water operational reports against available hydrological data.⁴⁰ It should be noted that the WSPs themselves contain little operational and implementation detail. The Act provides specifically for the preparation of implementation programs to set out the means with which the objectives of management plans are to be achieved,⁴¹ and annual review and reporting on the effectiveness of these programs in implementing the plans. There have, however, been very considerable delays in finalising implementation plans, which has arguably impacted negatively on their early implementation.⁴²

In some areas covered by the WSPs, novel institutional arrangements involving management committees with a strong stakeholder and skills base have been established to manage aspects of the environmental water regime – specifically the delivery of Environmental Contingency Allowances.⁴³ The value of such arrangements, in terms of improving the capacity to manage for environmental outcomes, is discussed in more detail with reference to the Gwydir below.

ENVIRONMENTAL FLOW RULES FOR THE GWYDIR REGULATED RIVER

The Gwydir River rises in the northern tablelands of New South Wales and flows north-west through Moree. In the vicinity of Moree, the river enters a vast floodplain of very low gradient, which causes it to branch into a number of distributary streams. In natural circumstances, these would have flowed only during high flood through to the Barwon River, at which time the system linked directly into the Murray-Darling. Substantial overland flow occurring at the end of the system creates one of the most significant and extensive wetlands in New South Wales, which has been recognised for its ecological significance, most notably through the Ramsar international convention on wetland conservation.⁴⁴ The large variation in rainfall from year to year means that the natural flow regime is highly variable.⁴⁵

The system was regulated in 1976, with the completion of the Copeton Dam in the upper catchment, and construction of weirs and other regulating structures to store and distribute water. Various tributaries enter the river below the dam, contributing significantly to downstream flow. Regulation facilitated the establishment of an extensive irrigation industry – predominantly for large-scale furrow irrigated cotton production – concentrated on the distributary streams on the floodplain downstream of Moree.⁴⁶ Irrigation is by far the major water user in the valley.⁴⁷

⁴⁰ Comments made in interviews with water managers involved in the implementation of the Gwydir environmental water regimes, conducted in August 2006. Further detail is expected to be included in the Implementation Program for the Gwydir WSP not yet available.

⁴¹ *Water Management Act 2000* (NSW), s 51.⁴² It is now six years since the planning process began, and most plans have been in place for over three years, yet DNR has still

not finalised the implementation program for most of the significant regulated rivers, including the Gwydir.⁴³ Committee management arrangements are in place for the Gwydir, Macquarie and Lachlan regulated rivers.

⁴⁴ Commonwealth Department of Environment, Water, Heritage and the Arts, *Australia's Ramsar Sites*, available online at <http://www.environment.gov.au/water/publications/environmental/wetlands/ramsar.html> (viewed 15 January 2006).

⁴⁵ Robert McCosker, *Gwydir Watercourse – Plan of Management* (2000), pp 1-2; Robert McCosker, *Gwydir Wetlands: Ecological Response to Flooding 1998 (A Report Prepared for NSW National Parks and Wildlife Service, NSW Dept of Land and Water Conservation, Gwydir River Management Committee)* (NSW DLWC, 1999); P A Keyte, *Lower Gwydir Wetland Plan of Management 1994-1997 (Report by NSW Department of Water Resources for the Lower Gwydir Wetland Steering Committee)* (MDBC, NSW DWR, 1994), p 5; Gwydir Regulated River Management Committee, *Water Sharing Plan: Gwydir Regulated River Water Source, Part A – Guide to the Water Sharing Plan* (2001) pp 13-28.

⁴⁶ Extraction of water from the river occurs on a private individual farm basis, and relies on riparian access to the river. This differs from the group irrigation schemes more prevalent in southern New South Wales and Victoria. See: John J J Pigram, *Issues in the Management of Australia's Water Resources* (Longman Cheshire, 1986), p 178; MarkDMorrison and Jeff W Bennett, *Water Use Trade-Offs in the Macquarie and Gwydir Valleys (Choice Modelling Research Reports, No. 2)* (1997).

Like many other systems in the MDB, the water resources of the Gwydir have been significantly over-allocated: water users are licensed to extract almost double the amount of water available in an average year for extraction. Combined with the naturally high variability in flow from year to year, this massive over-allocation has meant that license holders can expect to receive their full entitlement only 4 years out of 10.⁴⁸ Irrigators have constructed large off-river water storages on farm to manage this variability and cope with poor reliability of their licensed entitlements. They use these storages to take advantage of water which enters the system below the dam which is deemed to be in excess of licensed entitlements (unregulated flows), and to store “overland flows” harvested from the floodplain. The industry has developed a significant reliance on such supplementary flows, and this use of water has a considerable impact on the ecological values of the system.⁴⁹

When the Copeton Dam was being planned, the development of an irrigation industry was not expected to have a significant effect on natural flooding patterns in the wetlands, and wetland landholders, who relied on the floods to sustain grazing enterprises, were assured that they would continue to receive 80% of the water which flowed naturally into the wetland system – effectively the water from tributaries below the dam.⁵⁰ Yet as irrigation expanded, and particularly as irrigators developed the capacity to harvest and store unregulated tributary and overland flows, the impact was far greater than expected. The way the system was managed meant that the wetlands received no tributary flows other than very large flood events which were beyond the capacity of the system to regulate, and it was estimated in 1994 that there had been a 70% reduction in flows large enough to reach the wetland area.⁵¹

The regulation of the Gwydir system and development of an irrigation industry in the valley has changed the natural flow regime considerably, with accompanying impacts on the riverine ecology, particularly evident in the wetlands at the end of the system. There has been a continued decline in the extent and ecological integrity of the wetland primarily due to reduced frequency and magnitude of flooding,⁵² and concern over the condition of the wetlands, particularly areas listed under the Ramsar convention, is widespread.⁵³

⁴⁷ Gwydir Regulated River Management Committee, *Water Sharing Plan: Gwydir Regulated River Water Source, Part A – Guide to the Water Sharing Plan* (2001), pp 13-28.

⁴⁸ See: John J J Pigram, *Issues in the Management of Australia's Water Resources* (Longman Cheshire, 1986); Siobhan McHugh, *Cottoning On: Stories of Australian Cotton-Growing* (Hale and Iremonger, 1996), pp 57-58; Mark D Morrison and Jeff W Bennett, *Water Use Trade-Offs in the Macquarie and Gwydir Valleys (Choice Modelling Research Reports, No. 2)* (1997), pp 13-14.

⁴⁹ See discussion in: Mark D Morrison and Jeff W Bennett, *Water Use Trade-Offs in the Macquarie and Gwydir Valleys (Choice Modelling Research Reports, No. 2)* (1997); P A Keyte, *Lower Gwydir Wetland Plan of Management 1994-1997 (Report by NSW Department of Water Resources for the Lower Gwydir Wetland Steering Committee)* (1994), n 45, p 19; R O McCosker and J A Duggin, *Gingham Watercourse – Resource Management Issues, Gwydir River Basin, Moree NSW* (1992), pp 10-11.

⁵⁰ R O McCosker and J A Duggin, *Gingham Watercourse – Resource Management Issues, Gwydir River Basin, Moree NSW* (1992); McHugh, n 48, pp 19, 56.

⁵¹ P A Keyte, *Lower Gwydir Wetland Plan of Management 1994-1997 (Report by NSW Department of Water Resources for the Lower Gwydir Wetland Steering Committee)* (1994)

⁵² See generally, P A Keyte, *Lower Gwydir Wetland Plan of Management 1994-1997 (Report by NSW Department of Water Resources for the Lower Gwydir Wetland Steering Committee)* (1994) 5; Robert McCosker, *Gwydir Watercourse – Plan of Management* (2000); R O McCosker and J A Duggin, *Gingham Watercourse – Resource Management Issues, Gwydir River Basin, Moree NSW* (1992).

⁵³ See for example, Jacqueline Allan and Siwan Lovett, *Impediments to Managing Environmental Water Provisions*, (1997), pp 27-35; Richard T Kingsford, “Ecological Impact of Dams, Water Diversions and River Management on Floodplain Wetlands in Australia” (2000) 25 *Austral Ecology* 109 at 116-117; Ilona Millar, “No Relief for Stressed Gwydir Wetlands” (2004) Summer 2004 *Environmental Defender* 1.

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Environmental flow rules

The Gwydir Valley was one of the first in New South Wales to recognise and provide for environmental water needs: environmental flow rules negotiated in the 1990s aimed at restoring some natural flooding to the wetlands. These had no legislative basis.⁵⁴ With the introduction of the WM Act, these early rules were revisited in the context of the legislative planning framework and the new legal status accorded environmental water. The resulting WSP was gazetted in February 2003.⁵⁵

The elements of the Gwydir environmental water regime of most relevance to this analysis are discussed below.

Operational rules to protect a proportion of tributary inflows to the wetlands

The rationale behind these two rules is to preserve some degree of the natural variability in the system, particularly for smaller flood events and freshes, and protect a proportion of inflows to the wetlands:

a) *Protection of first 500ML/day of tributary inflow:*⁵⁶ The first 500ML/day of inflows to the Gwydir river from three key tributaries below Copeton Dam may not be extracted and is allowed to flow through to the wetlands.

b) *Limits on accessing supplementary flows:*⁵⁷ The plan allocates licenses to water users to access supplementary flows, which are defined as flows that are in excess of the water needed to meet the environmental provisions of the plan, basic landholder rights, and water orders placed by holders of regulated river access licenses. Such flows occur when there is a significant rainfall event downstream from Copeton Dam. Access is limited to 50% of the flow event. This effectively means that 50% of unregulated flows entering the system which exceed the 500ML/day mark, and which exceed all other demands on the system, must not be extracted and remain effectively as “environmental water” within the system.

Environmental contingency allowance (ECA)

The plan⁵⁸ establishes a volumetric allocation in Copeton Dam to be accounted for in a similar fashion to extractive water licenses. The volume is 45000ML per year,

multiplied by the percentage allocation credited to general security access licenses in that year, and may be carried over in storage up to 90000ML.⁵⁹ There are no limits on the amount of water that may be used from the account in any one

⁵⁴ An environmental flows committee was formed through the regional catchment management body in 1994. This preceded by a few years the 1997 State-wide introduction of a policy recognising environmental water needs and a process to provide for them in New South Wales. Efforts in the 1990s yielded a simple environmental flow regime which attempted to recover some of the smaller flow events and freshes in the system which had been lost to the wetlands by allowing irrigators to access to supplementary water and using tributary inflows to meet licensed water orders. The regime also set aside a volumetric environmental allocation in Copeton dam to be made available to artificially prolong a flooding in the wetlands to support a breeding event of aquatic birds. See: NSW Department of Land and Water Conservation, *Building a More Secure Future for the Gwydir: Progress Report of the Gwydir River Management Committee* (1998).

⁵⁵ NSW Department of Infrastructure Planning and Natural Resources, *Water Sharing Plan for the Gwydir Regulated River Source* (2004). The plan was originally Gazetted in February 2003, however is dated July 2004 due to amendments made in 2004.

⁵⁶ New South Wales Department of Infrastructure Planning and Natural Resources, n 55, cl 14.

⁵⁷ New South Wales Department of Infrastructure Planning and Natural Resources, n 55, cl 48. While the rationale behind this rule is clearly environmental, it is not included formally in the plan as an environmental rule.

⁵⁸ New South Wales Department of Infrastructure Planning and Natural Resources, n 55, cl 15.

⁵⁹ Whether the environment receives the full allocation in any given year depends on whether irrigators receive 100% of their access entitlement. If they are only able to access 75% of their entitlement for example, then the environmental account will be credited with only 75% of 45000ML.

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year.⁶⁰ The plan lists a number of objectives for which water may be released: some focus specifically on the ecological condition of the wetland system,⁶¹ others relate to in-stream and more general river health.⁶²

The plan also contains a long-term extraction limit,⁶³ and provides for water to be committed from extraction licenses as adaptive environmental water.⁶⁴ To date there are no access licenses committed to an environmental purpose. The high demand for water in the valley and its associated market value suggest that the allocation of water to the environment via this mechanism will only occur with a targeted and well-financed acquisition program.⁶⁵

MANAGEMENT OF ENVIRONMENTAL WATER IN THE GWYDIR

The way in which environmental water is managed and accounted for in the Gwydir raises important issues for environmental water management generally in the MDB. This discussion covers the institutional arrangements and capacity to manage for environmental outcomes; operational limitations on the full implementation of environmental flow rules; reporting on compliance with environmental water rules; and monitoring the impacts of the environmental water regime. Particular attention is

given to the participatory management model used to manage the Environmental Contingency Allocation – a stakeholder and skills-based committee. This institutional arrangement offers significant advantages in terms of fostering community (and broader institutional) understanding and acceptance of the new regime, and heightened public accountability for its implementation. Yet the discussion is generally mindful of the very challenging management context posed by the introduction of environmental water rules in highly regulated systems that continue to serve the interests of extractive water users. While institutional change can go part way to addressing some of these challenges, the very different management framework required by consumptive and non-consumptive uses of water remains a considerable limitation on the environmental outcomes that can be achieved.

Institutional arrangements for the environmental water regime

The following discussion outlines briefly how the Gwydir environmental water regime has been managed to date. It is mindful of the institutional considerations noted above: namely the common institutional history of the responsible organisations; the lack of specific focus on environmental water management and potential bias towards consumptive water customers within State Water; and the

⁶⁰ This, and the carry over provisions mentioned above, add important flexibility to the management of environmental water as it may be accumulated over a period of time to allow sufficient volumes to be released at appropriate times to achieve the desired ecological impact.

⁶¹ For example, to support a colonial nesting native bird breeding event that has been initiated in the Gwydir wetlands following natural flood inundation (cl 15(d)(i)), and to provide additional inundation in the Gingham and Lower Gwydir Wetlands during or following periods of extended dry climatic conditions (cl 15(d)(ii)).

⁶² For example, to provide inundation of higher level benches in the upstream river reaches (cl 15(d)(iii)), and to support native fish populations and habitat (cl 15(d)(vi)), invertebrates and other aquatic species (cl 15(d)(vii)), and a general objectives to maintain aquatic ecosystem health (cl 15(d)(ix)).

⁶³ New South Wales Department of Infrastructure Planning and Natural Resources, n 55, cl 14(a) and (b), 30 and 32. This limit is set volumetrically according to the average extractions that would have occurred over the long term with the water storages and water use development that existed as of 1999/2000. The plan actually provides for the limit to be the lesser of the average extractions that would have occurred over the long term given the levels of development in 1993/1994 (the level at which the MDB Cap is set) or those occurring given 1999/2000 development levels. The limit bears no direct relation to the water availability situation in any given year, but rather is based on average use under certain development conditions. A process of compliance is provided whereby water available for consumptive use will be progressively reduced if this extraction limit is exceeded in any three year period.

⁶⁴ New South Wales Department of Infrastructure Planning and Natural Resources, n 55, cl 16. See also, *Water Management Act 2000* (NSW), ss 8(1), (2) and (4).

⁶⁵ The first official environmental water recovery programs involving buy back of licenses commenced in New South Wales in 2005: New South Wales Riverbank and New South Wales Wetland Recovery Plan. However the potential of these programs to achieve significant levels of environmental water recovery particularly in the valleys of northern New South Wales where water is significantly more expensive, is limited by available funds, and the requirement to spend funds as efficiently and effectively as possible.

substantial erosion of departmental expertise and capacity to manage for environmental water outcomes within DNR, which has arguably manifested in considerable delays in fulfilling legislative responsibilities. Of most relevance to this discussion is the delay in preparation of Implementation Programs for the WSPs. It is now six years since the planning process began, and most plans have been in place for more than three years, yet at the time of writing, the DNR had not finalised the implementation program for the Gwydir, nor for other significant regulated rivers.⁶⁶ According to operational water managers, clear implementation guidelines are urgently needed. In the absence of Implementation Programs, State Water has been forced to devise their own interpretations and reporting frameworks for rules, which they describe as ambiguous and difficult to implement.⁶⁷ It is arguable that in the particular institutional and operational circumstances, this is not likely to benefit the environment. This situation suggests a failure of regulatory responsibility on the part of the DNR, and is a good example of how a focus on improved independent regulatory oversight would arguably benefit the implementation of environmental water regimes more generally across the MDB.

Implementation difficulties are identified below for the key operational environmental water rules.

Protection of the first 500ML of tributary inflows

State Water have commented that the delivery of this rule is problematic because tributary inflow is measured upstream of the designated delivery point for this water, which is on average four days delivery time downstream at the end of the regulated system where the wetlands begin. Significant losses often occur over this distance. In the common situation of dry conditions when no releases are being made, if a small fresh occurs in the system that would qualify for protection under this rule, it is difficult to ensure this volume of water reaches the delivery point at the entrance to the wetlands due to losses, and extractions for basic rights. Current interpretations of this rule allow for such attenuation of the natural fresh, rather than ensuring additional water is released to account for these losses and basic use rights.⁶⁸ Thus the practical circumstances of the rule will yield less water to the wetlands than appears to be intended through the plan unless specific provision is otherwise made. Clarification through an implementation program appears to be necessary.

Limits on accessing supplementary flows to 50% of a flow event

State Water staff describe the implementation and reporting on this rule as being a particularly “grey area”.⁶⁹ In practice, a substantial degree of discretion remains with State Water, who decides the volume available for extraction under the rule on the basis of the best available information at the time.⁷⁰ It should be noted that the demand for surplus water and the capacity to extract it and store it on-farm far outweighs its availability in the Gwydir – hence there is much pressure from water users to allow access to every last drop of such water.⁷¹ Considering this pressure, it seems that a tighter process may be required to govern the implementation of this rule. The approach used prior to the WSP, which required flows to pass a certain threshold before an event was declared, and involved the departmental regulatory body in the declaration of an event, seemed to offer greater protection for the

environmental component of the flow event.

Management arrangements – Environmental contingency allocation

The institutional arrangements for the management of the volumetric ECA are quite distinct. The Gwydir WSP establishes an ECA Operations Advisory Committee with independent scientific and

⁶⁶ NSW Department of Infrastructure Planning and Natural Resources, *Annual Report 2004-05* (2005), p 55. The Annual Report of the Department of Natural Resources (the subsequent responsible agency) for the following year (2005-2006) makes no mention of Implementation Programs. See: NSW Department of Natural Resources, *Annual Report 2005-06* (2006). As at the time of writing it is believed that the Program for the Gwydir is complete but still awaiting ministerial approval.

⁶⁷ Comments made in interviews with State Water staff involved in the implementation of the Gwydir environmental water regime, conducted in August 2006.

⁶⁸ See n 67.

⁶⁹ See n 67.

⁷⁰ See n 67.

⁷¹ Comments made in interviews with water managers involved in the implementation of the Gwydir environmental water regime, conducted in August 2006.

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broad stakeholder representation to provide advice on ECA releases.⁷² The committee does not have the direct authority to order a release of water, but must make a recommendation for a release to the DNR, which then places the order with State Water. According to the plan, this committee should include: two independent scientific representatives, one representative of the irrigation industry, the nature conservation movement and landholders from both key areas of the wetland. It also has agency representatives from the various relevant agencies⁷³ and State Water. The Committee has an independent chair, and is serviced by an Executive Officer. It was formed in mid-2005, yet has experienced some delays in gaining full membership.⁷⁴

Prior to the establishment of the committee, the implementation of the ECA in the Gwydir was problematic and controversial, and arguably, as a result, it was not used to its capacity.⁷⁵ The few times that it was used, were associated with bird breeding events in the wetlands while the other broader objectives for which a release could be ordered remained untested. In the summer of 2004/2005, an ECA release was ordered to sustain a bird breeding event which had been initiated with a natural flood. At this time, the ECA committee was not yet operational, and its functions were being conducted by the DNR in conjunction with the State nature conservation agency. Not all bird species recorded in this event bred successfully. This was attributed by some to a failure to deliver adequate water from the ECA account to the wetland area: allegations were made that there was reluctance by State Water to deliver the required

amounts, and that ECA water was made available for extraction, rather than delivered as requested.⁷⁶ Undoubtedly, a range of factors contributed to the failure such as understaffing over the Christmas period, and operational problems associated with delivering water efficiently in the unregulated wetland area (see discussion below under “Operational limitations”). Nonetheless, as a result of the surrounding controversy, the initial work of the ECA committee has focused on establishing a transparent, accountable and adaptive management framework to avoid a repeat of such an event.⁷⁷

The institutional arrangement, incorporating independent skills and community representatives, seems to have been instrumental in laying the groundwork for the fuller, more regular future implementation of the ECA. Committee members display a keen perception that they hold responsibility for the delivery of large volumes of a valuable and scarce resource, and therefore need to be accountable and transparent in their operation. The combination of a strong independent and respected scientific skills base, coupled with stakeholder representation to provide important local knowledge of the system and likely responses to ECA releases, and operational expertise appears to present a strong and effective management team. Specifically the emphasis on independent scientists and operational involvement addresses some of the concerns raised about representation on earlier water planning committees, where these perspectives were thought to be lacking. The ECA committee has recently created an operations manager role for the ECA which focuses on liaison with State Water to ensure smooth delivery of environmental water so as to optimise environmental outcomes. This development and the involvement of State Water generally in the a committee undoubtedly also serves

⁷² New South Wales Department of Infrastructure Planning and Natural Resources, n 55, cl 15(g), (h) and (i). The committee is to advise on annual release programs for the ECA, the making of releases during a water year and the development of a long term river and wetland health plan.

⁷³ This includes nature conservation, fisheries and natural resource management agencies.

⁷⁴ Border Rivers – Gwydir Catchment Management Authority, *Committee members guiding ECA flows* (Press Release, 25 May 2005).

⁷⁵ Comments made by environmental stakeholders, conservation officers, and community members involved in the implementation of the Gwydir environmental water regime, in interviews conducted in August 2006. These comments are supported by the controversy surrounding the ECA release in 2004/2005. See n 74.

⁷⁶ These comments are sourced from interviews conducted with a range of stakeholders involved in the implementation of the environmental water regime in the Gwydir in August 2006, and from observation of a meeting of the ECA Advisory Committee on 29 August 2006 in Moree. For further comment on the incident see: Department of Infrastructure, Planning and Natural Resources, *Environmental Flows help bird breeding in the Gwydir Wetlands* (Press Release 8 February 2005); Ilona Millar, “No Relief for Stressed Gwydir Wetlands” (2004 Summer 2004 *Environmental Defender* 1

⁷⁷ Comments made in interview with the Chairperson and committee members of the ECA Advisory Committee, August 2006.

to improve understanding and acceptance within the organisation of the rationale behind the environmental water rules, and also exposes the authority to a certain degree of additional scrutiny which may translate positively to improved implementation. There is some concern among committee members that they must rely on the discretion of the DNR and State Water to achieve an effective ECA release, and that the three-step process is cumbersome in a situation which often demands swift decision-making. Yet in general, committee members appear to support the institutional arrangements, and are working hard to make sure the decisions of all involved are justified so as to ensure transparency and accountability.⁷⁸ Such a participatory model seems to offer considerable potential in this management advisory role, and should be considered in any reform of the way in which environmental water is managed in the Basin.

Operational limitations

There are a number of limitations in the operational context of the Gwydir environmental water regime that make delivery of the flow rules, particularly the ECA, very challenging. Similar challenges associated with re-introducing elements of the natural flow regime to highly altered regulated rivers would be experienced across the MDB.

For example, the Gwydir plan deals only with the regulated portion of the river. It does not cover the unregulated wetland system.⁷⁹ This means that State Water is officially responsible only for the delivery of environmental flows up to the last point of regulation before the wetlands. Yet the flow rules dealing with protection of tributary inflows and the ECA (in respect of many of its objectives) aim to provide flows to the wetland system. The wetland occurs on a large floodplain of very low gradient. The movement of water over this area is significantly influenced by any change in topography, and can be adversely impacted by stock and domestic channels, roads, informal vehicle tracks and even minor earthworks. Additionally, many landholders within the wetland area no longer desire the flooding associated with the natural flow regime as they have converted land from pasture to cultivation.⁸⁰ This combination of factors means that it is increasingly difficult practically, and also highly controversial among landholders, to deliver water to certain areas of the wetland efficiently and effectively. For example, some of the Ramsar sites within the watercourse are located 70-80km from the last point of regulation, on land that is now much less frequently flooded.⁸¹ To reinstate the type of natural flooding required by these areas poses very complex and contested management decisions.

Some of the other objectives of the ECA also have significant potential operational limitations. For example, the ECA may be released to wet high level benches upstream in the system, to improve carbon and nutrient cycling throughout the river.⁸² Yet the volumes of water required to inundate these benches high in the system may be too great for the current gauge capacity of dam. While retrofitting is possible, this is not on the agenda in the foreseeable future and involves considerable expense. Even if the infrastructure allowed, achieving this objective may conflict with management imperatives for delivering water for irrigation. For example, if water levels are required to drop quickly after wetting

⁷⁸ The conclusions in this paragraph are drawn from comments made in interviews conducted with a range of

stakeholders involved in the implementation of the environmental water regime in the Gwydir in August 2006; from observation of a meeting of the ECA Advisory Committee on 29 August 2006 in Moree; and from investigation of the work of the committee to date.

⁷⁹ New South Wales Department of Infrastructure Planning and Natural Resources, n 55, cl 4. Note: A new Water Sharing Plan for the unregulated wetland area is in preparation to address some of the operational issues raised here and improve the regulatory capacity within this area.

⁸⁰ See discussion in: P A Keyte, *Lower Gwydir Wetland Plan of Management 1994-1997 (Report by NSW Department of Water Resources for the Lower Gwydir Wetland Steering Committee)* (1994), pp 44-45; R O McCosker and J A Duggin, *Gingham Watercourse – Resource Management Issues, Gwydir River Basin, Moree NSW* (1992) Jacqueline Allan and Siwan Lovett, *Impediments to Managing Environmental Water Provisions*, (Bureau of Resource Sciences, 1997) 33.

⁸¹ Jacqueline Allan and Siwan Lovett, *Impediments to Managing Environmental Water Provisions*, (Bureau of Resource Sciences, 1997).

⁸² New South Wales Department of Infrastructure Planning and Natural Resources, n 55, cl 15(d)(iii).

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to mirror a natural flood pulse, this may be difficult to achieve, especially if the volumes were achieved by piggy-backing ECA water on top of irrigation releases which required continued delivery.⁸³

Another objective of the ECA is to support native fish populations.⁸⁴ Yet this too poses certain operational difficulties. Thermal pollution from the release of cold water from the low level off-take of Copeton Dam is a significant issue in the Gwydir, impacting on natural reproductive cycles of native fish.⁸⁵ In terms of temperature and nutrient status, bulk storage releases are of questionable ecological value.⁸⁶ Proposals to retrofit the dam with a multi-level water off-take are currently under consideration to enable water of better quality to be released for environmental purposes.⁸⁷ The many weirs in the system are also a limiting factor in achieving any benefit through the release of ECA water for native fish, as they act as barriers and disrupt the natural passage of fish throughout the system.⁸⁸

Although many of these challenges seem insurmountable from the perspective of system managers, under a different lens they can also be seen as evidence of a reluctance to depart from the view that the primary purpose of the system is to supply water for extraction, and that environmental water rules have to be grafted onto this existing system, without disrupting its operation. There seems to be a resistance to contemplate how the system can be used creatively to deliver environmental objectives. This is no doubt linked to the institutional history and past focus on water management and supply, and the need to develop institutional expertise on how to manage the system for environmental outcomes. It will be interesting to observe the future operations of the ECA committee in terms of whether they can engineer opportunities for a fuller use of the water set aside for the environment in the system.⁸⁹

Reporting and monitoring

Given the implementation challenges noted above, there is a very real need to approach the management task adaptively and allow continued learning and readjustment of water management frameworks.⁹⁰ As such, a comprehensive and transparent program of reporting on the delivery of the environmental water regime and monitoring its impact takes on particular importance.⁹¹ This is, of course, also fundamental to ensuring transparency and accountability in implementation. In New

⁸³ These comments were made by State Water employees interviewed for the research in August 2006, and supported by comments made by other interviewees involved in the implementation of the environmental water regime.

⁸⁴ New South Wales Department of Infrastructure Planning and Natural Resources, n 55, cl 15(d)(vi).

⁸⁵ Comments made in interviews conducted in August 2006 with independent scientific and nature conservation representatives on the ECA advisory committee. See also general discussion of thermal pollution issues and their impact on native fish in the MDB in: Murray Darling Basin Commission, *Native Fish Strategy for the Murray-Darling Basin 2003-2013* (2003), pp 9-10.

⁸⁶ Comments made in interviews conducted in August 2006 with independent scientific conservation representative on the ECA Advisory Committee.

⁸⁷ Comments made in interviews conducted in August 2006 with representatives of fisheries and water resources management on the ECA Advisory Committee.

⁸⁸ Comments made in interviews conducted in August 2006 with fisheries and nature conservation representatives on the ECA advisory committee. See also general discussion of impacts of weirs and dams on the natural migration passage of native fish in the MDB in: Murray Darling Basin Commission, *Native Fish Strategy for the Murray-Darling Basin 2003-2013* (2003), pp 18-21.

⁸⁹ For example, opportunities may present to piggy-back ECA water onto irrigation releases in order to achieve multiple objectives of the ECA with one release: wetting of high level benches upstream in the catchment, and various objectives downstream in the wetlands. Such options should be attractive to operational managers as they represent a way to reduce otherwise high losses.

⁹⁰ See the discussion of the need for adaptive management approaches to environmental water delivery: Nick Schofield, Alana Burt and Daniel Connell, *Environmental Water Allocation: Principles, Policies and Practices* (Land and Water Australia, 2003), p 30. Adaptive management of surface and groundwater systems is also a key outcome identified in the National Water Initiative. See: Council of Australian Governments, *Intergovernmental Agreement on a National Water Initiative* (2004), cl 25(iv).

⁹¹ Improved reporting and monitoring frameworks is a key theme of national water policy. The NWI requires annual reporting on environmental rules including whether or not they were activated in a particular year, the extent to which rules were

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South Wales, the WM Act leaves much of the detail on implementation, including reporting and monitoring, to the water management plans and proposed implementation programs.⁹² Yet the plans themselves contain little detail on reporting and monitoring, and much relies on the resources invested at the implementation scale.⁹³ This section identifies some concerns with the current processes used to date in the Gwydir to report on and monitor the effect of the

environmental rules, and highlights ways in which accountability and also the potential to adapt management so as to optimise environmental outcomes could be improved.

Operational environmental water rules

Currently,⁹⁴ State Water must report to the DNR every time an environmental release is made. In the case of the operational rules this would be in the form of monthly flow reports or an operational report on a supplementary flow event. These are reviewed by the DNR against available hydrological data, and any discrepancies would be dealt with internally between the department and the water authority.⁹⁵ As such, there appears to be minimal independent oversight of the implementation of these rules, which is concerning given the ambiguities and difficulties associated with the rules noted above (“Institutional arrangements for the environmental water regime”), and the institutional history of the organisations involved.

At present, the only public reporting on compliance with these rules occurs at the level of the annual reports of State Water and the DNR. Such macro-scale reporting means that much of the compliance detail is lost. For example, the Annual Report from the direct predecessor to the DNR for 2004/2005, the year in which the first round of WSPs, including the Gwydir, were commenced, reported on the implementation of environmental water rules in regulated rivers in the following very general terms: “despite the drought conditions across much of inland New South Wales, the environmental flow rules in the WSPs were implemented in all but one of the seven regulated river systems.”⁹⁶ No further detail on the particular flow rules was supplied. Similarly, the annual reports of State Water over recent years include little detailed reporting on environmental water rules.⁹⁷ This scale of reporting offers little assistance in understanding whether and how the environmental flow rules were implemented. It should be noted that there are plans to improve the quality and detail of reporting on the environmental water rules at the level of annual reports,⁹⁸ and also that an

implemented and their overall effectiveness. It also foresees the development of an environmental water register to make such information easily and publicly accessible. See: Council of Australian Governments, *Intergovernmental Agreement on a National Water Initiative* (2004), cl 84-85.

⁹² *Water Management Act 2000* (NSW), s 17.

⁹³ Plans do contain general performance indicators which are intended to structure future monitoring and reporting of their impact. This is planned at the scale and time frames of WSP five yearly audits (*Water Management Act 2000* (NSW) s 44) and reviews by the New South Wales Natural Resources Commission against external natural resource management targets and standards (*Water Management Act 2000* (NSW) s 43A). These reviews have not yet been undertaken in New South Wales, so it is difficult to judge their comprehensiveness. Concern has been raised however at the adequacy and appropriateness of performance indicators contained within the plans. See discussion in: *Nature Conservation Council of NSW Inc v Minister for Sustainable Natural Resources* (2004) 133 LGERA 168; *Nature Conservation Council of NSW Inc v Minister Administering the Water Management Act 2000* (2005) 137 LGERA 320.

⁹⁴ These rules protect the first 500ML of tributary inflow to the wetlands, and limit access to supplementary flows to 50% of a flow event. See discussion above under *Operational rules to protect a proportion of tributary inflows to the wetlands*.

⁹⁵ Information provided by water managers involved in the implementation of the Gwydir environmental water regime, interviewed in August 2006 in Moree. Further public information on the division of responsibilities in this area is expected to be included in the Implementation Program for the Gwydir WSP, however as noted above this is not yet publicly available.

⁹⁶ NSW Department of Infrastructure Planning and Natural Resources, *Annual Report 2004-05* (2005), p 55. In the following year there was little further detail supplied. See: NSW Department of Natural Resources, *Annual Report 2005-06* (2006).

⁹⁷ State Water Corporation, *State Water Annual Report 2002-03* (2003), pp 33-35; State Water Corporation, *State Water Annual Report 2003-04* (2004), pp 32-35. These reports merely state the proportion of total flows that were protected for the environment, and that were recorded at the end of the system. State Water Corporation, *State Water Annual Report 2004-5* (2005), p 51. This report devotes more space to reporting on environmental water delivery, however there is still little detail, and the reporting is quite selective.

⁹⁸ Comments made by agency staff in interviews conducted in August 2006.

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Environmental Water Register which would make public a certain level of compliance information on the environmental water rules is planned as per the National Water Initiative.⁹⁹ These are important initiatives which would improve the situation considerably, and are developments which the Commonwealth could take a more direct role in implementing and auditing performance (see below “Towards ecologically sustainable water management – Lessons for the future”).

Environmental contingency allowance

The reporting arrangements are more advanced for the ECA, due both to the clear-cut nature of the entitlement, and the efforts of the ECA advisory committee. State Water is required to maintain a water account for the ECA similar to those held by water users. This records the account balance, including any debits (incurred by release) or credits (incurred as the account is credited in line with allocations to general security access licenses). The account is publicly accessible on the New South Wales Water Register.

As noted above, the ECA advisory committee has devoted much time to developing decision-making protocols to ensure the management of the ECA is both transparent and accountable. These include important innovations in reporting and monitoring. An implementation manual for ECA releases is being developed which provides a step-by-step guide to the process required for release of the ECA. This covers the coordination of roles and responsibilities of the three parties involved in orchestrating a release; monitoring responsibilities for the hydrologic and ecological responses to the ECA; and reporting requirements on the operational aspects of the release, the ecological and hydrological monitoring, and the overall decision-making undertaken for the event. At the time of writing there were no reports available for scrutiny under these new arrangements.

However, what is striking about these developments is that they are being initiated by

the committee, rather than required by legislative or implementation guidelines. For example, it is the committee who is making the decision on whether such reports should be publicly available.¹⁰⁰

Monitoring the effect of environmental flows

There has been a program – Integrated Monitoring of Environmental Flows (IMEF) – for monitoring the ecological response to environmental flows in the major regulated river systems in New South Wales since initial flow rules were first introduced in 1998/1999. This program initially focused on testing the various general hypotheses on which the flow rules had been based.¹⁰¹ In the Gwydir, IMEF focused on the reinstatement of freshes, small floods and consequent overland flows to the wetlands.¹⁰² More recently the program in the Gwydir has begun to focus on monitoring the outcomes of independent flood events, including those involving the release of the ECA. This is the type of approach that the DNR now intends to use to report on ECA outcomes under the system established by the ECA committee. It is believed that this more focused monitoring will strengthen the overall plan delivery.¹⁰³

The above discussion illustrates the need for improved reporting, particularly public reporting, on the implementation of the environmental water regime. Greater independent oversight, and implementation guidance by the regulator at the State level, would both address lingering ambiguities

⁹⁹ This is likely to be operational in late 2007. See: NSW Department of Natural Resources, *Draft Implementation Plan for the National Water Initiative* (2005), pp 73-74.

¹⁰⁰ Such issues were discussed in the meeting of the ECA advisory committee, observed in Moree in August 2006.

¹⁰¹ For example by measuring changes in the hydrology, habitats, animals, plants and ecological processes in the major regulated river systems following the introduction of the flow rules, and using this information to test the relationships over time between flow regime and ecosystem responses.

¹⁰² NSW Department of Natural Resources, *Water for the Environment – Environmental Monitoring*, <http://www.naturalresources.nsw.gov.au/water/monitoring/shtml> (viewed 16 June 2006); NSW Department of Land and Water Conservation, *Integrated Monitoring of Environmental Flows: An Overview* available online at http://www.dnr.nsw.gov.au/water/pdf/imef_brochure.pdf (viewed 17 January 2008); NSW Department of Infrastructure Planning and Natural Resources, *Integrated Monitoring of Environmental Flows – State Summary Report 1998-2000* (2000).

¹⁰³ Comments made in interview with agency staff involved in IMEF in the Gwydir. Monitoring programs through IMEF in the Gwydir were also discussed at the meeting of the ECA advisory committee observed in Moree, 29 August 2006.

associated with delivering these rules on the ground. While the IMEF monitoring of the impact of the environmental flow rules is an important resource, it can only now begin to provide some commentary on whether individual rules are adequate in achieving the desired ecological outcomes. The efforts of the ECA committee to establish a system of reporting and monitoring to ensure accountability and transparency, and to support an adaptive management approach, are commendable. However it is concerning that these developments are not being driven by the responsible agencies and therefore there are not yet consistent reporting requirements across the State. Rather, it seems the governmental attempts to introduce better reporting and monitoring are suffering considerable delays, reminiscent of previous problems experienced in the development of policy guidelines for the negotiation of the plans themselves.

This discussion has raised a series of concerns about the way in which the environmental water regime is managed and accounted for. Many of these concerns are related to the general difficulty of introducing flow rules which attempt to recapture elements of the natural flow regime, to a highly regulated system. Yet the discussion has shown that some changes to the institutional arrangements (eg participatory and skills-based management models such as for the ECA, increased environmental management expertise within the operational arm of water management, and more regulatory oversight of implementation) and a focus on improving reporting and monitoring to facilitate adaptive management, would greatly improve the situation in the Gwydir.

LEGAL PROTECTION OF ENVIRONMENTAL WATER IN THE GWYDIR

The legal status and enforceability of environmental water rules as established under the WM Act and the Gwydir WSP, and accorded by the institutional management arrangements described above, will now be explored. This involves delving behind the priorities established by the legislation and the WSP, and assessing how the actual implementation of the environmental water regime may be impacted by the management of the system to meet consumptive water requirements, by general compliance standards across the system, and by the various regulatory loopholes in the system, which continue to allow water to be harvested unaccounted for and therefore undermine all other entitlements in the system. Increasing water scarcity under climate change scenarios can only accentuate such concerns.

Legal status – Under the WM Act and the Gwydir WSP

As noted above, under the WM Act, at a general legislative level, water for the environment is granted higher priority and status than licensed use.¹⁰⁴ WSPs are in place for 10 years, and the environmental water regimes within the plans are effectively guaranteed for this time.¹⁰⁵ While consumptive entitlements are also granted such a term of security, the majority of these entitlements in the Gwydir are general security access licenses, which are expressed as shares of the available resource. This means that license holders are only granted water as it becomes available through the available water determinations, meaning that they are vulnerable to reduced inflow and changing water availability on a yearly basis.

Yet it is important to distill what these general legislative priorities and expressions of security actually mean on the ground. Indeed, only one of the operational rules in the

plan – that protecting the first 500ML/day of tributary inflow to the wetlands – appears to be granted higher security and status than the majority of consumptive entitlements. According to the scheme of the legislation and the

¹⁰⁴ See discussion above at *Legal and institutional frameworks for environmental water under Legal regime*. Water sharing is required to give first priority to the protection of the environment and its dependent ecosystems, and second priority to protection of basic landholder rights. Sharing or extraction of water under any other right or by licensed use must not prejudice these priorities except in extreme drought conditions, when basic landholder rights are given priority. The security and status of environmental water are also discussed in: NSW Department of Natural Resources, *Draft Implementation Plan for the National Water Initiative* (2005), pp 15-16. These priorities are reflected in the Gwydir WSP in Pts 3, 4, and 5, which successively deal with environmental water rules, basic landholder rights and establish the Bulk Access Regime having regard to the former. See: New South Wales Department of Infrastructure Planning and Natural Resources, n 54.

¹⁰⁵ *Water Management Act 2000* (NSW), s 43. See discussion in: NSW Department of Natural Resources, *Draft Implementation Plan for the National Water Initiative* (2005), pp 15-16.

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WSP, this is a secure operational rule, the delivery of which takes precedence over all but basic rights in times of severe drought. Yet earlier comments have shown how even this rule may be vulnerable in practice to extractions for basic rights and delivery losses, which may undermine its environmental benefit (see “Institutional arrangements for the environmental water regime”).

The ECA is, of course, treated very similarly to general security access licenses in that it is only credited with water through the available water determination process at the same rate as general security access licenses, after basic rights and high security licenses have been credited to 100% of their allocation.¹⁰⁶ It is also vulnerable to reduced inflow and changing water availability on a yearly basis, which is becoming an issue of increasing relevance in light of climate change predictions.¹⁰⁷ This is an issue not just for the volume of water that may be available in the future for environmental contingencies, but also for the potential implementation of the allocation. In dry times, when irrigation releases are also severely curtailed and the wetland areas are parched, considerable evaporative losses mean that far more water may be required than otherwise to achieve any ecological benefit. This throws into question the ecological value and potential of the 45000ML set aside in Copeton Dam.¹⁰⁸

There are some differences between the ECA and general security licenses which give the ECA more management flexibility: eg carry-over provisions are more generous than for general security licenses, and there is no limit on the amount of water that can be released from the account in any one year as there is with general security licenses. These provisions will allow for some more tailored management according to prevailing climatic conditions.

Adaptive environmental water entitlements, of which there are currently none in the Gwydir, would retain a similar legal status to the original consumptive entitlement from which they are sourced, and therefore, in the case of general security licenses,

would be subject to the same low levels of reliability, limited carry-over and annual use rules.

Thus overall, while there are general guarantees of superior legal status in the legislation, when the rules in the WSP are examined more closely in the context of their on the ground implementation, it is questionable whether the environmental water regime is granted any additional status, which actually translates through to management decisions. The following discussion raises further issues which suggest that despite the protections established by the Act and the plan, the current context of implementation suggests a far less secure legal status for environmental water.

A direct conflict of interest between delivery of consumptive and environmental water

The way in which environmental water may be treated if its delivery requirements conflict with the delivery of consumptive water is an issue of concern. The most likely situation in which such a conflict would occur surrounds the delivery of the ECA. For example, if the ECA were to be required along a distributory channel where there are irrigation licenses, issues of insufficient channel capacity

¹⁰⁶ New South Wales Department of Infrastructure Planning and Natural Resources, n 54, cl 15(c). See also discussion in: *Nature Conservation Council of NSW Inc v Minister for Sustainable Natural Resources* (2004) 133 LGERA 168; *Nature Conservation Council of NSW Inc v Minister Administering the Water Management Act 2000* (2005) 137 LGERA 320.

¹⁰⁷ See n 2. As noted above, this paper describes recent projections of climate change for the MDB and more specifically for the Macquarie catchment (which neighbours the Gwydir to the south).

¹⁰⁸ Current deliberations of ECA committee on how best to use the ECA in the present drought are illustrative. At the time of research (August-October 2006), the ECA Advisory Committee was considering three very valid competing requests for the release of ECA water: to water Ramsar sites in the wetlands; to maintain water levels in a particular wetland area to support a program of biological control program for a significant pest species – water hyacinth; and to facilitate a study on the response of native fish to changes in flow regime. In the context of generally dry conditions which meant extensive losses would be suffered in any use of the ECA, the limitations posed by the volume set aside, and the complexity and difficulty of their mandate were being increasingly perceived by the Committee.

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may arise if the timing of delivery coincided with irrigation releases.¹⁰⁹ Such a direct conflict has not yet arisen, yet managers describe it as a conceivable situation.¹¹⁰

Exactly how the priorities and status established at a general level by the legislation and the plan would translate to resolving such a conflict on the ground remains an open question.¹¹¹ This effectively means that the decision would be left to the discretion of State Water as operational manager of the system. The views expressed by State Water staff suggest that the organisation attempts to treat the ECA like any other legitimate water user, and such situations would best be resolved on a case by case basis, with reference to the urgency of the ECA request – eg whether timely delivery was required to support a breeding event in the wetlands.¹¹² Yet the

potential political fall out of monopolising channels for environmental water delivery during the irrigation season, particularly for cotton which is a crop with very precise water requirements, make it questionable whether a delivery priority would be accorded to environmental water over consumptive water in the current political and institutional context without specific direction to that effect.

General compliance standards and their impact on the status of existing entitlements

In practical terms the status and enforceability of environmental water, and indeed of all other entitlements, also depends on the level of compliance generally within the system. Under the institutional arrangements described above, the DNR has been responsible to ensure water is being allocated correctly to users and the environment, and there is no fraudulent extraction of water from the system.¹¹³ Yet the operational functions of State Water overlap significantly with the DNR's compliance responsibilities,¹¹⁴ and a certain level of coordination between the agencies is required.

In the mid 1990s a comprehensive independent investigation of water management in the river valleys of north-western New South Wales highlighted serious deficiencies in compliance and enforcement. In the Gwydir particularly, water metering was found to be highly inaccurate due to issues such as the inferior quality and condition of meters, meter tampering, meter accuracy and unauthorised changes to metering installations. Breaches of license conditions were also detected. These findings were attributed to poor standards of monitoring and surveillance by the responsible Department. The situation was worsened by a general limited documentation and recording of flow data which made it difficult to account for the amount of water being used.¹¹⁵

Research conducted for this article suggested that efforts have since been made to tighten compliance, no doubt encouraged by the general directions of National Water Policy and the corporatisation of State Water.¹¹⁶ Yet there is ongoing concern among some water managers and community members that poor compliance remains an issue threatening effective, efficient

¹⁰⁹ This may occur on the distributary channels of the lower Gwydir or Malawa.

¹¹⁰ Comments raised in interviews conducted with water managers involved in the implementation of the Gwydir environmental water regime (August 2006).

¹¹¹ At the time of research (August-October 2006) the ECA committee had requested legal advice on this issue.

¹¹² Comments made in interviews conducted with State Water staff involved in the implementation of the Gwydir environmental water regime (August 2006).

¹¹³ *Water Management Act 2000* (NSW). Chapter 7 outlines the range of enforcement powers available under the Act. ¹¹⁴ For example, State Water is responsible for metering water extractions in regulated systems, and this is the key point at which

compliance issues generally arise.

¹¹⁵ North West Rivers Audit (Sept 1995) and River Meters Audits (May 1995) prepared by consultants for the

New South Wales Dept of Water Resources. These reports are referenced in: Jacqueline Allan and Siwan Lovett, *Impediments to Managing Environmental Water Provisions*, (1997) 30-31; and Siobhan McHugh, *Cottoning On: Stories of Australian Cotton-Growing* (1996) 179. Governmental acknowledgement of the problems is made in: NSW Department of Land and Water Conservation, *Water Sharing – the Way Forward: NSW Progress on the Water Reforms 1995-1998* (1998), pp 17-18.

¹¹⁶ Comments made in interviews with State Water staff involved in the implementation of the environmental water regime, conducted in August 2006, suggest for example that State Water has increased their attention to reading and calibration of meters.

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management of the system, and that significant breaches still occur.¹¹⁷ This appears to be a result of a fractured approach to water use regulation, evidentiary difficulties of proving a breach, and insufficient resources allocated to compliance activities.

For example, although State Water is responsible for reading meters and ensuring they are accurate, it is the responsibility of the license holder to purchase and install the meter.¹¹⁸ This split of responsibility is of significant concern. For example, meters may be installed in places where they become un-operational during a large flow event (ie below the level of flow associated with higher flow events). This effectively means that un-metered pumping can occur during the event, and could be a method to fraudulently extract water from the system. This is potentially an issue of significance for enforcing the limits on access to supplementary water, so important to the overall environmental water regime. Meters are also very easy to disable, and anecdotal evidence of unauthorised extraction through meter tampering persists in the community.¹¹⁹ Again, any such unauthorised pumping could undermine the delivery of environmental water, particularly in the context of a supplementary water event which may potentially involve the piggy-backing of an ECA release onto irrigation releases, where environmental water must be clearly distinguished from that available for extraction.

Water managers concede the particular evidentiary difficulties of proving a breach: after water has been pumped there is no way of knowing where it has gone, meaning that compliance officers must be on the spot at the time.¹²⁰ This is potentially exacerbated by the split roles of the DNR and State Water, in that State Water is the most likely party to uncover a breach, yet the enforcement/compliance responsibilities rest essentially with the DNR.

Recently, a State Water Extraction Monitoring Policy and accompanying standards were developed to increase the extent of active monitoring of water extraction.¹²¹ Yet this policy focuses largely on introducing metering to unregulated rivers and groundwater sources, stating that in the regulated rivers, extraction monitoring is generally at an acceptable level with the vast majority of licenses being measured using flow meters.¹²² The standards address, inter-alia, the capability of the flow meter including measures to prevent manipulation and tampering, and the situation of the meter to ensure comprehensive recording of all extractions, even in times of high

flow. State Water staff have suggested there is a significant discrepancy between these standards and conditions on the ground in the regulated section of the Gwydir, and that there is insufficient capacity to implement the standards.¹²³

Of more direct relevance to ensuring compliance with the environmental water rules is river gauging. Accurate measurement of water level is required to enable effective delivery of the ECA, as water depth and the extent of inundation are key to ensuring the desired vegetation and other ecological responses. Yet since the wetland system is naturally so dynamic, gauges are often found to be inappropriately sited, and there is insufficient data available to monitor water depth and therefore

¹¹⁷ Comments made in interviews with water managers and community members involved in the implementation of the environmental water regime, conducted in August 2006, suggest compliance activity is weak and that this is evidenced by the very few prosecutions carried out under the Act. Anecdotal evidence of water fraud persists in the community.

¹¹⁸ NSW Department of Infrastructure Planning and Natural Resources, *NSW Water Extraction Monitoring Policy* (2005), http://www.dnr.nsw.gov.au/water/pdf/monitoring_policy_2005-05-25_bn_y05-364.pdf (viewed 16 June 2006), p 6.

¹¹⁹ See, n 116. See also, Siobhan McHugh, *Cottoning On: Stories of Australian Cotton-Growing* (Hale and Iremonger, 1996), p 179.

¹²⁰ Comments made in interviews with State Water staff involved in the implementation of the environmental water regime, conducted in August 2006.

¹²¹ NSW Department of Infrastructure Planning and Natural Resources, *NSW Water Extraction Monitoring Policy* (2005); NSW Department of Natural Resources and State Water, *NSW Water Extraction Monitoring Standards* (2005), <http://www.dnr.nsw.gov.au/water/compliance.shtml> (viewed 16 June 2006).

¹²² NSW Department of Infrastructure Planning and Natural Resources, *NSW Water Extraction Monitoring Policy* (2005), <http://www.dnr.nsw.gov.au/water/compliance.shtml> (viewed 16 June 2006), p 5.

¹²³ Comments made in interviews with State Water staff involved in the implementation of the environmental water regime, conducted in August 2006.

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required ECA delivery. This is largely an issue of lack of resources, and is an issue that must be addressed if the ECA is to be delivered efficiently and accountably.¹²⁴

Floodplain harvesting

Floodplain harvesting is the collection, extraction or impoundment of water flowing across floodplains. These flows can originate from local run-off that has not yet entered the main channel of a river, or from water that has overflowed from the main channel of a river during flood. Floodplain harvesting reduces the amount of water which enters the river, and which therefore is available to meet downstream river health, wetland and floodplain needs and in some cases the water supply entitlements

of other users downstream. Yet to date, floodplain harvesting has not been licensed or accounted for, and harvested floodplain water has been treated as a freely available bonus to a farmer's licensed entitlement.¹²⁵

In the Gwydir, the resulting reduced downstream flow impacts significantly on the beneficial environmental impact of these flows, particularly in the terminal wetlands. In this respect floodplain harvesting may undermine the effectiveness of environmental water set aside in the plan. Quantifying the extent of floodplain harvesting is very difficult due to the opportunistic nature of the extraction, the diversity of structures and methods used to harvest such water, and the considerable overlap of such extraction with harvesting rainfall run-off, and managing irrigation return flows. Nonetheless, current estimates suggest that it accounts for a very significant portion of total water extracted in the valleys of northern New South Wales such as the Gwydir.¹²⁶

Attempts are currently being made to better account for floodplain harvesting. Under the WM Act, such activities require a water extraction license.¹²⁷ The first generation of management plans under the Act has not addressed this issue. The government has however concurrently developed a Statewide policy on floodplain harvesting, which provides that all existing works and extractions will be licensed, and that licensing will focus initially on controlling structures, but will later move towards specifying volume limits and flow-related conditions, including metering of pumps. No new works that result in additional diversion of water will be authorised. Any diversions associated with works in place prior to 1994, will be considered as within the MDB Cap,¹²⁸ and appropriate steps will be taken to keep diversions to Cap levels. The magnitude of the task is not under-stated, and the policy provides no timeframe for the completion of these tasks.¹²⁹

Such proposals are controversial in an area such as the Gwydir where there is heavy reliance on accessing these flows. If licensing occurs as planned, then any diversions beyond 1994 MDB cap levels would indicate a growth in water usage, necessitating reductions in other types of extraction to maintain Cap compliance. In the context of the WSP which sets the long term extraction limit below Cap levels at 1999/2000 levels of development, and explicitly includes water diverted through

¹²⁴ Comments made in interviews with water managers involved in the implementation of the environmental water regime, conducted in August 2006.

¹²⁵ See State Floodplain Harvesting Principles in: Gwydir Regulated River Management Committee, *Water Sharing Plan: Gwydir Regulated River Water Source, Part A – Guide to the Water Sharing Plan* (2001), p 39. Previous legislation, the *Water Act 1912* (NSW) provided powers for licensing but these were never applied as there was generally no requirement to restrict total overall water extractions or off allocation diversions.

¹²⁶ Comments made in interviews with conservation officers involved in the implementation of the environmental water regime, conducted in August 2006.

¹²⁷ See n 125, p 39. Floodplain harvesting works and water extractions clearly fall into those activities that may only be undertaken by way of a license. The Act also requires such licensing to consider the ecological functioning of floodplains. The National Water Initiative also addresses the impact of intercepting and storing overland flows on the integrity of water access entitlements and the achievement of environmental objectives for water systems. See: Council of Australian Governments, *Intergovernmental Agreement on a National Water Initiative* (2004), cll 55-57.

¹²⁸ In June 1995, the Ministerial Council announced a cap on surface water diversions in the Basin, whereby participating jurisdictions agreed voluntarily to cap their own diversions at the volume of water used at 1993/1994 levels of development. That level did not refer to the specific volume of water actually used in 1993/1994, but rather to the water estimated as available with the infrastructure in place and under the type of management rules in existence in 1993/1994.

¹²⁹ See n 125, pp 39-40.

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floodplain harvesting within this, any growth in extractions beyond this point would necessitate staged reductions in access to water under other entitlements, beginning firstly with a reduction in water available to supplementary access license holders. Nonetheless, it seems as though it will be some time before the regulatory activities of the Department in this area actually reach the point of limiting such extractions. Initially, much must be done to understand the extent of the issue, and devise ways to regulate an extraction of water which is highly episodic and where individual structures and works are very different. In the meantime, this remains an attractive source of additional water as under today's rules it is water that must not be accounted for nor paid for.

The concerns raised above are examples of issues in the practical management of the regulated river system which have the effect of undermining the legal status and enforceability of the environmental water regime. When considered in the context of the operational and institutional constraints on full implementation of the existing rules, and the general levels of over-allocation and resulting low reliability of entitlements in the system, the effective legal status of environmental water appears significantly compromised. Interestingly, this poor status, or, in other terms, the insecure nature of the property right associated with environmental water, may make a catchment, such as the Gwydir, unattractive to any future investment in purchasing water on the market for addition to the environmental water regime as an adaptive environmental water license. The resolution of such operational and enforceability issues to improve the security of environmental entitlements is a very real concern for buy back programs like Riverbank in New South Wales.¹³⁰

TOWARDS ECOLOGICALLY SUSTAINABLE WATER MANAGEMENT – LESSONS FOR THE FUTURE

The management of water resources in the MDB in the context of climate change and prolonged drought has been given considerable coverage in national debate in recent months. An historic takeover of the constitutional powers to manage the water resources of the Basin from the States by the federal government was proposed, widely debated and legislated in late 2007.¹³¹ Of particular relevance to the material covered in this article will be the future increased involvement of the Commonwealth in planning environmental watering, and the management of environmental water.¹³² Coverage of the very new Commonwealth regime is beyond the scope of this article. However, in conclusion, lessons learnt from the early implementation of the Gwydir environmental water regime are identified to inform the ongoing debate about the best way to manage and protect water that is set aside for the environment in the MDB. Particular attention is given to whether and to what extent these issues will be improved by increased Commonwealth involvement in environmental water management.

Important characteristics of an effective environmental management regime are discussed below.

Clear mandate for environmental management

It is clear from the experience in the Gwydir, that an unambiguous mandate for management of a water system for identified ecological outcomes is crucial to a successful environmental water regime. This needs to express the legal status of environmental water in terms of how it should be implemented and delivered on the ground: it must address potential conflicts of interest with delivery

¹³⁰ Comments made by conservation officers involved in the implementation of the environmental water regime, conducted in August 2006, suggest the Riverbank program, which has significant funds to invest in water buy back for the environment, would be discouraged from investing heavily in a catchment like the Gwydir as their investment would not be considered adequately secure. Another limiting factor for investment in the catchments of northern New South Wales is the high value of water. The Riverbank program is relatively new, and as such the applicability of these comments cannot yet be verified.

¹³¹ See: Commonwealth of Australia, *A National Plan for Water Security* (2007). Press coverage of the plan has been extensive. See for example: Gwydir Regulated River Management Committee, *Water Sharing Plan: Gwydir Regulated River Water Source, Part A – Guide to the Water Sharing Plan* (2001); “PM’s \$10b Water Plan”, *Sydney Morning Herald* (Sydney), 25 January 2007; Jewel Topsfield, Peter Ker and Michelle Grattan, “Brack’s Plan Left in Tatters”, *The Age* (Melbourne), 22 February 2007; Jewel Topsfield, “Water Plan: Canberra Backs Down”, *The Age* (Melbourne), 8 May 2007; “Vic Farmers Mack Murray-Darling Plan”, *The Age* (Melbourne), 8 May 2007.

¹³² See: Commonwealth of Australia, *A National Plan for Water Security* (2007), p 11; *Water Act 2007* (Cth), Parts 2 and 6.

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of water for consumptive use, and how to overcome operational limitations which will be present in any regulated system that continues to supply water for extraction. While the New South Wales legislation provides certain duties and priorities which distinguish environmental water from water for consumptive use at the level of principle, the Gwydir case study shows that at the level of plan implementation there

are lingering uncertainties and grey areas, which in practice may well diminish the ecological value of the flow rules. The imperatives of managing a system for consumptive use mean that environmental water may well be given second priority if its actual status is not made clear. This threat will only increase in the context of climate change as increasing water scarcity heightens competition for the scarce resource.

Independence

A certain degree of independence from the operational management of systems for consumptive purposes is required to ensure effective, uncompromised implementation of an environmental water regime. In practical terms, overlap and coordination with water delivery operations is unavoidable, and indeed the operational expertise of water authorities is critical to any delivery of environmental water in a regulated system which continues to support consumptive water use. Yet as experience in the Gwydir suggests, there is a need for further, independent scrutiny of the implementation of environmental water rules. In this particular case this could be achieved through better reporting and implementation guidelines provided to the operational manager, and broader, more detailed public reporting which addresses not only the delivery of environmental water, but also assesses its effectiveness. Improved public reporting is particularly important as it will open up the system to community scrutiny, which will in turn improve accountability.

With the Commonwealth assuming further control of environmental water management in the MDB, the division of responsibilities in this area will be important. The new legislation will establish a Commonwealth Environmental Water Holder function to manage Commonwealth Environmental Water Holdings directly.¹³³ Yet in terms of water delivery and on-the-ground management, they will still rely significantly on regional expertise, and coordination with state and regional bodies will be crucial. The Commonwealth would also be well placed to set up stringent implementation guidelines for all environmental water, including reporting and monitoring frameworks, and audit state performance against these – indeed much of this is already foreshadowed by the National Water Initiative (NWI), and should be strengthened and accelerated.¹³⁴

It is also important to consider the effects of further dividing the management of environmental water. Already in New South Wales the institutional management frameworks are increasing in complexity. Management arrangements under the WSPs have been outlined above, however, as further water is recovered for the environment, eg through buy back initiatives such as New South Wales Riverbank, different institutions such as the State nature conservation department, and catchment management authorities will in theory hold and manage different parcels of environmental water.¹³⁵

¹³³ *Water Act 2007* (Cth), Part 6; Commonwealth of Australia, *A National Plan for Water Security* (2007), pp 11, 12-14. The Water Act establishes a Commonwealth Environmental Water Holder to manage Commonwealth Environmental Water Holdings (at this stage largely water that is accrued for the environment from savings achieved under the National Water Plan). This function will be conducted by a division of the Commonwealth Department administering the *Water Act* (ss 115 – 116).

¹³⁴ See: Council of Australian Governments, *Intergovernmental Agreement on a National Water Initiative* (2004), cl 84-85.

135 At present in New South Wales water recovered by two key environmental water programs – New South Wales Riverbank and the New South Wales Wetlands Recovery Plan – will be managed by the nature conservation agency. Additionally the *Catchment Management Authorities Act 2003* (NSW) enables CMAs to establish Environmental Water Trust Funds to purchase environmental water, and administrative arrangements are to be developed by CMAs in conjunction with the agency responsible for the implementation of the *Water Management Act 2000*. See: NSW Department of Natural Resources, *Draft Implementation Plan for the National Water Initiative* (2005), pp 73-74; NSW Department of Natural Resources, *Water for the Environment – Water Recovery Projects*, <http://www.dnr.nsw.gov.au/water/recovery.shtml> (viewed 16 June 2006); NSW Department of Environment and Conservation, *NSW Riverbank* (2006), <http://www.environment.nsw.gov.au/education/nswriverbank.htm> (viewed 7 July 2006); NSW Department of Natural Resources, *The NSW Wetland Recovery Plan*, http://www.dnr.nsw.gov.au/water/wetlands_recovery.shtml (viewed 7 July 2006).

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As noted above, the Commonwealth will now also hold and manage environmental water.¹³⁶ Having multiple bodies involved in management may quite conceivably cause problems with efficient and effective delivery. The priorities and approaches to management between the different bodies may also vary considerably. From an ecological perspective it would be preferable to consolidate the total water available to the environment within one coordinated management framework. The additional Commonwealth involvement in this area should therefore be undertaken with a view to rationalise and streamline management rather than add a further layer of bureaucracy or new separate parcels of environmental water.

A union of environmental and operational expertise, and local knowledge

An effective environmental water manager will combine detailed local knowledge of both ecological needs and the operational water management options for the system. The operational challenges associated with environmental water delivery in the Gwydir demonstrate the depth of expertise and local understanding required to achieve identified ecological outcomes, as well as the need for adaptive management frameworks to allow for continued learning. This situation would be paralleled in most regulated systems in the Basin, where the natural flow regime has been considerably altered and sits at odds with the requirements of consumptive users, and therefore considerable skill, creativity and experimentation is required to reinstate identified flow priorities. The combination of skills, independence and representation within the ECA advisory committee appears to be well suited to this management role. It is argued that this particular committee management model should be further strengthened and applied more broadly, not sacrificed to another reinvention of the water bureaucracy as the Commonwealth increases their involvement in this area. Any increased Commonwealth involvement in management will continue to rely on such a local skill base, and must not jeopardise the capacity for adaptive management at the level of implementation.

Resources for implementation

Even if an environmental water regime of appropriate nature and magnitude is negotiated, this cannot have the desired impact unless sufficient resources are directed to its ongoing implementation. The experience in the Gwydir highlights the

importance of allocating resources to implementation, with insufficient resources arguably undermining the environmental water regime through delays in preparation of implementation plans, poor general compliance, and inadequate monitoring programs. The way in which the State departmental resources in this area have been depleted since the water planning phase concluded is particularly worrying. While there are various improvements planned to address many of these areas,¹³⁷ the delays associated paint a poor picture of policy development and delivery, with agencies playing catch up in installing the institutional framework necessary for full implementation of the rules.

The new Commonwealth management regime for the MDB is accompanied by significant funding promises, the majority of which aim to modernise irrigation infrastructure to save water and increase efficiency, and to a lesser extent address over-allocation and purchase additional water for the environment.¹³⁸ A small proportion of the funding is committed to improving water resource information, and will require certain standards of monitoring and metering by all water data collecting agencies.¹³⁹ More emphasis on such implementation standards (for compliance, reporting, and monitoring) by the Commonwealth would give important direction and impetus to ensuring the institutional framework necessary for full implementation of environmental water regimes are in place across the Basin. States should be required to reach certain stringent implementation standards in order to access associated funds.

¹³⁶ See n 133.

¹³⁷ Delays in preparation of Implementation Programs for WSPs, and the Environmental Water Register have been noted in the article.

¹³⁸ Commonwealth of Australia, *A National Plan for Water Security* (2007), p 4. The plan commits \$6 billion over ten years to modernising irrigation infrastructure, and \$3 billion over ten years to address over-allocation in the MDB (including reconfiguration of irrigation systems, retiring non-viable areas from irrigation, and purchase of entitlements on the market).

¹³⁹ Commonwealth of Australia, n 137, pp 15-17.

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Effective legal protection for environmental water

The discussion above (“Legal protection of environmental water in the Gwydir”) raised a number of issues which undermine the extent and effectiveness of legal protection provided to environmental water, and indeed other entitlements in the Gwydir. For example, under climate change scenarios, volumetric environmental entitlements are vulnerable to reduced inflow, and their value may be further diminished by generally dryer conditions which impede efficient implementation. This situation highlights the need not only for sufficient volumes to be set aside for environmental purposes, but also the imperative for flexible management rules such

as carry over provisions, and addressing limits on the amount of water which can be used at any given time. Addressing floodplain harvesting through licensing not just works and structures but also the extractions, must also be given a high priority in future efforts to tighten water resource management in the MDB, and ensure the integrity of all existing entitlements including environmental water. In a time of increasing water scarcity, this is a considerable loophole in the way in which water use is regulated and accounted for.

CONCLUSION

The need for considerable Commonwealth investment in targeted environmental water recovery to achieve environmental water regimes of an appropriate nature and magnitude for ecologically sustainable water management in the MDB is undeniable. Yet the material covered in this article suggests that further federal involvement in environmental water management should be carefully and selectively approached.¹⁴⁰ There appears to be questionable value in the Commonwealth taking on the operational role of environmental water delivery, for which local knowledge and experience of both ecological needs and operational options are vital, and appropriate institutional models such as the Gwydir ECA committee are slowly developing. Yet there is arguably considerable under-developed potential for federal intervention to strengthen State-based management frameworks for environmental water, by adding a further layer of independent scrutiny and requiring certain standards of implementation, including compliance, reporting and monitoring. Many appropriate improvements to the management framework are already on the table through the NWI. It is hoped that the new federal regime will add impetus to implementation and raise standards.

¹⁴⁰ It should be noted that there was some concern among environmental stakeholders that the federal government rushed through legislation to enact the National Water Plan in an election year, and that appropriate consultation with stakeholders who have valuable insights, experience and knowledge of the Basin's problems was not conducted. See: Joint Environment Groups, *Environment Groups Statement on National Water Plan and Draft Water Bill* (2007), http://www.acfonline.org.au/uploads/res_water_statement.pdf (viewed 13 June 2007), p 1.

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Water law, the High Court and techniques of judicial reasoning

Professor DE Fisher*

The status of rights and interests in relation to water has never been unambiguous. Are they rights of access, of use or of property? Is the status of individual rights the same as the status of the statutory rights of the State to the use and control of water? Much depends upon which stage of the hydrological cycle is relevant: water in its natural state, water stored in a reservoir, water piped to a distant destination, or water contained in a receptacle. The High Court has recently addressed some of these issues in the context of s 51(xxxi) of the Commonwealth Constitution restricting acquisition of property to acquisition on just terms. In undertaking this analysis the High Court has revealed an interesting range of approaches to legal

reasoning. This article seeks to review some of these issues.

INTRODUCTION

It is rare for the High Court of Australia to be given an opportunity to comment upon the doctrinal foundations of the legal arrangements for managing water resources in Australia. The evolution from a common law system, based upon individual rights of access to water, to a statutory system, based upon the right of the Crown – now the State – to the use and control of water resources, was addressed by the High Court in 1955¹ but not again until its decision in the *ICM Agriculture* case in 2009.² The conferment of such a right upon the State introduced indirectly into Australia the concept of the public domain in relation to water resources – a concept well recognised in civil law jurisdictions with their distinctive techniques of legal reasoning. This laid the foundations for the strategic management of water resources by the executive in exercise of this statutory right.

The form, structure and language of the law relating to the environment and its natural resources in Australia have changed dramatically over those five decades. In 1955 the focus of the law was the facilitation of the use and development of natural resources. The later decades of the 20th century saw increasing emphasis being given to the protection of the environment and the conservation of its natural resources. In the 1990s ecologically sustainable development was seen by many as the concept that would bring together the development of natural resources and the protection of the environment in achieving the economic, social and ecological objectives of the community. Indeed, the Vice-President of the International Court of Justice identified the principle of sustainable development as the principle that would “harmonise” the needs of development and the necessity to protect the environment.³ Ecologically sustainable development is thus emerging as the standard that informs the exercise of public rights and private rights and the discharge of public duties and private duties.⁴ Accordingly, it impacts upon the strategic and regulatory functions of the public sector as well as the strategic and operational functions of the private sector. In this way, it underpins responsibility for past activities, current activities and future activities that relate to the use and development of the natural resources of the environment. This applies to water resources as it does to natural resources generally.

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¹ *Thorpes Ltd v Grant Pastoral Co Pty Ltd* (1955) 92 CLR 317.

² *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87.

³ *Judgment in the Case Concerning the Gabčíkovo-Nagymaros Project* (1998) 37 ILM 162 at 205.

⁴ In relation to natural resources generally, see Fisher DE, *Australian Environmental Law: Norms, Principles and Rules* (2nd ed, Thomson Reuters, 2010) Chs 6 and 7, and in relation to water resources, see Ch 7 at pp 170-172.

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THE EMERGENCE OF A PUBLIC DOMAIN REGIME

The right of the State – originally the Crown – to the use and control of water resources in Australia emerged towards the end of the 19th century. One of the earliest examples was the *Water Rights Act 1896* of New South Wales. In 1955 Fullagar J in the High Court said this about “the real object” of this Act:

[It] was to enable the Crown, in a country in which water is a comparatively scarce and important commodity, to exercise full dominion over the water of rivers and lakes and to undertake generally the conservation and distribution of water.⁵

The use of the word dominion is significant. It means something in the nature of rights of political control or of sovereignty: an inchoate public domain regime. How did the High Court characterise the right of the State to the use and control of water resources in 2009? In this way:

The vesting of rights to the “use” and “control” of water constituted an exercise of sovereignty in the sense that the rights so vested were based on the political power of the State.⁶

The exercise by the State of its rights is accordingly an exercise of political power, in the sense that the rights are exercisable for the public benefit or in the public interest. But what is for the public benefit and what is in the public interest are often matters of controversy. However, in 2009 the High Court explained clearly and concisely what this means:

The term “in the public interest” is one of broad import. When used in a statute, the term classically imports a discretionary value judgement to be made by reference to undefined factual matters confined only by the subject matter, scope and purpose of the statute in question.⁷

Interestingly, the “only” restrictions are the subject matter, scope and purpose of the legislation. These are – in the context of environmental law – substantial restrictions.

A MATRIX OF INSTRUMENTAL RULES

The ecologically sustainable development of water resources does not stand alone in the legal arrangements for their management. It may be seen to sit at the apex of the system or to underpin it. Either way, it is one among a number of emerging rules which govern how water resources are managed. These rules perform different functions and assume different forms. For example:

- cxliii. statements of value or principle;
- cxliv. strategic rules;
- cxlv. regulatory rules;
- cxlvi. liability rules; and
- cxlvii. market rules.⁹ □ Statements of value express the fundamental concepts and principles upon which the system is based. Strategic rules indicate the broad

direction of decision-making or operational activity in the management of water resources. Regulatory rules explain how decisions about the future use and development of water resources are to be made and activities to be undertaken. These include the imposition of procedural obligations and operational obligations. The former state how decisions are made, eg the range of matters that must be considered, any priorities associated with these and the expected outcome of the decision-making process. The latter include restrictions upon activities without authorisation or requirements about the terms and conditions on which such operational activities are able to be undertaken. Then there are liability rules, which indicate directly or indirectly the consequences of a failure to comply with any of these regulatory rules. For example, the breach of a duty may lead to an injunction, the imposition of a penalty, an award of damages, an administrative order for compliance, a combination of these or others. Then there are market rules, which support the use of economic and commercial instruments as mechanisms for managing water resources. For ⁵ *Thorpes Ltd v Grant Pastoral Co Pty Ltd* (1955) 92 CLR 317 at 331 per Fullagar J. ⁶ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [54] per French CJ, Gummow and Crennan JJ. ⁷ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [20] per French CJ, Gummow and Crennan JJ. ⁹ See Fisher, n 4, pp 11-13.

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example, the creation of water entitlements in a way and in a form which lead to their intrinsic capacity to be traded. In other words, the creation of what economists call property rights or rights in the nature of property rights. Whether they are rights of property for the purposes of the law is a controversial issue and one which attracted the attention of the High Court in this case in 2009.

THE FUNCTIONS OF INSTRUMENTAL RULES

The rules described in the previous paragraph perform different functions within the legal system. They are all rules in the sense that they set standards of decision-making or standards of behaviour or of conduct. Some are relatively general, while some are relatively specific. A number are specific to the point of enforceability in the traditional sense of this expression. But what is important is the relationship between each of them. The tendency of environmental legislation in Australia is to state the relationship between all of these different types of rules, to recognise that they perform different functions and, accordingly, to afford to them different normative values. Some are directly enforceable. Others are not. But each informs the others. For example, a decision whether to grant a water entitlement cannot ignore the stated objects of the legislation and these include aspects of ecologically sustainable development. One of the principles of ecologically sustainable development is the precautionary principle. Accordingly, a failure to consider it or apply it – depending upon the nature of the obligation – may endanger the validity of the decision and render it liable to a declaration of nullity. Similarly, the assessment of what penalty to impose for the commission of an offence, such as the pollution of water, may need to address the principles of ecologically sustainable development.

All of these rules or at least some of them will play a part in judicial reasoning in any

particular set of circumstances. How the legislation is structured, how the rules are structured and the language according to which they are structured are beginning to impact significantly upon the processes of reasoning adopted by the courts. Traditionally, courts in common law jurisdictions have adopted forms of inductive reasoning moving from the particular to the general. Courts in civil law jurisdictions have tended to apply general statements in codes in particular sets of circumstances through processes of deductive reasoning. The structure of environmental legislation as a variegated set of rules along the lines discussed indicates a form of deductive reasoning. But it is not as simple as that. Each of the several provisions in the legislation needs to be set off against the others in contrapuntal fashion. Accordingly, new processes of reasoning are beginning to emerge. The decision of the High Court in 2009 in the *ICM Agriculture* case is an example of this. Let us now turn to an examination of the issues in this case.

THE CONTEXT OF THE DECISION

The National Water Initiative (NWI) of 2004 – in the form of an intergovernmental agreement – is designed to achieve the sustainable use and development of all water resources in Australia by means of appropriate planning, regulatory and market arrangements.¹⁰ As the High Court itself noted, “one of the key objectives of the NWI was to return currently over-allocated or overused water systems to environmentally sustainable levels of extraction”.¹¹ This is directed particularly but not only at the water resources of the Murray Darling basin. The implementation of the *Water Act 2007* (Cth) will eventually enable the Commonwealth to become more directly involved in how the water resources of the Murray Darling basin are managed through the formulation and implementation of the Murray Darling basin plan and its associated water resources plans. However, it remains a matter essentially for the States to ensure compliance with the 2007 Act and its associated plans in accordance with the laws of each of the four basin States.

It is open, and indeed it always has been open, to the Commonwealth to influence the management of water resources in the States through the provision of funds in support of particular projects or particular policies. In the *ICM Agriculture* case the issues revolved around the funding

¹⁰ See generally Fisher DE, “Delivering the National Water Initiative” in Hussey K and Dovers S (eds), *Managing Water for Australia: The Social and Institutional Challenges* (CSIRO Publishing, 2007) pp 113-126.

¹¹ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [12] per French CJ, Gummow and Crennan JJ.

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arrangements between the Commonwealth and, in this case, New South Wales, the relevant statutory and regulatory arrangements in New South Wales and the relationships between them. There was accordingly no opportunity for the High Court to consider the provisions of the *Water Act 2007* (Cth). However, it was the involvement of the Commonwealth as the provider of funds that led to a detailed analysis of whether there had been an acquisition of property other than on just terms

contrary to s 51(xxxi) of the Commonwealth *Constitution*. It was this context – the acquisition of property on just terms – that provided the opportunity of the High Court to analyse in detail the legal characteristics of water resources, water and water entitlements.

How did these issues arise? A group of agriculturalists in New South Wales held statutory bore licences enabling the extraction and use of groundwater for irrigation under the *Water Act 1912* (NSW). The Commonwealth, acting through the National Water Commission in accordance with the *National Water Commission Act 2004* (Cth), entered into an agreement with New South Wales, according to which the Commonwealth provided funds for State-based schemes. In this case Commonwealth funds were made available to New South Wales to bring about the reduction of water available for irrigation in the area of these agricultural activities in New South Wales. Although the Commonwealth partially funded the scheme, operationally it needed to be implemented by varying the relevant water plans in New South Wales. Accordingly, the bore licences held by this group of agriculturalists were replaced with aquifer access licences under the *Water Management Act 2000* (NSW). The water plans determining the quantity of water available under the aquifer access licences were varied so that the amount of water able to be extracted from the relevant aquifer was substantially reduced. The irrigators received structural adjustment payments in consequence of these changed arrangements. The irrigators, however, claimed that their property had been acquired otherwise than on just terms contrary to s 51(xxxi) of the *Constitution*.

A number of these issues had earlier been litigated in the courts in New South Wales.¹² However, these proceedings were in the form of proceedings commenced in the original jurisdiction of the High Court. The High Court itself presented the issue in this way:

The plaintiffs [the irrigators] contend that the steps taken under the 2000 Act to reduce their access to groundwater amount to an acquisition of their property otherwise than on just terms, contrary to the constitutional guarantee found in 51(xxxi) of the *Constitution* and interpreted by decisions of this Court. Pursuant to r 27.08 of the *High Court Rules 2004* there is before the Full Court a special case posing five questions for determination.¹³

The six of the seven justices responded in this way: □ The replacement of the plaintiffs' bore licences did not constitute an acquisition of property within the

meaning of s 51(xxxi) of the *Constitution*.¹⁴

While the funding was provided partially in this case by the Commonwealth, the instruments achieving the reduction in the amount of water available were governed by the law of New South Wales. How did s 51(xxxi) of the *Constitution* become relevant?

THE RELEVANCE OF S 51(XXXI) OF THE CONSTITUTION

The judicial analysis focused in this respect upon ss 96 and 51(xxxvi) and their relationship with s 51(xxxi). Section 96 enables the Parliament to grant financial assistance to any State on such terms and conditions as the Parliament thinks fit.

Section 51(xxxvi) enables the Parliament to make laws with respect to matters in respect of which the *Constitution* makes provision. The issue of significance in this case was whether these legislative powers and in particular the power in s 96 were limited by the “constitutional guarantee” in s 51(xxxi). Three of the justices put it this way:

The question argued in this matter...is whether s 51(xxxi) intersects in some relevant manner with s 96. More particularly, in fixing “such terms and conditions as the Parliament thinks fit” for the grant of

¹² *Arnold v Minister Administering the Water Management Act 2000* (2008) 73 NSWLR 196; 163 LGERA 429. ¹³ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [8] per French CJ, Gummow and Crennan JJ.

¹⁴ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [89] per French CJ, Gummow and Crennan JJ and at [155] per Hayne, Kiefel and Bell JJ.

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financial assistance to a State under s 96, may the Parliament fix a term or condition that requires compulsory acquisition of property by the State otherwise than on just terms?¹⁵

What, then, were the terms and conditions attached to the grant of financial assistance in this case? This was the detailed answer:

By the Funding Agreement the State agreed to carry out “the Project”. So far as immediately relevant, it is enough to notice that “the Project” required the State (A) to convert all water licences in the Lower Lachlan Groundwater System to licences under the Water Management Act 2000; (B) to develop a method for reducing water entitlements to the Groundwater System that took into account a licence holder’s historical extraction of water from the relevant system; and (C) once that method had been agreed by the Prime Minister and Premier of New South Wales, to achieve a reduction of 56 percent in water entitlements in respect of the Lower Lachlan Groundwater System by 1 July 2016.¹⁶

Significantly, this imposes an obligation upon the State. Can the Commonwealth impose such an obligation upon the State or does such a requirement contravene the constitutional guarantee in s 51(xxxi) of the *Constitution*? The High Court responded by acknowledging in a traditional fashion without changing the established approach that there is a connection between ss 96 and 51(xxxi). Accordingly, without going into the subtleties of these constitutionally-based arguments, the conclusion reached by the High Court was clear. Namely:

The result is that the legislative power of the Commonwealth conferred by s 96 and s 51 (xxxvi) does not extend to the grant of financial assistance to a State on terms and conditions requiring the State to acquire property on other than just terms. The plaintiffs’ [irrigator’s] case, to that extent, should be accepted.¹⁷

Section 51(xxxi) of the *Constitution* was accordingly relevant. It applied to the way New South Wales implemented its obligations under the agreement with the Commonwealth. This led to the review by the High Court of the principles underlying water law in New South Wales and in Australia.

THE DOCTRINAL FOUNDATIONS OF WATER LAW

Property

The High Court proceeded immediately to the next issue.

But that is not the end of the matter. It is necessary now to consider whether the replacement of the plaintiffs' bore licences issued under the 1912 Act involved the acquisition of property other than on just terms within the meaning of section 51 (xxxi).¹⁸

As we have already noted, six of the seven justices decided that there had been no acquisition of property. The reasons for reaching this decision not only illuminate the fundamental doctrines of law as they relate to water resources but also highlight the tensions in how natural resources generally are managed; in this case, the tension in relation to water resources between, on the one hand, the public interest in ensuring that water resources are used and developed sustainably for the future and, on the other hand, the need to protect private interests in the use of water resources in the context of the rights of existing users – in this case, irrigators. In other words, how do you achieve a balance within the context of the law which seeks to protect two potentially conflicting aspects of the public interest: the interest of the community in the sustainable management of water resources; and the interests of individual members of the community in having their rights protected? Let us now move away from the subtleties of the *Constitution* to consider the doctrinal foundations of water law in Australia as they have emerged.

The acquisition of property on just terms is a complex concept involving three interrelated elements – property, acquisition, and just terms. Property is a difficult concept. Hohfeld, for one, has suggested that the confusion between non-legal and legal conceptions arises from “the ambiguity and

¹⁵ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [136] per Hayne, Kiefel and Bell JJ. ¹⁶ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [99] per Hayne, Kiefel and Bell JJ. ¹⁷ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [46] per French CJ, Gummow and Crennan JJ. ¹⁸ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [47] per French CJ, Gummow and Crennan JJ.

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looseness of our legal terminology”. Property is an example of this. Thus:

Both with lawyers and with laymen this term has no definite or stable connotation. Sometimes it is employed to indicate the physical object to which various legal rights [and] privileges relate; then again – with far greater discrimination and accuracy – the word is used to denote the legal interest (or aggregate of legal relations) appertaining

to such physical object. Frequently there is a rapid and fallacious shift from the one meaning to the other. At times, also, the term is used in such a “blended” sense as to convey no definite meaning whatever.¹⁹

Notwithstanding the width of the concept of property, whether it relates to a physical object, a legal interest or a set of legal relations, its distinctive characteristic is that it exists in relation to a clearly identifiable institution or person. Its original meaning is derived from the Latin adjective *proprius*. The subject matter may be as wide or as narrow as can be but, whatever the subject matter, it is linked legally to this clearly identifiable institution or person and no other institution or person. The institution or person in question may, of course, change in consequence of a transfer or some other form of dealing.

So what is the subject matter of dispute – the property – in this case? There are at least three possibilities:

- . water in its natural location – in an underground aquifer as in this case or flowing through a watercourse;
- . water confined – probably artificially confined – within identifiable boundaries such as an enclosed lake, pond or container; and
- . an interest in the water recognised or granted by a rule of law either in accordance with the common law or in accordance with legislation. □To extrapolate these to the circumstances of this case, the three are:
 - the water located naturally in the aquifer in question;
 - any water extracted from the aquifer and located either on the surface of the land, in an artificial □channel, in a pipe or in some other conduit; and
 - the licence to extract and use the water. □Much of the judicial analysis in this case began with the status of water under the common law and then its status under the inchoate public domain system created by the legislation in Australia. This proved to be particularly significant when the High Court then went on to discuss what is acquisition. But let us leave that issue aside for the moment. □**Water resources as common property** □The development of the common law was by no means clear and uncontroversial. However, “by the middle of the 19th century, the English common law had settled many of the issues about rights to the use of water that had emerged during the industrial revolution”.²⁰ The mature riparian doctrine applied to water flowing through a watercourse. It was essentially a right of access to the water. The High Court noted that “the underlying proposition was that water, like light and air, is common property (for the common benefit of man)”.²¹ In other words, it is a legal relationship between the community and its water resources. There is no identified or indeed identifiable institution or person. The same – at least by implication – is true of the common law in relation to groundwater. The owner of the surface of the land has no more than a right of access to any water stored or flowing underground. The importance of this emerges from this comment: □The settlement in the 19th century of these common law rules about riparian rights and use of groundwater must not be permitted to obscure

some important underlying ideas that find reflection in the rules that were established.²² □¹⁹ Hohfield WN, “Fundamental Legal Conceptions” (1913) 23 *Yale Law Journal* 16 at 21-22. □²⁰ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [109] per Hayne, Kiefel and Bell JJ. ²¹ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [109] per Hayne, Kiefel and Bell JJ. ²² *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [111] per Hayne, Kiefel and Bell JJ.

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This takes us to the fundamental principles underlying the doctrines of the common law. What were these?

Two appear to be particularly significant. Here is one:

First and foremost there was then, and still must be, a clear recognition of the difficulty of applying notions of ownership or property to water in the ground or in a flowing stream. What exactly would be the subject of property rights? While still allowed to flow, no part of the water that flows in the stream can be isolated and tagged as the water “owned” by some person. And water in the ground may move more slowly but there is no less difficulty in identifying what would be the subject of the proprietary rights.²³

Then there is this second issue:

Next, even if these difficulties of identifying the object in respect of which proprietary rights were to exist could be overcome, should any private proprietary right be recognised?²⁴

The analysis went on to emphasise that water is provided naturally for the common benefit of humankind. Accordingly, while the common law recognised individual or private rights of access in relation to water, they were based upon water as common property in the sense described. These rights of access existed in the absence of any institutionalised system for their recognition or creation. They simply existed by virtue of these rules of the common law.

A public domain system is intrinsically different. In this case rights of access to water are granted in accordance with an institutionalised set of arrangements. We have suggested that the conferment upon the State of a right to the use and control of water resources in Australia has created something like a public domain regime. Has this in any way affected the fundamental principles upon which the system – either common law or public domain – is based? The answer was this:

Finally, it is of the very first importance to recognise that the common law principles established in the 19th century were directed to the adjustment of rights between landowners. The issue in this case arises, not because there has been some adjustment of those rights, but because the polity has sought to regulate generally the access allowed to a common resource.²⁵

In other words, the common law regulated access to a common resource. Now the polity regulates access to a common resource. Three of the justices specifically examined the text of the legislation in New South Wales from its creation in 1912 until its reformulation in 1986 and then in 2000. Thus:

It will be noted the language...is the same as the language used in respect of surface water in the late 19th century as described earlier; it is language consonant with a recognition that water is a common resource.²⁶

So under the common law, water fundamentally is a common resource; and under the legislation in Australia, water is fundamentally a common resource. While this may not be the language of the legislation, it is the effect of the legislation. In other words, concepts of property are not helpful – certainly not helpful in relation to the fundamental principles upon which the water law is based. Perhaps concepts of property are more helpful once rights of access have been exercised and the water is lawfully and clearly within the control of an identifiable institution or person.

Water entitlements as property

The property, which the irrigators claimed New South Wales had acquired with funds provided by the Commonwealth, comprised the bore licences granted under the 1912 Act and substituted by the aquifer access licences granted under the 2000 Act. To express the issue more generally – are statutory water entitlements property? This question had never been answered judicially, it would seem, but over recent years there have been judicial analyses of these issues in relation to other natural

²³ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [112] per Hayne, Kiefel and Bell JJ. ²⁴ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [113] per Hayne, Kiefel and Bell JJ. ²⁵ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [115] per Hayne, Kiefel and Bell JJ. ²⁶ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [73] per French CJ, Gummow and Crennan JJ.

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resources, eg minerals and fisheries.²⁷ However, the characterisation of the nature of interests in one resource cannot necessarily be extrapolated to another resource. What is important is the nature of water resources and of water; in particular, its fugacious nature and consequently its unpredictability and uncertainty – issues directly addressed by the High Court in this case.

The unpredictability and uncertainty of water resources are confounded by the unpredictability and uncertainty of the statutory arrangements for the management of water resources in the context of this emerging public domain regime. The criteria according to which rights are described as rights of property are reasonably well established. These include:

- the capacity of the right to be legally protected;
- the definition of the substance of the right;

- the identification of the holder of the right;
- the exclusive use and control of the right by the holder;
- the capacity of the right to be transferred; and
- the permanence, stability and security of the right. □ It is suggested that in practice it is the last that is probably the most important and indeed controversial. Apart from suspension and cancellation, water entitlements generally are inherently susceptible to variation in accordance with the legislation. There is no doubt that statutory water entitlements are valuable and tradeable. Indeed they are traded. This occurs notwithstanding their inherent susceptibility to variation and change. Three justices concluded that it was unnecessary in the circumstances “to determine whether the bore licences were of such an insubstantial character as to be no more than interests defeasible by operation of the legislation which called them into existence”.²⁸ However, three other justices readily accepted “that the bore licences that were cancelled were a species of property”.²⁹ On the other hand, Heydon J positively rejected “the contention that the bore licences were not property on the ground that they conferred only rights which were inherently susceptible to modification or adjustment”.³⁰ Accordingly, overall, the legal status of statutory water entitlements remains somewhat equivocal. □ **Acquisition** □ The judicial analysis then proceeded to respond to the question of whether in the circumstances there had been an acquisition – on the assumption that the water entitlements were either property or a species of property. The approach to this question was clear. Having noted that the licences were “a species of property”, the argument then proceeded along these lines: □ That the entitlements attaching to the licences could be traded or used as security amply demonstrates that to be so. [That is, that they are a species of property.] It must also be accepted, as the fundamental premise for consideration of whether there has been an acquisition of property, that, until the cancellation of their bore licences, the plaintiffs had “entitlements” to a certain volume of water and that after cancellation their “entitlements” were less. Those “entitlements” were themselves fragile. They could be reduced at any time, and in the past had been. But there can be no *acquisition* of property unless some identifiable and measurable advantage is derived by another from, or in consequence of, the replacement of the plaintiffs’ licences or reduction of entitlements. That is, another must acquire “an interest in property, however slight or insubstantial it may be.”³¹ □ The analysis has subtly switched from an analysis of the status of licences to an analysis of the status of the entitlements to certain volumes of water associated with these licences. It is a question neither of ownership of the water nor of ownership of the licence giving access to the water. The question that has emerged is whether the entitlement to a specific volume or quantity of water to which there is access constituted an interest that could be acquired. Or, in the more traditional language used in this □²⁷ See eg Fisher DE, “Rights of Property in Water – Confusion or Clarity” (2004) 21 EPLJ 200 at 211-214. □²⁸ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [80] per French CJ, Gummow, Crennan JJ. ²⁹ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [147] per Hayne, Kiefel and Bell JJ. □³⁰ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [215] per Heydon J. □³¹ *ICM Agriculture Pty Ltd v*

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context, whether the State had received “some identifiable and measureable advantage” from the changes that it had made to the interests – whatever their nature might be – of the irrigators. Three of the justices of the High Court responded in two ways. First:

The four considerations set out earlier in these reasons (the replaceable and fugitive nature of groundwater; that the licences in issue are a creature of statute and inherently fragile; that groundwater has not hitherto been thought to be a subject of property; and that the rights vested in the State are statutory rights for the purpose of controlling access to a public resource) all point towards the conclusion that the State gained no identifiable or measurable advantage from the steps that have been taken with respect to the plaintiffs’ water licences and entitlements.³²

From the point of view of both of the irrigators and of the State, nothing had changed. Secondly:

Since at least 1966 no landowner in New South Wales has had any right to take groundwater except pursuant to licence. The rights the plaintiffs had under their bore licences (in particular, their right to extract certain volumes of water) did not in any sense “return” to the State upon cancellation of the licences. The State gained no larger or different right itself to extract or permit others to extract water from that system. It gained no larger or different right at all.³³

Three other justices commented consistently but perhaps even more powerfully in these words:

However, in the present case, and contrary to the plaintiffs’ submissions, the groundwater in the LLGS [Lower Lachlan Groundwater System] was not the subject of private rights enjoyed by them. Rather, and as these reasons have sought to demonstrate, it was a natural resource, and the State always had the power to limit the volume of water to be taken from that resource. The State exercised that power from time to time by legislation imposing a prohibition upon access to and use of that natural resource, which might be lifted or qualified by compliance with a licensing system. The changes of which the plaintiffs complain implemented the policy of the State respecting the use of a limited natural resource, but that did not constitute an “acquisition” by the State in the sense of s 51(xxxi). Nor can it be shown that there has been an acquisition in the necessary sense by other licensees or prospective licensees. They have at best the prospect of increasing or obtaining allocations under the new system applying to the LLGS.³⁴

Quite clearly, therefore, there was no acquisition of property. Even if the licences were a species of property, the State had acquired nothing. The State was and always had been – certainly under the arrangements by which the State exercises its exclusive right to the use and control of water resources – able to control the use of water

resources as the common resources or common property of the community. This had probably been the position under the common law and certainly was the position under the legislation. The legislation simply institutionalised and controlled the procedures according to which the State exercised this right, which has been and remains the fundamental principle upon which the whole system is based. Accordingly, the State, acting in accordance with the legislation, can and in this case had interfered with the rights of the irrigators by reducing the quantity of water available. This was the policy of the Commonwealth and the policy of the State. The implementation of the policy was funded by the Commonwealth and implemented by the State. The constitutional guarantee for an acquisition of property to be on just terms had not been infringed. This was fundamentally and simply because there was no acquisition within the meaning of this provision.

The reasoning process

What is interesting is that this conclusion was reached by a process of deductive reasoning along these lines:

- the fundamental principle of water resources as common resources or common property;
- the function of the State to be the guardian or the steward of these water resources;
- the institutionalisation of how this function is performed by the enactment of the statutory right of the State to the exclusive use and control of water resources;
- the original grant of the bore licences under the 1912 Act; □³² *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [149] per Hayne, Kiefel and Bell JJ. □³³ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [150] per Hayne, Kiefel and Bell JJ. □³⁴ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [84] per French CJ, Gummow and Crennan JJ. □ (2010) 27 EPLJ 85 93

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- the amendment of the water plans to require the reduction of water available for irrigation in the area;
- the grant of aquifer access licences accordingly in substitution for the bore licences; and
- the reduced quantity of water available to the irrigators in question in the locations specified. □ Let us bear in mind that the irrigators in this case received structural adjustment payments but no compensation for interference with their rights. Whether compensation should be payable is another matter. Since there was no acquisition of property, the issue did not arise. □ **THE CRITICAL FUNCTION OF PROPERTY Doctrinal foundations** □ The analysis undertaken by Heydon J was remarkably different. His Honour's analysis focused upon the critical function played by property in the social and economic affairs of the community and the importance of compensating for any expropriation or extinguishment of valuable rights relating to property. An

extensive range of reasons supported this approach.³⁵ These included:

the need for unambiguous statutory language to enable expropriation without fair compensation;

payment of compensation is a matter of justice;

payment of compensation is an element of the rule of law;

compensation for expropriation is economically efficient and desirable;

compensation for expropriation has been a fundamental principle of the common law and of the civil law – eg by reference to Magna Carta, the writings of Blackstone, the writings of Grotius, the French Declaration of the Rights of Man and of the Citizen of 1789, the French Constitution of 1791, the French Civil Code, and elements of many constitutions;

the protection of property rights essential to the liberalism of Locke, Bentham and Maine;

the importance of private property rights in the debates on the formulation of the Commonwealth *□ Constitution*; and

the way in which the High Court has interpreted and applied s 51(xxxi) of the *Constitution* over *□* many years. *□* This led to the endorsement by Heydon J of the proposition that “one should lean towards a wider rather than narrower concept of property, and look beyond legal forms to the substance of the matter”.³⁶ *□* **Property** *□* Against this background, Heydon J proceeded to answer the question whether the bore licences granted under the *Water Act 1912* (NSW) were property. The rights associated with the licences were not common law rights but statutory rights. They were “a form of property”. The reasons were clear: *□* A bore licence was definable. It was identifiable by third parties. It had a considerable degree of permanence and stability. Once granted, it could not be terminated, except for cause, before its lapse or expiry. The Ministerial Corporation was under a duty to renew it on payment of a prescribed fee. And it was capable of assumption by third parties either by transfer with the land to which it was connected or by transfer separately from the land.³⁷ *□* In this respect there was much common ground between the views of Heydon J and those of the other six justices. *□* What perhaps emerges as a critical distinguishing factor is the degree of security or stability afforded to these licences. Clearly the legislation enables their modification and adjustment. What appears to be important, however, is the degree of security or stability associated with the licences. *□*³⁵ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [175]-[189].*□*³⁶ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [189] quoting Gummow J at *Smith Kline & French Laboratories (Aust) Ltd v Secretary, Dept of Community Services and Health* (1990) 22 FCR 73 at 121. ³⁷ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [197] per Heydon J.

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Heydon J's response to this was clear. First:

Some key characteristics of the bore licences must be borne in mind. Not only were the bore licences renewable, non-cancellable and transferable. Not only could the water allocations under the bore licences not be reduced at will. But they had other relevant characteristics as well.³⁸

These characteristics reflect what may be described as commercial as well as legal perspectives. Thus:

Bore licensees were persons who in some cases had paid consideration for a transfer; in all cases had paid fees; in all cases were entitled to rely on the licences as increasing the value of their land; in many cases were obliged, in order to maintain the licences, to sink bores; in many cases relied on the licences as having sufficient practical content to justify investment by sinking bores, introducing and maintaining equipment capable of extracting water from those bores, developing surface irrigation channels, and buying overhead sprinkler systems (in the case of the first two plaintiffs, \$7.5 million worth); in many cases had used the licences as security for loans; and in that respect had dealt with lenders who were entitled to have relied in good faith on the continuation of the licences.³⁹

While the irrigators did not have any right to “an immutable quantity of water”,⁴⁰ the legislation did not confer “an uncontrolled discretion to reduced allocations at will”.⁴¹ There accordingly emerged an array of private interest considerations as well as public interest considerations in addressing the degree of security or stability attached to these licences. The final conclusion reached by his Honour was thus:

The powers [of intervention in the public interest] did not render the bore licenses so “slight” or “insubstantial”, or so “inherently susceptible to modification or extinguishment”, that they were incapable of being property. The breadth of the powers might affect the value of the property, but they were not so broad as to prevent it being categorised as property.⁴²

The licences were for this purpose categorised as property. But had it been acquired by New South Wales?

Acquisition

The concept of acquisition has been analysed on many occasions by the High Court and much appears to have depended upon how the relevant legislation is characterised. Whatever the niceties and subtleties of these arguments, Heydon J appears to have been concerned to ensure that the constitutional guarantee in s 51(xxxi) of the *Constitution* would not “sink to the depths of a purely formal provision”.⁴³ Accordingly, his Honour went directly to what was described as “the heart of the scheme”.⁴⁴ Namely:

The expropriation of bore licences was not a mere “incident” or “consequence” or

“subservient” feature of the legislative scheme. It was at the heart of the scheme. The scheme could not have operated without a reduction in the entitlements of the bore licensees, and it depended on abolishing those entitlements and replacing them with different and lesser ones.⁴⁵

This appears to strike at the practical outcomes of what had happened rather than the more formal legal outcomes of what had happened. In other words, a reduction in the actual amount of water available. This appears to focus upon the water as the subject matter of the licence rather than upon the legal relationship between the holder of the licence and the water as the subject matter of the licence. In this sense, what had happened could be seen to be a direct rather than an indirect reduction in the amount of water available. This, of course, was very much the contention of the irrigators.

³⁸ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [207] per Heydon J. ³⁹ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [207] per Heydon J. ⁴⁰ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [208] per Heydon J. ⁴¹ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [208] per Heydon J. ⁴² *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [208] per Heydon J. ⁴³ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [218] per Heydon J. ⁴⁴ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [223] per Heydon J. ⁴⁵ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [223] per Heydon J.

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But the question remained – had New South Wales acquired something that it did not have prior to the implementation of these arrangements? Whether or not there was an acquisition thus depended “on the identification of some advantage accruing to New South Wales”.⁴⁶ It had been argued that “the benefit gained by New South Wales is not water but the serving of certain public interest purposes”.⁴⁷ There were three reasons to reject this approach. The first was that New South Wales had regained “complete control over water resources, namely the difference between the actual allocations licensees’ entitlements and the allocations under the aquifer access licenses”.⁴⁸ Secondly:

The existence of the bore licensees’ rights entailed a liability in New South Wales not to interfere with them unlawfully. The extinguishment of the bore licensees’ rights relieved New South Wales of those liabilities. By the extinguishment of that liability, New South Wales obtained “relief from suit by the holders of the bore licences, and the obtaining of that relief was an acquisition of property by New South Wales.”⁴⁹

Then there was the third reason. This was what was described as the contingent increase in the capacity of New South Wales to take or grant rights to water. Since there was no way of knowing whether the quantity of water available under the aquifer access licences had been over-allocated or under-allocated, this created the possibility that New South Wales would have “gained something” that it did not have before the changes to the allocations – namely “a capacity to take more water itself or to issue more rights to others without damaging the goal of sustainability”.⁵⁰ If that were to happen, it would be a benefit or advantage that New South Wales had acquired.

And then Heydon J made this interesting observation:

The possibility that that capacity will be gained is a presently existing, direct and identifiable benefit or advantage accruing to New South Wales as a result of the extinguishment of the bore licensees' rights, even though it may not be proprietary in a conventional sense: it is thus acquisition of property by New South Wales.⁵¹

While this benefit or advantage was an acquisition of property, it was not perceived as a proprietary interest "in a conventional sense". It thus remains a paradox what is property in the conventional sense. Property is perhaps no more and no less than the existence or recognition of a power to control whatever is its subject matter. It may be a power to control vested in a public institution or in a private institution or person. In that sense it does not matter. The purposes for which the power may be exercised derive from other elements of the legal system. Property in this sense is an instrument recognised by the law, which identifies the holder of the right and the subject matter of the right. The legal relationship between these two and between other institutions or persons affected is governed by the wider legal arrangements – both common law and statutory – that govern how the right to control is exercised.

CONCLUSION

The several analyses undertaken by the High Court in the *ICM Agriculture* case address indirectly, it has been suggested, the tensions involved in managing natural resources, including water resources: the tensions between the public interest in ensuring the sustainable use and development of water resources for the future, on the one hand; and the need to protect existing private interests in the use of water, on the other hand. In other words, how to balance the public interest and the range of private interests involved. The issue arose in the particularly difficult and controversial context of the constitutional guarantee in s 51(xxxi) of the *Constitution*. This involves three difficult concepts: property, acquisition, and just terms. Although these concepts are elements of the legal system, they are also reflective of a wide range of potentially conflicting social, economic, cultural and political

⁴⁶ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [228] per Heydon J. ⁴⁷ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [230] per Heydon J. ⁴⁸ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [232] per Heydon J. ⁴⁹ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [234] per Heydon J. ⁵⁰ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [235] per Heydon J. ⁵¹ *ICM Agriculture Pty Ltd v Commonwealth* (2009) 84 ALJR 87 at [235] per Heydon J.

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values. The terminology of the constitutional guarantee does not allow the High Court to sidestep these issues. Words such as "acquisition" and "property" appear in judicial determinations in accordance with the common law, in legislation, and, of course, in constitutions. Their meaning in any particular set of circumstances may well reflect the context in which they appear – one or more of these three possibilities. For example, property in the context of the constitutional guarantee may not necessarily

have the same meaning as in legislation about the environment, natural resources or commercial assets. In relation to water, for example, we have already identified water as a natural resource in situ, water as the subject matter of a right of access – common law or statutory – or water as a commodity confined in one way or another and able to be identified as such.

These issues have been addressed indirectly in relation to water in this case. What is particularly interesting about the judicial reasoning in this case is the point of commencement of the rationalisation process. Six of the justices based their reasoning upon the fundamental principle of water resources as common resources or common property. Heydon J based his reasoning upon the fundamental importance of property as a social and economic institution as well as a legal institution and hence the need for its protection from interference. It is no surprise that the application of these principles led to different results. In other words, where did the balance lie – with the public interest in ensuring the sustainable management of water resources or with the protection of private rights of property? Whether or not it should be a function of a court to resolve these issues, the way in which the constitutional guarantee has been formulated effectively imposes upon the High Court this responsibility. While the point of commencement of any analysis is the text of the constitutional guarantee, the way in which it is interpreted and applied in a particular set of circumstances reveals – as in this case – the fundamental principles underlying the legal arrangements for the management of water resources in Australia. The High Court has told us that water resources – either from the point of view of the common law or of the public domain regime created by legislation – are quintessentially common resources or common property. Any private interests in or in relation to water derive from that source and from no other source.

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Changing character: The Ramsar Convention on Wetlands and climate change in the Murray-Darling Basin, Australia

Jamie Pittock, Max Finlayson, Alex Gardner and Clare McKay*

The Ramsar Convention on Wetlands was established to conserve the world's diminishing wetlands on the assumption of a stationary hydrology, which is now threatened by climate change. This article examines how the Australian Commonwealth government is using the provisions within the Convention to deal with the degradation of six Ramsar-listed wetlands in the Murray-Darling Basin in Australia. The ecological character of the wetlands is changing, primarily due to the manner in which the rivers have been managed and excessive extraction of water for human consumption. Climate change is expected to exacerbate this situation. The authors outline breaches in the government's obligations under the Convention. The Environment Protection and Biodiversity Conservation Act 1999 (Cth) and the Water Act 2007 (Cth), which are based in part on supporting the implementation of the Convention, are undermined by a lack of adherence to the Convention. Gaps and inconsistencies are also identified in the Convention for managing the impacts

of climate change on wetlands.

INTRODUCTION

Globally, the demand for water is growing dramatically with increased population, wealth and consumption of water-intensive products.¹ As a consequence of the expansion of agriculture and the regulation of rivers,² freshwater and coastal wetlands are particularly threatened and degraded, and are the least well conserved when compared to other ecosystems.³ Climate change is exacerbating the impacts of existing threats to freshwater ecosystems; directly with changes in water distribution and indirectly as measures that consume more water are adopted to respond to climate change.⁴

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¹ Comprehensive Assessment of Water Management in Agriculture (CAOWMiA), *Water for Food, Water for Life. A Comprehensive Assessment of Water Management in Agriculture* (London, Earthscan; Colombo, International Water Management Institute, 2007).

² Regulation of rivers in this context refers to the use of infrastructure to control water flows. ³ Millennium Ecosystem Assessment (MEA), "Ecosystems and Human Well-being: Synthesis" in *The Millennium Ecosystem*

Assessment (Island Press, Washington DC, 2005).

⁴ Pittock J, Hansen LJ and Abell R, "Running Dry: Freshwater Biodiversity, Protected Areas and Climate Change" (2008) 9(3&4) *Biodiversity* 30; Bates BC, Kundzewicz ZW, Wu S and Palutikof JP (eds), *Climate Change and Water: Technical Paper of the Intergovernmental Panel on Climate Change* (IPCC Secretariat, Geneva, 2008), <http://www.ipcc.ch/pdf/technical-papers/climate-change-water-en.pdf> viewed 21 November 2008; Finlayson CM, Gitay H, Bellio MG, van Dam RA and Taylor I, "Climate Variability and Change and Other Pressures on Wetlands and Waterbirds: Impacts and Adaptation" in Boere GC, Galbraith CA and Stroud D (eds), *Waterbirds Around the World* (The Stationery Office, United Kingdom, 2006) pp 88-97.

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In response to the growing human pressures on ecosystems, the world's governments have committed to "significantly reduce the rate of loss of biological diversity" by 2010 and, through the Convention on Biological Diversity and the Ramsar Convention on Wetlands (Ramsar/Convention), to manage all wetlands sustainably. These commitments include the establishment of effective and representative

freshwater protected areas, such as Ramsar sites.⁶ The available evidence suggests that this goal will not be met. This is demonstrated, for example, by data showing declining waterbird populations in the East Asian-Australasian Flyway, which includes Australia.⁷

The world's governments have also agreed to prevent "dangerous" climate change.⁸ Consequently, substantial conflicts and challenges arise for societies and governments that seek to meet societal demands for water, conserve freshwater ecosystems and manage climate change. The focus of these competing challenges is starting to revolve around a new understanding of resource management. Most water management and conservation institutions were established on the assumption that hydrology and biodiversity were largely stationary, an assumption that is now unrealistic given the pervasive impacts of human water consumption and climate change. "Stationarity is dead because substantial anthropogenic change of the Earth's climate is altering the means and extremes of precipitation, evapotranspiration, and rates of discharge of rivers".⁹ The displacement of the assumption of stationarity reveals emerging institutional gaps in Australia and in the provisions of the Ramsar Convention for managing Ramsar sites that are impacted by climate change.

In this article, the authors examine these conflicts and challenges in relation to significant wetlands included by Australia since 1974 on the List of Wetlands of International Importance as Ramsar sites. When sites are listed, governments have an obligation to "promote the conservation"¹⁰ of these sites by maintaining their "ecological character".¹¹ This article will begin by outlining the legal framework for managing Ramsar wetlands in Australia. Then the authors draw on empirical data available for Ramsar sites in the Murray-Darling Basin (MDB) to examine how well:

i) the Commonwealth government has responded to the goal of maintaining the ecological character of wetlands;

⁵ United Nations, *Report of the World Summit on Sustainable Development. Johannesburg, South Africa, 26 August-4 September 2002* (2002); Walpole M, Almond REA, Besancon C, Butchart SHM, Campbell-Lendrum D, Carr GM, Collen B, Collette L, Davidson NC, Dulloo E, Fazel AM, Galloway JN, Gill M, Goverse T, Hockings M, Leaman DJ, Morgan DHW, Revenga C, Rickwood CJ, Schutyser F, Simons S, Stattersfield AJ, Tyrrell TD, Vie JC and Zimsky M, "Tracking Progress Toward the 2010 Biodiversity Target and Beyond" (2009) 325 *Science* 1503.

⁶ Ramsar Convention on Wetlands (Ramsar), *Resolution X.1. The Ramsar Strategic Plan 2009-2015* (Changwon, 2008), http://www.ramsar.org/doc/res/key_res_x_01_e.doc viewed 20 October 2010 http://www.ramsar.org/res/key_res_x_index_e.htm viewed 12 December 2008; Convention on Biological Diversity, *Decision VII/4 Biological Diversity of Inland Waters* (Montreal, 2004), <http://www.cbd.int/decisions/cop-07.shtml?m=COP-07&id=7741&lg=0> viewed 22 July 2010; Convention on Biological Diversity, *Decision VII/28 Protected Areas (Arts 8(a) to (e))* (Montreal, 2004), <http://www.cbd.int/decisions/cop-07.shtml?m=COP-07&id=7765&lg=0> viewed 22 July 2010.

⁷ Straw P, *Status and Conservation of Shorebirds in the East Asian-Australasian Flyway*, Proceedings of the Australasian Shorebirds Conference, (Canberra, 13-15 December 2003), <http://www.wetlands.org/LinkClick.aspx?fileticket=tBISw4nYvvM%3D&tabid=56> viewed 17 March 2010; Finlayson et al, n 4.

⁸ United Nations, *United Nations Framework Convention on Climate Change* (1992), <http://www.unfccc.int/resource/docs/convkp/conveng.pdf> viewed 12 December 2008.

⁹ Milly PCD, Betancourt J, Falkenmark M, Hirsch RM, Kundzewicz ZW, Lettenmaier DP and Stouffer RJ, "Stationarity is Dead: Whither Water Management?" (2008) 319 *Science* 573.

¹⁰ *Convention on Wetlands of International Importance Especially as Waterfowl Habitat*, opened for signature on 2 February 1971, UNTS 14583, Art 3.1 (entered into force 21 December 1975) (Wetlands Convention).

¹¹ Ramsar, *Resolution IX.1. Annex A: A Conceptual Framework for the Wise use of Wetlands and the Maintenance of their Ecological Character* (Kampala, 2005), http://www.ramsar.org/cda/ramsar/display/main/main.jsp?zn=ramsar&cp=1-31-107^23536_4000_0 viewed 9 December 2009 (Resolution IX.1. Annex A).

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ii) the processes of the Ramsar Convention can cope with the impacts of water consumption and climate change; and

iii) potential response options.

This article's focus is on the southern part of the Murray-Darling Basin as a region that appears to be particularly impacted by climate change-induced drying due to reduced precipitation and greater evapotranspiration.¹² The implications for the Commonwealth government and the Ramsar Convention from the view of Ramsar sites in the Basin is then assessed, leading to conclusions on desirable changes at national and Convention levels to better conserve wetlands under climate change.

THE LEGAL FRAMEWORK FOR MANAGING RAMSAR WETLANDS IN AUSTRALIA Ramsar Convention on Wetlands

Australia was a foundation member of the 1971 Ramsar Convention on Wetlands and, consequently, is required to fulfil three major obligations: designate and conserve Ramsar sites (Art 2), make wise use of all wetlands (Art 3), and support international cooperation for wetlands conservation (Art 5). These requirements have been further detailed in decisions of the Conference of Parties (CoP), for example, in the current *Strategic Plan* for:

appropriate management and wise use of those internationally important wetlands that are not yet formally designated as Ramsar sites but have been identified as qualifying through domestic application of the *Strategic Framework* [for identifying potential

Ramsar sites] or an equivalent process.¹³

The requirement in Art 3.1 of the Convention to “promote the conservation” of Ramsar sites has been equated to the “maintenance of the ecological character” of these sites.¹⁴ “Ecological character” is defined as: “the combination of the ecosystem components, processes and benefits/services that characterise the wetland at a given point in time”¹⁵ and, in this context, ecosystem benefits are defined as “the benefits that people receive from ecosystems”.¹⁶

Wise use of wetlands is the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development.¹⁷

Therefore, contracting parties to the Convention are obliged under international law to make wise use and maintain the ecological character of all wetlands. How this obligation may be fulfilled in Australian law is discussed below.

In listing a wetland as a Ramsar site, contracting parties are required to submit a Ramsar Information Sheet (RIS), summarising the bio-physical attributes and management arrangements for the site, and these must be updated every six years.¹⁸ An ecological character description is

¹² Cai W and Cowan T, “Evidence of Impacts From Rising Temperature on Inflows to the Murray-Darling Basin” (2008) *Geophysical Research Letters* 35; Timbal B and Jones DA, “Future Projection on Winter Rainfall in Southeast Australia Using a Statistical Downscaling Technique” (2008) 86 *Climatic Change* 165; Timbal B “The Continuing Decline in South-East Australian Rainfall – Update to May 2009” (2009) 2 CAWCR Research Letters 4.

¹³ Ramsar, n 6, Resolution X.1, Goal 2, http://www.ramsar.org/pdf/key_strat_plan_2009_e.pdf viewed 12 March 2010.

¹⁴ Ramsar, *Resolution X.15, Describing the Ecological Character of Wetlands, and Data Needs and Formats for Core Inventory: Harmonized Scientific and Technical Guidance* (Korea, 2008) http://www.ramsar.org/cda/ramsar/display/main/main.jsp?zn=ramsar&cp=1-31-107^21247_4000_0 viewed 17 December 2009 (Resolution X.15).

¹⁵ Ramsar, n 14, Resolution X.15. ¹⁶ Ramsar, n 11, Resolution IX.1. Annex A. ¹⁷ Ramsar, n 11, Resolution IX.1. Annex A.

¹⁸ Ramsar, *Strategic Framework and Guidelines for the Future Development of the List of Wetlands of International Importance of the Convention on Wetlands* (Ramsar, Iran, 1971) (Changwon, 2008), http://www.ramsar.org/cda/en/ramsar-documents-guidelines-strategic-framework-and/main/ramsar/1-31-105%5E20823_4000_0 viewed 24 June 2010 (Strategic Framework and Guidelines).

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recommended,¹⁹ as well as a management plan.²⁰ These processes are intended to facilitate maintenance of the ecological character of the wetland and establish a baseline against which any changes may be measured. Where adverse changes in ecological character have occurred, are occurring, or are likely to occur, the Montreux Record provides a voluntary mechanism by which contracting parties may designate Ramsar wetlands to highlight and prioritise conservation responses.²¹

The Convention has adopted processes for managing “positive” and “negative” changes in the ecological character of listed sites, which are shown in Fig 1. Under Art 3.2, a party is to notify the secretariat of the Convention if the ecological character of a site has changed, is changing, or is likely to change as the result of technological developments, pollution or other human interference,²² characterised as “negative human-induced change”.²³ In essence, Art 3.2 requires that where a site did once meet one or more of the nine criteria for designation, while ever it is physically possible, the ecological character should be restored (Fig 1, response option A). Article 2.5 of the Convention provides for site deletions or restrictions, stating that, “any Contracting Party shall have the right ... because of its urgent national interests, to delete or restrict the boundaries of wetlands already included by it in the List”.

This right is qualified by the requirement in Art 4.2 to compensate for any loss of wetland resources by the protection of additional areas of the original habitat²⁴ (Fig 1, response option D). Where “urgent national interests” are not an issue, the 2005 9th Conference of the Parties adopted Resolution IX.6, defining processes for addressing Ramsar sites or parts of sites that no longer meet the criteria for designation²⁵ (Fig 1, response option C). If loss of part or all of a Ramsar site is unavoidable, “consideration of the deletion or restriction of the boundaries of a listed Ramsar site” can only proceed with approval of the Ramsar Conference of Parties and compensation by designation of another wetland area.²⁶

¹⁹ Ramsar, n 14, Resolution X.15.

²⁰ Ramsar, *New Guidelines for Management Planning for Ramsar Sites and other Wetlands* (Valencia, 2002), http://www.ramsar.org/cda/en/ramsar-documents-guidelines-new-guidelines-for/main/ramsar/1-31-105%5E20857_4000_0 viewed 25 June 2008.

²¹ Ramsar, *Guidelines for Operation of the Montreux Record* (Brisbane, 1996), http://www.ramsar.org/cda/en/ramsar-documents-montreux-guidelines-for-operation-20983/main/ramsar/1-31-118%5E20983_4000_0 viewed 25 June 2010.

²² Wetlands Convention, n 10; Department of the Environment, Water, Heritage and the Arts (DEWHA), *National Guidelines for Notifying Change in Ecological Character of Australian Ramsar Sites (Art 3.2)*, “Module 3 of the National Guidelines for Ramsar Wetlands- Implementing the Ramsar Convention in Australia” (2009), <http://www.environment.gov.au/water/publications/environmental/wetlands/pubs/module-3-change.pdf> viewed 4 January 2010.

²³ Ramsar, *Resolution X.16: A Framework for Processes of Detecting, Reporting and Responding to Change in Wetland Ecological Character* (Changwon, 2008), http://www.ramsar.org/pdf/res/key_res_x_16_e.pdf viewed 5 January 2009 (Resolution X.16).

²⁴ Ramsar, *Resolution IX.6: Guidance for Addressing Ramsar Sites or Parts of Sites which no Longer meet the Criteria for Designation* (Kampala, 2005), http://www.ramsar.org/cda/ramsar/display/main/main.jsp?zn=ramsar&cp=1-31-107^23500_4000_0 viewed 17

December 2009 (Resolution IX.6).

²⁵ Ramsar, n 24, Resolution IX.6. ²⁶ Ramsar, n 24, Resolution IX.6.

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FIGURE 1 Response options following detection of change in ecological character of a Ramsar site

Simplified from Convention decisions²⁷ and elaborated to show missing guidance for option (B), proposed here, for sites where restoration or prevention of change in ecological character is not possible but the wetland still meets one or more criteria for Ramsar site listing.

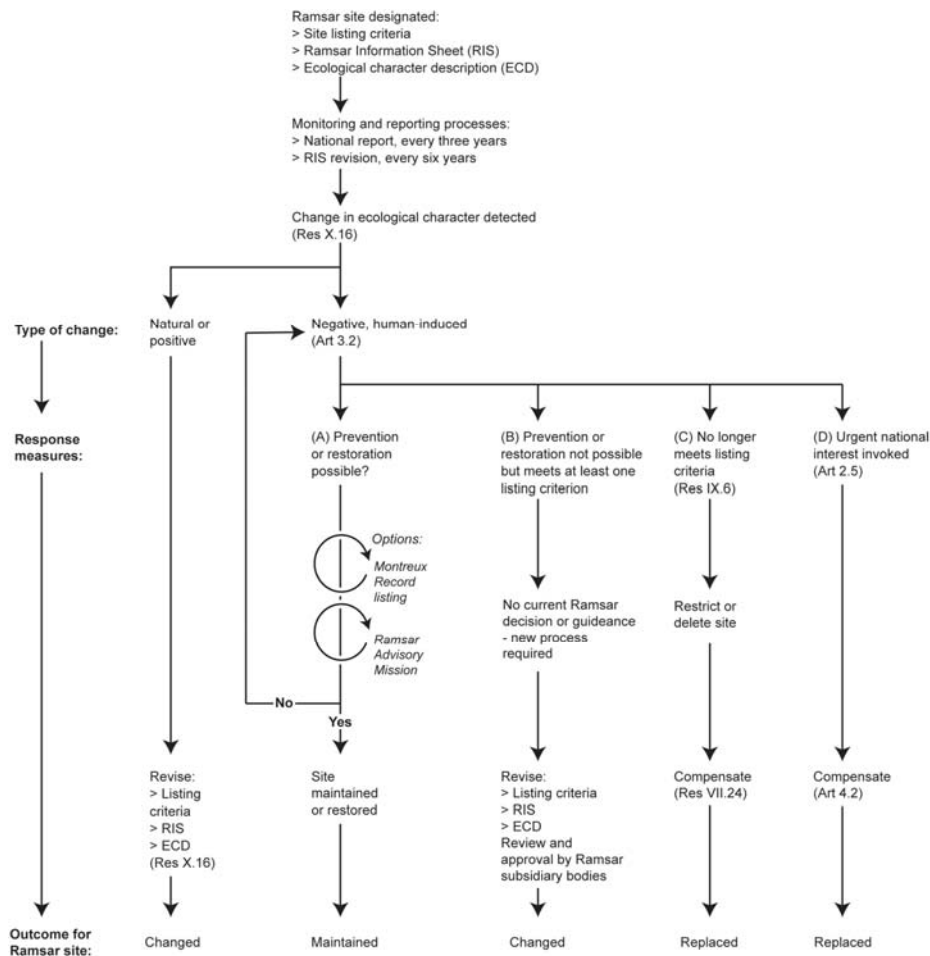
This Resolution IX.6 procedure has not been formally applied by any nation. However in the circumstance where a country seemingly changed the boundaries of a site without implementing this resolution or informing the secretariat of the Convention, it is not clear how this would be formally addressed by the Convention. This question of non-compliance raises an important limitation of the Convention; namely, the limited sanctions that can be applied if a contracting party does not abide by Convention decisions and the reliance on moral suasion for compliance with its provisions.

Commentators have noted the lack of compliance and enforcement provisions in the Convention.²⁸ The Convention contains no provisions dealing with breach or termination of its obligations, and establishes no dispute settlement policy or process. Although it would be possible for

²⁷ Ramsar, n 23, Resolution X.16.

²⁸ Bacon BL, "Enforcement Mechanisms in International Wildlife Agreements and the United States: Wading Through the Murk" (1999) 12(1) *Geo Int'l Envtl L Rev* 331 at 359-360; Birnie P, Boyle A and Redgell C, *International Law & the Environment* (3rd ed, Oxford University Press, United States, 2009) p 673; Kruchek BL, "Extending Wetlands Protection Under the Ramsar Treaty's Wise Use Obligation" (2003) 20(2) *Arizona Journal of International and Comparative Law* 409 at 425.

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a party or parties to suspend or terminate their obligations in response to a “material breach” by one or more parties,²⁹ it is difficult to establish a material breach that warrants one party unilaterally suspending or terminating their obligations in response.³⁰ Proceedings to establish a breach through international arbitration or in the International Court of Justice requires agreement from the member state(s) alleged to be in breach and any rulings are difficult to enforce. Thus, guidance on the implementation of the Convention is primarily founded on resolutions of the CoP making general or specific recommendations.³¹ Contracting parties are obligated to “ensure that those responsible at all levels for wetlands management shall be informed or, and take into consideration, recommendations of such Conferences”.³²

How effective are such recommendations for inducing national implementation of the broad obligations of the Convention? One commentator has explained:

the recommendations and resolutions passed by the member states at the Conferences are “soft law”. Consequently, although these publications explain, amplify, or supplement the provisions of the Convention, the members may ignore the recommendations. Thus, countries have a moral compulsion, rather than a legal obligation to uphold the Convention.³³

On the other hand, it is acknowledged that resolutions and recommendations of the

CoP may be implemented over time by national action.³⁴ Responding to the CoP's recommendations, several contracting parties have enacted legislation requiring environmental impact assessments of development projects that may affect Ramsar-listed sites, despite not being required to do so by the Convention.³⁵ Increases in authority accorded to the CoP and its resolutions have arguably played a crucial role in the national interpretation of Convention obligations.³⁶

Nevertheless, in the context of difficulties in achieving compliance with the Convention, the CoP resolutions raise key questions for climate change and Ramsar site conservation and governance:

- cxlviii. Does climate change represent “negative human-induced” change to the ecological character of a □ Ramsar site? Is it unavoidable?³⁷
- cxlix. How does a government compensate for a degraded or lost Ramsar site?
- cl. How can Ramsar processes cope with widespread change to wetlands anticipated from climate □ change impacts? □ **Australian institutions** □ These questions are examined in this article by focusing on the role and actions of the Commonwealth government – rather than the State and Territory (provincial) governments³⁸ – as under its legislative and executive powers relating to external affairs³⁹ and under the Convention, the Commonwealth □²⁹ *Vienna Convention on the Law of Treaties 1969*, opened for signature 23 May 1969, 1155 UNTS 331, Arts 60-62 (entered into force 27 January 1980). □³⁰ *Gabcikovo-Nagymaros case (Hungary v Slovakia)* (1997) ICJ Reports 7 at 68, where the International Court of Justice rejected Hungary's argument that it could unilaterally terminate a treaty with Czechoslovakia for reciprocal non-compliance. □³¹ Wetlands Convention, n 10, Art 6.2. □³² Wetlands Convention, n 10, Art 6.3. □³³ Kruchek, n 28 at 425 (references omitted). □³⁴ Bowman M, “The Ramsar Convention on Wetlands: Has it Made a Difference?” in Stokke OS and Thommessen OB (eds), *Yearbook of International Co-operation on Environment and Development 2002/2003* (Earthscan Publications, London, 2002) pp 61-68. □³⁵ Birnie et al, n 28, p 676. □³⁶ Verschuuren J, *Ramsar Soft Law is Not Soft at All* (2008), reproduced in translation on the Ramsar website, http://www.ramsar.org/cda/en/ramsar-documents-wurl-laws/main/ramsar/1-31-116-165_4000_0 viewed 22 July 2010; Birnie et al, n 28, p 676. □³⁷ Ramsar, n 23, Resolution X.16; Ramsar, n 24, Resolution IX.6. □³⁸ The term “governments” is used to refer to the Commonwealth, State and Territory governments collectively, as opposed to the Commonwealth (also known as the federal or Australian) government on a national scale. □³⁹ *Commonwealth of Australia Constitution Act 1901* (Cth), s 51(xxix).

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government has primary responsibility for overseeing the implementation of Australia's Ramsar obligations. If the performance of Australia's Ramsar obligations requires a change to domestic law, the Commonwealth Parliament must legislate to implement those obligations, for under the Commonwealth constitution the making of or adherence to an international treaty does not change the domestic law.⁴⁰ Failure to legislate to implement an international obligation does not mean that the domestic law is invalid.⁴¹ As Professor Zines has explained: “[c]learly, if the required alteration is not made, the Commonwealth, if it has ratified the treaty, is in breach of its agreement

so far as international law is concerned".⁴² Sanction for a breach of international law is to be found in international law. The significant issues for our purposes are what the Commonwealth may do to implement the Convention obligations.

The first question is the Commonwealth's constitutional authority to legislate to implement Convention obligations and the subsequent resolutions and recommendations of the CoP. Decisions of the High Court of Australia on this question provide a number of pertinent propositions. The Commonwealth may legislate to implement an international treaty, even where the subject matter of the treaty and the legislation would otherwise be outside the Commonwealth's legislative powers. To be valid, the implementing legislation must give effect to a treaty or convention in such a manner as to be reasonably capable of being considered appropriate and adapted to the achievement of the treaty or convention's purpose or object.⁴³ The Commonwealth's legislative power relating to external affairs is not confined to implementing treaty obligations; it may extend to the carrying out of recommendations adopted pursuant to a convention provided that such recommendations can reasonably be regarded as appropriate and adapted to giving effect to that convention.⁴⁴ Resolutions or recommendations of international agencies that are not made with reference to the implementation of international treaty obligations may not support the enactment of domestic legislation.⁴⁵ It is not possible here to conduct an exhaustive analysis of the Ramsar resolutions and recommendations discussed in this article to assert authoritatively that they would support the full implementation of the relevant Australian legislation. Instead, for the purposes of this article, the argument that the Ramsar resolutions and recommendations would support Commonwealth legislation to fulfil the essential Ramsar obligation to maintain the ecological character of the Ramsar listed sites has been adopted.

The Australian Parliament enacted the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act), which in part implements the Convention by recognising Ramsar wetlands as matters of national environmental significance and making provision for the "conservation and wise use of Ramsar wetlands of international importance".⁴⁶ Specifically, the EPBC Act requires: the designation of Ramsar wetlands, environmental approval of any new "action" with a significant impact on the ecological character of a Ramsar wetland (Pt 3, Div 1B); promotion of planning and management (though only in cooperation with the States for wetlands within State territory), and providing assistance for their conservation (Pt 15, Div 2). In deciding whether an action requires an

⁴⁰ *R v Burgess; Ex parte Henry* (1936) 55 CLR 608 at 644 (Latham CJ).

⁴¹ *Commonwealth v Tasmania* (the Tasmanian Dams case) (1983) 158 CLR 1.

⁴² Zines L, *The High Court and the Constitution* (5th ed, The Federation Press, 2008) p 378.

⁴³ *Commonwealth v Tasmania* (1983) 158 CLR 1; *Victoria v Commonwealth* (the Industrial Relations case) (1996) 187 CLR 416 at 487-488, applied in *R v Tang* (2008) 237 CLR 1.

⁴⁴ *Victoria v Commonwealth* (1996) 187 CLR 416 at 509 (Brennan CJ, Toohey, Gaudron, McHugh and Gummow JJ).

⁴⁵ *Pape v Federal Commissioner of Taxation* (2009) 238 CLR 1. Hayne and Kiefel JJ stated that a recommendation of an international organisation cannot support legislative action if it imposes no obligation to take any particular course of action (at [368]-[374]). Heydon J held that for an international declaration or recommendation to support a legislative enactment it must either be designed to give effect to an international obligation or be specific and definite enough itself to give rise to an obligation to implement it (at [475]-[485]).

⁴⁶ *Environment Protection and Biodiversity Conservation Act 1999* (Cth), s 3(2)(f).

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environmental assessment for approval, and in determining whether to grant an approval, the Minister is bound to take into account the precautionary principle.⁴⁷

Further, there is increasing evidence that Australian planning and environmental regulatory agencies are taking into account the “soft law” of the Ramsar Convention. For example, in 2010 the Tasmanian Planning Commission recommended against approval of the Lauderdale Quay (marina) Development Proposal partly on the basis that it would have negative impacts on the Ralphs Bay wetland which, although not listed under the Convention, would qualify for listing and thus should be protected under Ramsar Resolution X.1.⁴⁸

In practice, the day to day management of most Australian Ramsar wetlands – including the six sites that are the focus of this article – is by State government institutions (and occasionally by non-government wetland managers). The EPBC Act recognises the need to conserve Ramsar wetlands. However, it does not regulate:

- . (a) the continuation of an existing lawful use, such as water diversions upstream under legal entitlements conferred before the EPBC Act came into operation;
- . (b) a decision by a State or Commonwealth government body to grant an approval (authorisation) for another person to take an “action” (such as allocation of water for a new irrigation development), or a grant of funding,⁴⁹ thus enabling governments to adopt plans and programs that may impinge on Ramsar sites while placing the onus on specific development proponents to secure the EPBC Act environmental approvals from the Commonwealth Minister for the Environment; or
- . (c) the full range of Australian obligations under the Ramsar Convention. □One consequence is that Ramsar site management plans usually do not direct water allocations

required to sustain the wetland’s ecological character.

As a result, the continuation of uses of land and water that were lawful prior to the EPBC Act’s proclamation, and the perverse impacts of subsequent State and Commonwealth government decisions, have continued to degrade Ramsar wetlands (as detailed below). The *Water Act 2007* (Cth) was enacted in 2007 and amended in 2008 to extend the application of the Commonwealth government’s powers to directly

set water diversion limits, including to conserve Ramsar wetlands in the context of climate change, but only within the Murray-Darling Basin (as detailed below). The key instrument for achieving this purpose is the making of the Basin Plan in 2010-2011, which the *Water Act* provides must “promote the wise use of all Basin water resources” and the “conservation of declared Ramsar wetlands in the Murray-Darling Basin”.⁵⁰

Hence, at the Commonwealth level, Australia has legislated twice, in 1999 and 2007-2008, to conserve Ramsar wetlands. Yet while the Commonwealth government has increasingly exercised its powers to implement the Convention, the partial measures enacted to date do not articulate or enable the full implementation of Australian obligations under the Ramsar Convention. For instance, Australia has chosen to implement some Ramsar obligations through administrative policy rather than domestic law, such as the process for notifying the Secretariat of changes in ecological character of Ramsar sites under Art 3.2 (discussed below), or has ignored other commitments altogether, for instance, the establishment of a representative multi-stakeholder national committee.⁵¹ The next significant test of the Commonwealth government’s commitment to implement the Convention will be

⁴⁷ *Environment Protection and Biodiversity Conservation Act 1999* (Cth), s 391, which also defines the precautionary principle for these purposes.

⁴⁸ Ramsar, n 6, Resolution X.1, Goal 2, Strategy 2.7; Tasmanian Planning Commission, *Integrated Assessment Report: Lauderdale Quay Development Proposal* (June 2010), http://www.planning.tas.gov.au/_data/assets/pdf_file/0020/146711/FIAR_Final_Report.pdf viewed 13 July 2010, Recommendations D5 and D6, pp 77-79.

⁴⁹ See *Environment Protection and Biodiversity Conservation Act 1999* (Cth), ss 523-524A as to definitions of what is/is not an “action”.

⁵⁰ *Water Act 2007* (Cth), s 21(3).⁵¹ Ramsar, *Recommendation 5.7: National Committees* (Kushiro, 1993), [http://www.ramsar.org/cda/en/ramsar-documents-resol-](http://www.ramsar.org/cda/en/ramsar-documents-resol-recommendation-5-7/main/ramsar/1-31-107%5E23195_4000_0)

[recommendation-5-7/main/ramsar/1-31-107%5E23195_4000_0](http://www.ramsar.org/cda/en/ramsar-documents-resol-recommendation-5-7/main/ramsar/1-31-107%5E23195_4000_0) viewed 24 June 2010.

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in the provisions of the Basin Plan.⁵² In this context, the authors assess how Ramsar sites have been managed and how they may be conserved and governed in an era of climate change.

MANAGEMENT OF RAMSAR WETLANDS IN THE BASIN Murray-Darling Basin Ramsar wetlands

To examine these questions the authors assessed publicly available data for the 16 Ramsar sites covering 636,592 ha in the Murray-Darling Basin.⁵³

FIGURE 2 Location of the Murray-Darling Basin, Australia, showing the location of 16 Ramsar wetlands and six icon sites mentioned in the text

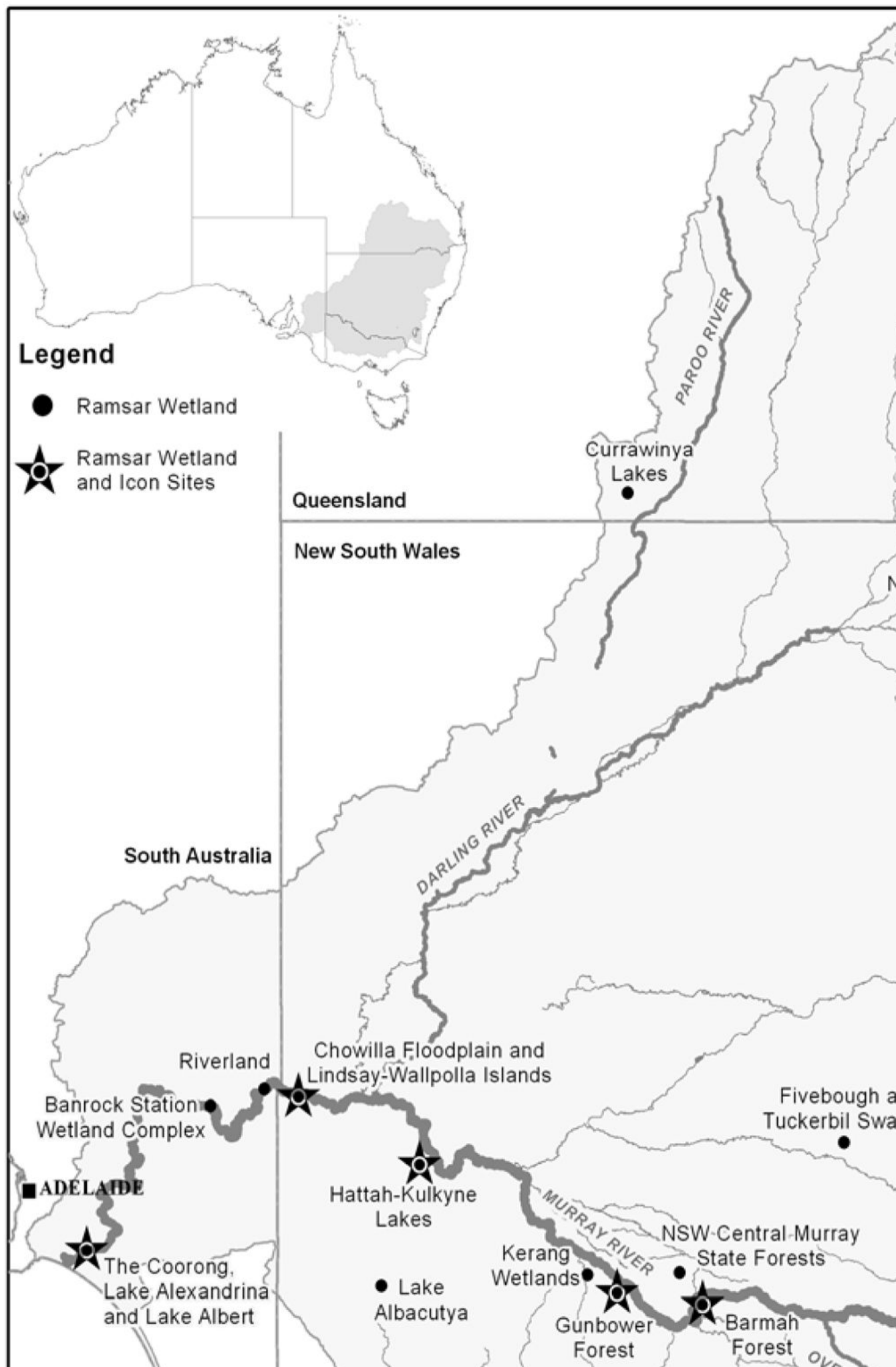
Many of these Ramsar sites are reported as undergoing significant ecological change, including the Macquarie Marshes and Gwydir Wetlands.⁵⁴ Major wetlands in the northern (Darling River) Basin have been subject to less coordinated management by Australian governments. Five major wetlands

⁵² On 8 October 2010 the Murray-Darling Basin Authority (MDBA) released a guide to the proposed Plan that envisages reallocation of between 27% and 37% of diverted water to the environment (from a revised baseline compared to the data in Table 6). The Authority is required to present a final Plan to the Minister in 2011. See MDBA, *A Guide to the Proposed Basin Plan* (2010), <http://www.thebasinplan.mdba.gov.au/guide/guide.php?document=the-murray-darling-basin> viewed 26 October 2010.

⁵³ DEWHA, *Australian Ramsar Wetlands* (2009), <http://www.environment.gov.au/cgi-bin/wetlands/alphablist.pl> viewed 17 December 2009.

⁵⁴ DEWHA, *National Report on the Implementation of the Ramsar Convention on Wetlands* (2008), <http://www.environment.gov.au/water/publications/environmental/wetlands/pubs/ramsar-report10.pdf> viewed 24 December 2009; Kingsford RT and Auld KM, "Waterbirds Breeding and Environmental Flow Management in the Macquarie Marshes, Arid Australia" (2005) 21(2-3) *River Research and Applications* 187; Kingsford RT, "Ecological Impacts of Dams, Water Diversions and River Management on Floodplain Wetlands in Australia" (2000) 25 *Austral Ecology* 109; Moles S, Fletcher B and Hankinson A, *Wetlands for our Future: Meeting National and International Wetland Commitments in the Murray-Darling Basin* (Australian Conservation Foundation and Inland Rivers Network, Victoria, 2008), http://www.acfonline.org.au/uploads/res/Ramsar_paper_final_201008.pdf viewed 24 December 2008.

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(comprising six Ramsar sites) in the southern (River Murray) Basin have been selected for assessment in this article due to their designation by the Australian governments in 2003 as “icon sites” as part of their “first step” program to restore the ecological health of the Basin rivers⁵⁵ (see Fig 1 and Table 1). Maintenance of the ecological character of these wetlands depends on sufficient and variable water inflows at seasonally appropriate times and, in particular, periodic floods. The regulation of the river system and diversion of the majority of inflows for irrigated agriculture has greatly diminished water available for the environment, reduced flow variability and changed seasonal flow patterns.⁵⁶ In addition to desiccation, the major consequences include the development of blue-green algae blooms⁵⁷ and salinisation of large tracts of land.⁵⁸ Invasion by exotic species such as carp (*Cyprinus carpio*) in lowland rivers, trout (*Salmo* spp) in the highland streams, and the mosquito fish (*Gambusia holbrooki*), as well as alien plants like the submerged leafy elodea (*Egeria densa*) have all contributed to the diminution of native fish populations.⁵⁹

Adopted conservation targets and ecological status

Quantifiable ecological objectives were established by government ministers for the icon sites,⁶⁰ “Environmental Management Plans” were developed, funding and water was allocated for their conservation, and comparable reports on their ecological condition were published.⁶¹ The relatively comparable data that is available is summarised in Tables 1 and 2, showing the conservation objectives set for the areas of floodplain forest wetlands at these sites in 2003 and the actual ecological condition in 2003, 2006 and 2009. Additional and unique conservation objectives were also agreed upon but are not reported here for simplicity. Objectives for the ecologically healthy portion of the floodplain forest area were set at each site. Red gum forests grow on more frequently flooded areas compared to black box forests that are higher on the floodplain and harder to water.

Some very low targets were adopted: the lowest just 20% of the area of black box forests of Chowilla, despite obligations to conserve representative portions of each wetland type.⁶² Similarly at Hattah Lakes a target to maintain a minimum of just 50% of the “aquatic vegetation zone” of the lakes in good ecological condition was adopted. The ministers did not give reasons for the magnitude of these targets,⁶³ and it should be noted that this decision was taken before the current “drought” was recognised and thus reflects long-term management intentions rather than an emergency response to short-term climate variability.

⁵⁵ Jones G, Hillman T, Kingsford R, McMahon T, Walker K, Arthington A, Whittington J and Cartwright S, *Independent Report of the Expert Reference Panel on Environmental Flows and Water Quality Requirements for the River Murray System* (Cooperative Research Centre for Freshwater Ecology, Canberra, 2002), http://www.thelivingmurray.mdbc.gov.au/publications/reports_pre-2003 viewed 13 May 2008; Murray-Darling Basin Ministerial Council (Australia) (MDBMC), *Murray Darling Basin Ministerial Council communique* (14 November 2003), http://www.mdbc.gov.au/_data/page/1589/MC34_communique_Nov-03.pdf viewed 21 November 2008.

⁵⁶ Kingsford, n 54; Commonwealth Scientific and Industrial Research Organisation (CSIRO), *Water Availability in the Murray-Darling Basin: A Report from CSIRO to the Australian Government* (2008), <http://www.csiro.au/files/files/po0n.pdf> viewed 15 April 2009.

⁵⁷ MDBMC, *The Algal Management Strategy for the Murray-Darling Basin: A Component of the Natural Resources Management Strategy* ((1994), http://www2.mdbc.gov.au/nrm/water_issues?algal_management.html viewed 5 July 2010.

⁵⁸ MDBMC, *Basin Salinity Management Strategy 2001-2015* ((2001), http://www.mdbc.gov.au/salinity/basin_salinity_management_strategy_20012015.html viewed 24 December 2009; Nielsen DL and Brock MA, “Modified Water Regime and Salinity as a Consequence of Climate Change: Prospects for Wetlands of Southern Australia” (2009) 95 *Climatic Change* 523.

⁵⁹ Murray-Darling Basin Commission (MDBC), *Native Fish Strategy for the Murray-Darling Basin 2003-2013* (2004) http://www.mdbc.gov.au/__data/page/65/Fish-Strat_ful.pdf viewed 24 December 2009.

⁶⁰ MDBMC, n 55.

⁶¹ MDBC, *The Living Murray Icon Site Condition Report* (2007), <http://www.thelivingmurray.mdbc.gov.au/publications> viewed 13 May 2008; MDBC, *Icon Site Condition Report* (2008), http://www2.mdbc.gov.au/__data/page/1327/2008_icon_site_report.pdf viewed 22 July 2010; Cunningham S, Mac Nally R, Griffioen P and White M, *Mapping the Condition of River Red Gum and Black Box Stands in The Living Murray Icon Sites* (Murray-Darling Basin Authority, Canberra, 2009).

⁶² Ramsar, n 18, Strategic Framework and Guidelines. ⁶³ MDBMC, n 55.

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TABLE 1 Comparison of the red gum forest condition in 2006 in four a Living Murray “icon sites” against government interim ecological objectives set in 2003

Living Wetland Murray area icon (ha) b wetland

site

Barmah- 66,000 Millewa □ Forest

Gunbower – 50,000 Koondrook □ – Perricoota □ Forest

Impact of development on flowsc

Interim red gum forest objectives

Healthy

Virtually all to be healthy

30%

Red gum stand condition

in 2006d

Severely degraded/ dead

0%

22%

45%

12%

Increase in average period between beneficial flooding

Nearly doubled

Nearly doubled

Average flood volume per year (% of natural)

<25%

17%

Healthy/ Declin- good ing

20% 75%

Poor

5%

19% 59% “unhealthy”

Hattah 48,000 Nearly 17% Aquatic 5% 19% 31%

Lakes

doubled vegetation of half the lakes to be

healthy

Wallpolla Islandse

Chowilla 17,700

qua- drupled

(17 lakes)

Lindsay & 20,000 Nearly 39% 100% 21% 45% 21%

100% Typically 20-60% of all trees are dead or nearly dead, while approximately 90% of live trees are stressed or severely stressed

a. The Coorong and Lakes Alexandrina and Albert Ramsar site and also the River Murray channel were also designated icon sites but are not included in Table 1 as different types of conservation objectives were adopted for them.

b. Total area is 201,700 ha.⁶⁴

c. Increase in average period between beneficial flooding and average flood volume per year compared to a “without-development” scenario.⁶⁵

d. Red gum stand condition categories were assessed using a stand condition index based on measurements of crown vigour, live basal area, and a plant area index as detailed by Cunningham et al.⁶⁶

e. Administered as part of the Chowilla icon site.

⁶⁴ MDBC (2007), n 61.

⁶⁵ CSIRO, n 56.

⁶⁶ Cunningham S, Mac Nally R, White M, Read J, Baker P, Thomson J and Griffioen P, *Mapping the Condition of River Red Gum (Eucalyptus camaldulensis Dehn)* Stands Along the Victorian Murray River Floodplain (Department of Sustainability and Environment, Melbourne, 2007).

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TABLE 2 Comparison of the condition of all forests at five Living Murray icon wetland sites in 2003 and 2009 against the MDB governments' interim ecological condition objectives set in 2003

Floodplain forest stand conditiona

Interim objectives for area of forest in “healthy”b con- dition from 2003.

Estimated mean stand area in “good”b condition in 2003.

Predicted mean stand area in “good”b condition in 2009.

The Living Murray icon site

Barmah- Millewa

55%

47.6%

21.4%

Gunbower- Koondrook- Pericoota

30% of red gum forest

20.6%

10.8%

Hattah Lakes

Aquatic vegetation zone in and around at least 50% of the lakes

6.6%

3.1%

Chowilla- Lindsay- Mulcra- Wallpolla

100% of red gum and 20% of black box forest

25.6%

21.4%

Murray channel

n/a

39.6%

28.1%

a. Unless otherwise indicated the data refers to all component forests, including both red gum and black box floodplain forests.

b. The term “healthy”, as opposed to “stressed”, is synonymous with the “good” classification of Cunningham et al⁶⁷ using a stand condition index based on remote sensing of crown vigour, live basal area, and a plant area index.

The New South Wales Natural Resource Commission⁶⁸ recently reported on future management of that state’s red gum forests. The Commission’s report included the New South Wales Central Murray State Forests Ramsar site, which has three disconnected portions, two of which are contiguous with Victorian sites. Table 3 summarises the reported ecological state and future vegetation structure with current trends in reduced water availability due to over extraction and climate change.

TABLE 3 Assessment of the current ecological state and future vegetation structure of the three portions of the New South Wales Central Murray State Forests Ramsar site by the New South Wales Natural Resources Commission

Portion of the Ramsar site

Millewa

Kondrook – Pericoota

Current condition

Heterogeneous forests in poor to moderate condition with only 20% of red gums remaining in healthy condition.

In general the condition of the forests is poor and continuing to decline. □ Campbell’s Island is in moderate condition which is attributed to access to groundwater.

“Trajectory” of floodplain vegetation

Arguably more resilient to water scarcity than other forests but expected to transition to a generally drier, less flood dependent ecology. Approximately 10% of forest expected to be lost over next 50 years under current flooding regime.

Will continue its well-advanced transition to a drier, less flood-dependent ecology without management intervention. □ Possible loss of 20-25% of forest over next 50 years.

⁶⁷ Cunningham et al, n 61. See also MDBMC, n 55.

⁶⁸ New South Wales Natural Resources Commission, *Final Assessment Report: Riverina Bioregion Regional*

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TABLE 3 *continued*

Portion of the Ramsar site

Werai

Current condition

General condition of the forests is very poor with 92% highly stressed, near dead and dead. Flooding frequency has been dramatically reduced as a result of river regulation and water resource development.

“Trajectory” of floodplain vegetation

Current poor condition of the group is unlikely to improve. □ Over 40% of river red gum stands and associated wetlands could be lost within

50 years if current conditions persist.

Application of Ramsar conservation processes

Given the substantial decline in the condition of red gum forests at all four sites (Tables 1 to 3) and degradation of the Coorong and Lakes Alexandrina and Albert Ramsar site with desiccation, increasing salinity, and oxidation of sediments to form sulphuric acid,⁶⁹ the authors examined Commonwealth government records⁷⁰ to identify the actions taken under the Convention in response. Ramsar Convention conservation processes applied by the government to these sites are listed in Table 4. While all sites have RISs that are required for their designation, and most have management plans and ecological character descriptions (ECDs), in only one instance have other Ramsar processes been applied. A second Art 3.2 assessment is now underway for changes in ecological character.⁷¹ Further, since the management plans do not provide for water allocations sufficient to maintain the ecological character of all listed wetlands, for example at Chowilla,⁷² they accept change to the ecological character of the sites and, unless reported under Art 3.2, amount to an institutional

decision not to meet Australia's obligations under the Convention. Three of the five sites have had their RISs revised within the past six years, as required by the Convention. However, despite the evident negative ecological changes at the sites, the Commonwealth government has only reported the Coorong and Lakes Alexandrina and Albert site to the Ramsar Secretariat as required under the Convention's Art 3.2. At none of the sites has the Commonwealth government applied other Convention processes for sites undergoing change – some of which are regarded as optional – including, requesting Ramsar Advisory Missions, listing sites on the Montreux Record, invoking “urgent national interest” to revoke listed areas, or applying other processes for responding to changes in wetland ecological character.⁷³

⁶⁹Kingsford RT, Fairweather PG, Geddes MC, Lester RE, Sammut J and Walker KF, *Engineering a Crisis in a Ramsar Wetland: The Coorong, Lower Lakes and Murray Mouth, Australia* (Australian Wetlands and Rivers Centre, University of New South Wales, 2009), <http://www.wetrivers.unsw.edu.au> viewed 17 December 2009; Phillips W and Muller K, *Ecological Character of the Coorong, Lakes Alexandrina and Albert Wetland of International Importance* (South Australian Department for Environment and Heritage, Adelaide, 2006); DEWHA, n 53; Hall KC, Baldwin DS, Rees GN and Richardson AJ, “Distribution of Inland Wetlands with Sulfidic Sediments in the Murray-Darling Basin, Australia” (2006) 370(1) *Science of The Total Environment* 235.

⁷⁰ DEWHA, n 53.

⁷¹ DEWHA, *Australian Ramsar Wetlands Bi-annual Newsletter* (2 July 2010).

⁷² MDBC, *The Chowilla Floodplain and Lindsay-Wallpolla Islands Icon Site Environmental Management Plan 2006-2007* (2006), Pt B, http://www.thelivingmurray.mdbc.gov.au/__data/page/195/CFLWI_EMP_2006-07_PartB.pdf viewed 26 October 2009.

⁷³ Ramsar, n 24, Resolution IX.6.

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TABLE 4 Conservation measures at selected floodplain Ramsar sites on the River Murray (information sourced from online database of DEWHA)

Ramsar Ramsar Manage- Ecologi- wetland informa- ment cal

tion sheet plan character (date last (date descrip- updated) pub- tion lished) status (date pub-lished)

Barmah May 1999 2003 2005 Forest

Gunbower August 2003 2006 Forest 2006

New October 2002 In□South 2002 prepara- Wales tion (Dec Central 2009)
Murray□State□Forests

Hattah- April 2003 2005 Kulkyne 2005□Lakes

Riverland August 2010 In□2007 prepara-

Current ecological statusa

Substan- tial change in character

Substan- tial change in character

Substan- tial change in character

Substan- tial change in character

Severe change in character

Severe change in character

**Art 3.2 Urgent Mon- Compen- notifica- national treux sa-tion tion (date interest
record for notified) invoked? listing degraded**

habitat consid- ered

None No No No

None No No No

Assess- No No No ment□underway□2010

None No No No

None No No No

2006 No No No

Coorong and lakes Alexand- rina and Albert

tion (Dec 2009)

March 2000 2006 2006

a. Authors' qualitative assessment based on data in Tables 1 to 3 and references.⁷⁴

Water availability and ecological decline

A key question is the extent to which the current ecological decline in the Basin is due to water management, versus climate variability, versus climate change. CSIRO⁷⁵ has assessed current water availability in the Basin and prepared scenarios to forecast future availability. This data is summarised in Tables 5 and 6.

TABLE 5 Murray-Darling Basin climate change scenarios and water availability to 2030

Scenario Average surface water availability in 2030

Extreme wet +7%

⁷⁴ Kingsford et al, n 69; Phillips and Muller, n 69. ⁷⁵ CSIRO, n 56.

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End of system flows in 2030

+20%

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TABLE 5 continued

Scenario

Median

Extreme dry

Average surface water availability in 2030

–12%

–37%

End of system flows in 2030

–24%

–69%

**TABLE 6 Murray-Darling Basin water inflows, diversions and uses
(adapted from CSIRO)**

Surface water component

Natural (pre-European) hydrology

Natural inflows

Natural losses

Natural end-of-system flow

Current situation with development (pre-“drought”)

Current inflows (with Snowy R. interbasin transfer; historical climate)

Current losses

Human-induced streamflow loss to groundwater

Current surface water diversions

Current end-of-system flow

Surface water availability in 2030

Long term average total surface water availability

Extreme wet (+7%) 2030

Median (–12%) 2030

Extreme dry (–37%) 2030

Current and proposed environmental reallocations

Current (pre-“drought”) surface water diversions

Reallocation to the environment recommended by Jones et al for good ecological health of six icon sites

The Living Murray “first step” reallocation currently underway (2003- 2010)b

Additional “average annual volume” in water entitlements purchased by the Commonwealth government for the environment in 2007-2010 as at 30 June 2010c

Likely environmental water recovery from 2007 from the Commonwealth government’s \$3.1 billion allocationd

Likely environmental water recovery under all major existing State and Commonwealth government programme

Reallocation to the Coorong, Lower Lakes and Murray Mouth recommended by Kingsford et alf

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Average volume per year (GL/yr)

29,640

17,407

12,233

29,779

13,720

181

11,146

4,733

15,879

16,991

13,974

10,004

11,146

4,000

500

591

1,268

2,540

700

Proportion of flow (%)

100

59

41

100

46

1

37

16

100

107

88

63

100

36

4

5

11

22

6

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TABLE 6 *continued*

Surface water component Average volume per year (Gl/yr)

Reallocation to the New South Wales red gum forests of the Murray, 1,200
Murrumbidgee and Lachlan rivers recommended by the NRC

Basin-wide reallocation recommended by the Wentworth Group of 4,400 Concerned Scientists^g

a. See Jones et al.⁷⁶ b. See MDBMC.⁷⁷ c. According to data from DEWHA.⁷⁸ d. Sourced from the Productivity Commission.⁷⁹ e. See Productivity Commission.⁸⁰ f. See Kingsford et al.⁸¹ g. See Wentworth Group analysis.⁸²

Proportion of flow (%)

11

40

The above data shows that these six large Ramsar sites in the Basin are undergoing changes in ecological character due primarily to excessive water diversions, but this may be exacerbated by climate change. In 2003, the MDB governments set conservation objectives that were not sufficient to maintain the ecological character of these Ramsar sites (and adjacent areas of internationally important wetlands). By 2007/2008 the conservation objectives were not met and further declines appear likely.

Recent government responses

The MDB governments are currently developing infrastructure under The Living Murray program's \$270 million Environmental Works and Measures Program to water large parts, but not all, of the icon and Ramsar site floodplain forests along the River Murray. For example, the Environmental Management Plan for the Chowilla floodplain⁸³ proposes infrastructure for water transfers, raising or building new weirs to back up water from natural channels onto the floodplains, and regulators to control water access to the floodplains. While these interventions may enable the health of part of the Ramsar wetlands to be restored and maintained with less water, other areas are likely to be permanently desiccated. Some portions of these wetlands may be physically isolated from floods by the new infrastructure. More significantly, by maintaining some wetland areas with less water, this approach may facilitate high levels of human water consumption on an ongoing basis, obviating larger natural floods, as well as requiring constant management intervention. There has been little public discussion about the consequences of these decisions and the costs and benefits of moving to a regime that depends on constant intervention compared to less-interventionist management based on larger, more natural floods, nor of the merits of abandoning areas of wetland to transition to dry land

⁷⁶ Jones G, Hillman T, Kingsford R, McMahon T, Walker K, Arthington A, Whittington J and Cartwright S, *Independent Report of the Expert Reference Panel on Environmental Flows and Water Quality Requirements for the River Murray System* (Cooperative Research Centre for Freshwater Ecology, Canberra, 2002).

⁷⁷ MDBMC, n 55.

⁷⁸ DEWHA, *Purchases Secured under the Restoring the Balance in the Murray-Darling Basin Program as at 30 June 2010* (2010), <http://www.environment.gov.au/water/policy-programs/entitlement-purchasing/2008-09.html> viewed 26 July 2010.

⁷⁹ Productivity Commission, *Market Mechanisms for Recovering Water in the Murray-Darling Basin*, Final Report (March 2010), http://www.pc.gov.au/_data/assets/pdf_file/0019/96004/water-recovery-report.pdf, viewed

12 April 2010, p 262.

⁸⁰ Productivity Commission, n 79. ⁸¹ Kingsford et al, n 69.

⁸² Wentworth Group of Concerned Scientists, *Sustainable Diversions in the Murray-Darling Basin: An Analysis of the Options for Achieving a Sustainable Diversion Limit in the Murray-Darling Basin* (2010).

⁸³ MDBC, n 72.

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ecosystems.⁸⁴ Distinct wetland ecosystems at high elevations on the floodplains appear particularly vulnerable to such desiccation, especially black box floodplain forests.⁸⁵ Further, actions that disproportionately degrade particular wetland types would be in breach of obligations to conserve ecologically representative wetland ecosystems.⁸⁶ Such outcomes can be seen as deliberate decisions to allow the ecological character of these sites to change adversely and hence undermine the fulfilment of Australia's responsibilities under the Convention. It is emphasised that Australia voluntarily committed to these obligations – they have not been imposed. Nor are they new – the relevant Articles are essentially the same now as they were in 1975 when Australia ratified the Convention.

Commonwealth government guidelines state that the assessment of change in ecological character will be undertaken with respect to *critical* components, processes and benefits/services of the ecological character of the site. [...] One criterion for identifying a critical aspect is that adverse change would cause significant negative consequences to the character of the site if that change were to occur.⁸⁷

The authors contend that the types of changes identified in these southern Basin Ramsar sites clearly are critical, for instance: broad scale death of dominant floodplain forest trees, absence of colonial-nesting water bird breeding and conversion of freshwater wetlands to acidified and salinised water bodies. While floodplain ecological communities may vary over time, based on scientific significance tests we propose that a change of more than 10% in the area of these ecosystems should be regarded as critical by managers, which imposes a flexible standard given the Convention's requirement for each site to maintain the ecological character of "the whole of its original extent".⁸⁸ Wetland forests are declining or dead over more than 10% of each of the floodplain Ramsar sites.

In 2006, water sharing plans, intended to ensure that water was available for the environment, were suspended by the State governments of New South Wales and Victoria in order to allocate more of the available water to consumptive users.⁸⁹ These decisions highlight the sovereign risk for the maintenance of the ecological character of wetlands from management systems predicated on constant intervention.

Following ongoing ecological decline and severe reductions in river inflows, in 2008 the MDB governments adopted reforms for the management of the Basin through amendments to the *Water Act*. The constitutional mandate for this legislation relies in large part on the Commonwealth government's external affairs power to legislate to implement treaties, including the Convention on Biological Diversity and Ramsar Convention on Wetlands. The objects of the *Water Act* include measures to: give effect to relevant international agreements and to address the threats to the water resources; manage water resources to optimise economic, social and environmental outcomes; ensure the return to environmentally sustainable levels of water extraction; and restore and protect the ecological values and ecosystem services of the Basin.⁹⁰ Under the *Water Act*, the Murray-Darling Basin Authority is obliged to prepare for Commonwealth ministerial approval, by 2011, a Basin Plan⁹¹ that must: promote the wise use of all the Basin water resources; conserve declared Ramsar wetlands in the

⁸⁴ Pittock J and Lankford BA, "Environmental Water Requirements: Demand Management in an Era of Water Scarcity" (2010) 7(1) *Journal of Integrative Environmental Sciences* 75.

⁸⁵ New South Wales Natural Resources Commission, n 68; Victorian Environmental Assessment Council, *Final Report July 2008: River Red Gum Forests Investigation* (2008).

⁸⁶ Ramsar, n 18, Strategic Framework and Guidelines; Convention on Biological Diversity, n 6, Decision VII/28.

⁸⁷ DEWHA, n 22, p 7 (emphasis added).⁸⁸ Ramsar, n 24, Resolution IX.6.

⁸⁹ National Water Commission, *Australian Water Reform 2009: Second Biennial Assessment of Progress in Implementation of the National Water Initiative* (September 2009), http://www.nwc.gov.au/resources/documents/2009_BA_complete_report.pdf viewed 10 November 2009.

⁹⁰ *Water Act 2007* (Cth), s 3.

⁹¹ MDBA, *The Basin Plan: A Concept Statement* (2009), <http://www.mdba.gov.au/files/publications/basin-plan-concept-statement.pdf> viewed 24 June 2009 (MDBA Basin Plan); MDBA, *Development of Sustainable Diversion Limits for the Murray-Darling Basin*, Issue Paper (2009) http://www.mdba.gov.au/media_centre/media_releases/mr-water-extraction-limits viewed 30 November 2009 (MDBA Issues paper).

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Basin; and take account of the ecological character descriptions of declared Ramsar and all other key environmental sites within the Basin.⁹² The Basin Plan is also required to set long-term average sustainable diversion limits for the water that may be taken from the "water resources" (broadly defined) of the Basin as a whole and of each water resource management area within the Basin, and those limits "must reflect an environmentally sustainable level of take".⁹³

To help achieve this, since 2007 the Commonwealth government's "Water for the Future Program" has been acquiring water and, at 30 June 2010, 591 GL of average annual volume in water entitlements had been purchased.⁹⁴ Of a \$12.9 billion program budget, \$3.1 billion is allocated to purchase water, enough to purchase

around 1,268 Gl in average annual water, or about 11.2% of the Basin's annual consumptive water use (Table 6).⁹⁵ Likely environmental water recovery under all major existing State and Commonwealth government programs amounts to 2,540 Gl average annual flow, or 22.4% of annual consumptive use.⁹⁶

IMPLICATIONS FOR THE GOVERNMENT AND CONVENTION

Having described the ecological and governance status of the six selected Ramsar sites, this article will now discuss the implications for the Commonwealth government and the Ramsar Convention.

Is climate change “negative human-induced” and unavoidable?

Under the Convention, contracting parties are obliged to report “natural and positive change, and no change, in wetland ecological character” without a requirement for further action, whereas for “negative human-induced change” they must report and respond with conservation measures.⁹⁷ The Ramsar Standing Committee noted:

There is, however, no guidance provided to Parties on how to distinguish human-caused changes from naturally-occurring changes. In practice this can be difficult, since, for example, an apparently natural change to a site may in practice be the consequence of a human-caused ex situ change, such as changes in the water management elsewhere in a river basin. Furthermore, changes observed as natural may be an indirect consequence of a human activity, such as ecosystem change resulting from global climate change driven by human-caused increases in greenhouse gas emissions.⁹⁸

The Standing Committee went on to say that:

as for Article 3.2 reporting ... it should be noted that not all such trends, for example as a consequence of climate change, will necessarily be adverse, as is recognized by the STRP's [2002] report on climate change and wetlands.

The Commonwealth government notes that while “[t]here is no guidance currently available from the Convention on how to distinguish human-induced changes from those that are naturally-occurring ... [i]t is widely recognised that the current rate of climate change is human-induced”.⁹⁹ It is conceivable that some wetlands in Australia may benefit from climate change; for example, those that may expand with greater precipitation in north-western Australia. However, in the southern Basin only negative impacts are expected; for example, further contractions in the wetland area, as indicated in Tables 1 to 3.

In the case of the Basin, it is possible at a coarse level to distinguish between the impacts of water (mis)management and climate change. The CSIRO assessment shows that while 71% (11,327 of

⁹² *Water Act 2007* (Cth), s 21(3).⁹³ *Water Act 2007* (Cth), ss 22-23.⁹⁴ DEWHA, n 78.⁹⁵ Productivity Commission, n 79.⁹⁶ Productivity Commission, n 79.⁹⁷ Ramsar, n 23, Resolution X.16. See Fig 1 above.

⁹⁸ Ramsar, *Background and Rationale to the Framework for Processes of Detecting, Reporting and Responding to Change in Wetland Ecological Character* (Changwon, 2008), http://www.ramsar.org/cda/en/ramsar-documents-cops-cop10-10th-meeting-of-the-19287/main/ramsar/1-31-58-127%5E19287_4000_0 viewed 10 March 2010, pp

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16,060 Gl/yr; see Table 6) of currently available surface water is diverted by human intervention, the forecasts to 2030 of climate change impacts on water availability range from +7% (+1,112 Gl/yr) to -37% (-5,875 Gl/yr). Clearly, the majority of the current degradation arising from desiccation originates from poor water management. Climate-induced changes to hydrology are expected to exacerbate these impacts, but even with the most extreme reduction in water availability forecast to 2030, with reallocation it would be physically possible to supply enough of the remaining water to the Ramsar sites to sustain them. While currently some 11,146 Gl/yr is diverted,¹⁰⁰ Jones et al¹⁰¹ reported that additional environmental flows of 4,000 Gl/yr – a reallocation of 36% (see Table 6) – would have a high probability of restoring ecological health to the southern basin wetlands. Indeed, should water prices remain stable, a tripling of the \$3.1 billion allocated to purchase water entitlements from the Commonwealth government's \$12.9 billion "Water for the Future" program could fund the purchase of this 4,000 Gl of water entitlements. It is also noted that \$2 billion is allocated for new water infrastructure to manage declining freshwater inflows into the Coorong and Lakes Alexandrina and Albert Ramsar site¹⁰² that would be redundant with greater environmental flows.

Reallocating water to the environment would have a socio-economic cost, particularly in terms of lost production from irrigated agriculture. Currently, 90% of diverted water in the Basin is used for irrigated agriculture, which generates 41% of total national agricultural production with an annual value of \$7 billion.¹⁰³ There is also a risk that reallocation of water to Ramsar sites could be at the expense of other wetlands in the Basin. Under the Convention, the Commonwealth government is obliged to manage all wetlands wisely by maintaining their ecological character.

It could be argued that, since the current dry period commenced in 2002, Australian governments have had insufficient time to implement effective measures to conserve the Ramsar sites. However, the risks of over-extraction of water from the river system have been understood for well over a century¹⁰⁴ and the risks of south-eastern Australia drying due to climate change were reported from the 1990s.¹⁰⁵ Consequently, the authors conclude that the threats to the Ramsar wetlands are "negative human-induced", avoidable, and require a response by the Commonwealth government. They also argue that the conservation of the sites is physically and financially possible.

CONFLICTS BETWEEN THE RAMSAR CONVENTION AND THE WATER ACT 2007 (CTH)

Having established that the Commonwealth government has an obligation to respond to the degradation of the Basin Ramsar sites, the authors now consider whether their

response measures meet the Convention's requirements. The Government has not invoked the "urgent national interests" provision of the Ramsar Convention (Table 4; Fig 1) and, consequently, has an obligation to supply adequate water to all Ramsar sites to maintain their ecological character. Arguably, therefore, the MDB governments' 2003 decision (prior to adoption of the *Water Act*) to set conservation objectives for four of the six River Murray icon sites that would maintain only a portion of their area¹⁰⁶ (Tables 1 and 2) is a breach of the Convention.

The Commonwealth government has not applied the full range of Ramsar Convention measures for sites undergoing changes in ecological character that it is obliged or has the option to apply (see

¹⁰⁰ CSIRO, n 56. ¹⁰¹ Jones et al, n 76. ¹⁰² Kingsford et al, n 69.

¹⁰³ Australian Bureau of Statistics, Australian Bureau of Agricultural and Resource Economics, Bureau of Rural Sciences, *Socio-Economic Context for the Murray-Darling Basin – Descriptive Report* (Murray-Darling Basin Authority, Canberra, 2009), <http://www.mdba.gov.au/files/publications/Socio-economic-context-report-b2.pdf> viewed 24 December 2009.

¹⁰⁴ Connell D, *Water Politics in the Murray-Darling Basin* (The Federation Press, Leichardt, 2007).

¹⁰⁵ Schreider SY, Jakeman AJ, Whetton PH and Pittock AB, "Estimation of Climate Impact on Water Availability and Extreme Events for Snow-free and Snow-affected Catchments of the Murray-Darling Basin" (1997) 2(1) *Australian Journal of Water Resources* 35.

¹⁰⁶ MDBMC, n 55.

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Table 4) at each impacted site. The situation at the Coorong and Lakes Alexandrina and Albert is considered below. In respect of the other five sites, no Art 3.2 report has been made, which is an apparent breach of the Convention. The government has made a policy decision that:

[A] notification will not be made where climate change is the principal cause of identified ecological character change. It is widely recognised that the current rate of climate change is human-induced. However, the potential impacts of climate change on wetlands, and the implications of this relationship for the Convention as a whole, are complex. The issue is under active consideration by the Convention. Wetland ecology is complex and it is unlikely that change at a site could be attributed in a scientifically robust manner principally to human-induced climate change. However, where it appears that climate change is the main driver of ecological character change, and until such a time as the Convention provides guidance on an approach to this issue, it will not be an accepted basis on which to make a notification.¹⁰⁷

Importantly, Ramsar Resolution X.16 does not exclude climate-induced changes in ecological character. Consequently, the Commonwealth government is obliged to report and respond to climate change impacts on its Ramsar sites under Art 3.2.

The Commonwealth government has now embarked on a process of setting a new

sustainable diversion limit and Murray Darling Basin Plan, which the *Water Act* requires to “reflect an environmentally sustainable level of take”.¹⁰⁸ There is cause for concern with key measures, such as the sharing of future reductions in water availability between the environment – including Ramsar sites – and consumptive users. While the intention to proactively assign such risks and costs is commendable, the government has proposed two different policies that appear incompatible and ambiguous.

The 2009 MDB Plan concept paper reflected the 2004 National Water Initiative¹⁰⁹ policy in proposing that risk of future reductions in water entitlements will be borne by:¹¹⁰

- (i) water entitlement holders for reductions due to climate change or “periodic natural events”;
- (ii) a government as the result of changes in that government’s policy; and
- (iii) water entitlement holders and governments if improvements in knowledge require reductions in

water take to achieve environmentally sustainable levels.

However, the MDBA sustainable diversion limits discussion paper subsequently proposes that:

A principle of pro rata sharing of climate change impact between consumptive users and the environment of any overall reduction in water availability due to climate change could be an appropriate starting point.¹¹¹

Currently, the environment’s share of water is disproportionately reduced at times of water scarcity.¹¹² The authors contend that the Commonwealth government is obliged under international law to “maintain the ecological character” of each of its Ramsar sites while ever it is physically possible, meaning that only after minimum ecological requirements are met should water reductions due to climate change be shared with consumptive users: it is not a simplistic value judgement on “balance”. Recently, the CoP urged:

Contracting Parties to ensure that the necessary safeguards and mechanisms are in place to maintain the ecological character of wetlands, particularly with respect to water allocations for wetland ecosystems, in the face of climate driven changes.¹¹³

¹⁰⁷ DEWHA, n 22, pp 8-9. ¹⁰⁸ MDBA Basin Plan, n 91; *Water Act 2007* (Cth), s 23.

¹⁰⁹ Council of Australian Governments, *Intergovernmental Agreement on a National Water Initiative* (2004), <http://www.nwc.gov.au/www/html/117-national-water-initiative.asp> viewed 7 November 2008, s 48.

¹¹⁰ MDBA Basin Plan, n 91, p 15.

¹¹¹ MDBA Issues Paper, n 91, p 40.

¹¹² CSIRO, n 56.

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Section 86A of the *Water Act*, inserted by amendment in 2008, also appears to be in conflict with Australia's obligation under the Convention by declaring that the highest priority water use for Basin water resources is accorded to the vaguely defined "critical human water needs". Section 86(2) defines them as:

the needs for a minimum amount of water, that can only reasonably be provided from Basin water resources, required to meet [...] core human consumption requirements [and] those non-human consumption requirements that a failure to meet would cause prohibitively high social, economic or national security costs.

This priority is reinforced in preparation of the Basin Plan in s 86A(1), which also states that it does not limit the general basis on which the Basin Plan is to be developed under s 21; ie giving effect to relevant international agreements. Thus, the *Water Act* sets up an inevitable tension between fulfilment of the Ramsar Convention obligation to maintain the ecological character of Ramsar sites and the provision for broadly defined critical human needs.

This tension may be characterised as a constitutional dilemma: what happens when the legislation implementing Convention obligations does so only partially and contains provisions that are, arguably, in conflict with the Convention obligation? It is not fatal to the validity of the Commonwealth legislation that the legislation implements only part of the treaty obligations into domestic law.¹¹⁴ However, Commonwealth legislation could be held to be invalid if:

- a) the deficiency in domestic legislation was so substantial as to deny the law the character of a measure implementing the Convention; or
- b) when coupled with other provisions in the legislation, the deficiency in implementing international treaty obligations made the legislation *substantially inconsistent* with the treaty or Convention.¹¹⁵ □ The *Water Act* may be at risk of being declared constitutionally invalid under s 51(xxix) of the

Commonwealth *Constitution* if deficiencies in implementing the terms of the Ramsar Convention, coupled with provisions that impose negative ramifications on Ramsar sites, make this legislation "substantially inconsistent" with the terms of the Ramsar Convention. However, this result would be so detrimental to the general benefit of implementing the *Water Act* provisions that the High Court may decline to come to this view, especially if the source of the international obligation is based only on a recommendation or resolution of the CoP.¹¹⁶

On the other hand, the High Court may be unlikely to invalidate the critical human

needs provisions alone, especially if they could be upheld under other heads of Commonwealth legislative power. It may be that the High Court would be content to recognise the tension in the legislation and simply uphold the executive government's determination in the Basin Plan. Further, whichever side of the water resources debate may instigate legal proceedings, it is not clear that the High Court of Australia would regard the challenge as raising a justiciable issue and, if it did, what remedy it could apply if the legal ground of review could be made out.¹¹⁷

Ramsar processes: Sites and climate change

Having considered the legal obligations of the Commonwealth government to maintain the ecological character of Ramsar sites, this article now discusses the implications for the Convention of future, more severe climate change impacts. There is an “overarching principle that a wetland should remain designated as a Ramsar site, and that the whole of its original extent should remain designated,

¹¹⁴ *Victoria v Commonwealth* (1996) 187 CLR 416 at 488 (Brennan CJ, Toohey, Gaudron, McHugh and Gummow JJ); see also *Commonwealth v Tasmania* (1983) 158 CLR 1 at 172 (Murphy J), 233-234 (Brennan J); *Chu Kheng Lim v Minister for Immigration* (1992) 176 CLR 1 at 75 (McHugh J).

¹¹⁵ *Victoria v Commonwealth* (1996) 187 CLR 416 at 488. See also *Commonwealth v Tasmania* (1983) 158 CLR 1 at 268 (Deane J), cited in the Industrial Relations case.

¹¹⁶ *Pape v Federal Commissioner of Taxation* (2009) 238 CLR 1 at 165 (Heydon J). However, in *Pape*, the international recommendation was not founded on any convention obligations.

¹¹⁷ See Gardner A, “The Legal Protection of Ramsar Wetlands: Australian Reforms” (2011) Edward Elgar(forthcoming).

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whenever possible and appropriate”,¹¹⁸ a principle that is strongly defended by many stakeholders concerned that member governments may change site boundaries for mendacious reasons if they were allowed to do so. Originally, changes to Ramsar site designations were only envisaged “in the urgent national interest”. A more recent decision of the Convention, Resolution IX.6, envisages a range of situations in which a site's ecological character may change and it may no longer meet the criteria for Ramsar listing. The foremost obligation of parties in these circumstances is to restore the site, if it is possible. If restoration is not possible, the site may remain as a Ramsar wetland if one or more of the criteria remain fulfilled. If the site in part or in full no longer meets the criteria for Ramsar site listing, the site may be deleted or restricted after an application has been approved by the triennial Conference of the Contracting Parties and a compensatory wetland area is proposed for listing (see Fig 1).

Strangely, none of the relevant Ramsar resolutions¹¹⁹ explicitly describe a process for managing changes in ecological character due to climate change. The authors contend that human-induced climate change at the national scale could often be

considered unavoidable, requiring “consideration of the deletion or restriction of the boundaries of a listed Ramsar site”.¹²⁰ For example, while excessive water diversions are clearly human induced and avoidable change, water diversions that have historically been considered acceptable may become excessive with the impacts of climate change. However, the impacts of climate change on specific Ramsar wetlands may be considered avoidable if management interventions can counter these threats; for example, by providing environmental flows. For instance, there would clearly be enough water to maintain at least some if not all of the Ramsar wetlands in the Murray Darling Basin under the median climate change scenario for 2030 (Table 5).

In the discussion above, it was concluded that the changes in ecological character in the Ramsar sites in the Basin to date are primarily human-induced and avoidable. However, if more severe climate change is experienced – such as the CSIRO extreme dry scenario – then ecological thresholds may be exceeded and change could be considered unavoidable. Australia’s obligations under the Convention in these circumstances are to: a) maintain all Ramsar sites that still meet one or more of the listing criteria, b) manage all wetlands wisely, and c) apply Resolution IX.6 to sites that no longer meet the listing criteria.

The Ramsar Convention’s capacity to facilitate management of changes in the ecological character of many of the 1,880 listed Ramsar sites in the 160 contracting parties, due to climate change, currently appears to be weak. Relevant Convention decisions are not explicit in naming the impacts of climate change to guide member governments and these decisions require interpretation that may be contested. Given the likelihood of large scale climate change impacts on particular wetland types,¹²¹ such as coral reef or alpine wetlands, more explicit guidance and processes will be required. Two aspects of the Ramsar Convention’s decisions appear to be particularly unclear in managing climate-induced changes in the ecological character of Ramsar sites: a) compensation through designation of new Ramsar wetland areas and, more importantly, b) a process for managing sites undergoing change that still meet Ramsar site listing criteria.

Compensation through designation of new Ramsar wetland areas.

The Convention’s Art 4.2 states that:

where a Contracting Party in its urgent national interest [subsequently applied under Resolution IX.6 to sites that no longer meets the criteria for designation], deletes or restricts the boundaries of a wetland included in the List, it should as far as possible compensate for any loss of wetland resources, and in particular it should create additional nature reserves for waterfowl and for the protection, either in the same area or elsewhere, of an adequate portion of the original habitat.

¹¹⁸ Ramsar, n 24, Resolution IX.6.

¹¹⁹ Ramsar, n 11, Resolution IX.1. Annex A; Ramsar, n 24, Resolution IX.6; Ramsar, n 23, Resolution X.16; Ramsar, n 113, Resolution X.24.

¹²⁰ Ramsar, n 24, Resolution IX.6. ¹²¹ Ramsar, n 113, Resolution X.24.

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Article 4.2 is interpreted as meaning that any type of wetland of comparable size may be designated for compensation. True compensation would seek to replace like with like, reinforcing the ecological emphasis of Ramsar's site criteria on aspects such as representativeness.

There are some issues in applying these propositions to practical situations. First, if a new site meets the Ramsar criteria, it should be designated as a site regardless of a compensation process. Secondly, in the context of threatened large or unique Ramsar sites like the Coorong and Lakes Alexandrina and Albert, there are unlikely to be any additional wetlands in the same area or with similar ecological characteristics. Further, in an era of climate change, the ecological character of alternative sites is also likely to be changing. The CoP has identified development of guidance on "mitigation and compensation for wetland loss" as a priority to be addressed by 2012¹²² but needs explicitly to consider the climate change implications for these procedures.

Managing sites undergoing change that still meet Ramsar criteria

Our assessment has identified a gap in Ramsar Convention processes for managing sites undergoing climate and other changes that still meet one or more Ramsar site listing criteria.¹²³ It is possible that some Ramsar member governments could respond to climate change by revising RISs, and the summary of ecological character that they contain, to set new baselines without addressing negative underlying causes of the changes. RISs provide essential data on all designated wetlands, in part to provide baseline data for measuring changes in the ecological character of Ramsar sites. From 1996, the parties committed to providing updated RIS information for all of their Ramsar sites "no later than *every six years* or on the occasion of any significant change in the sites' ecological character".¹²⁴ Under Convention practice, the Ramsar Secretariat accepts RISs of member governments provided that they are technically accurate.

Resetting the ecological character through RISs, to describe a less desirable state, would appear to be against the spirit of the Convention if not the letter of its decisions. Nevertheless, this would be tempting for governments, such as those in Australia, where a lesser obligation to maintain a more degraded wetland would require less water, less expense, and fewer hard political decisions. Resolution VI.1, Annex 2.1 emphasises the need for the ecological character baseline to be established to monitor for any subsequent changes, stating: "[i]t is essential that the ecological character of a site be described by the Contracting Party concerned *at the time of designation for the Ramsar List*, by completion of an Information Sheet on Ramsar Wetlands".¹²⁵ In Annex 2.8, the Convention goes on to say that "[i]n some instances a Contracting Party may decide to restore a wetland to re-establish the ecological character that existed prior to the date of designation. In the case of such restoration programmes, a new Information Sheet should be provided, to establish a new baseline for assessing any future change".¹²⁶ This provision for ecological character

descriptions, revised only to reflect enhanced ecological conditions, is supported by the lack of provision for revision of RISs in the case of negative human-induced change in Resolution X.16.¹²⁷

As yet, the Convention is silent where climate-induced changes to ecological character mean that the RIS and ECD are no longer a practical basis for managing a site that still meets one or more listing

¹²² Ramsar, *Resolution X.10: Future Implementation of Scientific and Technical Aspects of the Convention* (Changwon, 2008), http://www.ramsar.org/pdf/res/key_res_x_10_e.pdf viewed 5 January 2010, Annex 2 at [9.1].

¹²³ The Coorong and Lakes Alexandrina and Albert (case study below) is likely to be one such site.

¹²⁴ Ramsar, *Resolution VI.13: Submission of Information on Sites Designated for the Ramsar List of Wetlands of International Importance* (Brisbane, 1996), http://www.ramsar.org/cda/ramsar/display/main/main.jsp?zn=ramsar&cp=1-31-107^20952_4000_0 viewed 4 January 2010 (emphasis in original).

¹²⁵ Ramsar, *Resolution VI.1: Working Definitions of Ecological Character, Guidelines for Describing and Maintaining the Ecological Character of Listed Sites, and Guidelines for Operation of the Montreux Record* (Brisbane, 1996), http://www.ramsar.org/cda/ramsar/display/main/main.jsp?zn=ramsar&cp=1-31-107^20929_4000_0 viewed 4 January 2010 (Resolution VI.1).

¹²⁶ Ramsar, n 125, Resolution VI.1. ¹²⁷ Ramsar, n 23, Resolution X.16, Flowcharts 2 and 3.

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criteria. How should the Convention deal with these circumstances? The authors urge the development of a new Ramsar process (see Fig 1 response option B). The Commonwealth government appears to recognise this by proposing a process not currently provided for under Ramsar decisions:

where remediation to the ecological character of the site at the time of listing is neither possible nor feasible, [we will establish] new objectives for the site (which retain the international importance of the site) and a revised adaptive management strategy to support these new objectives. This will also require the development and submission of a new RIS.

...

[W]here remediation to the ecological character of the site at the time of listing was neither possible nor feasible ... an updated RIS and ECD will be prepared for submission to the Ramsar Secretariat.¹²⁸

The authors argue that national governments should not be able to unilaterally change the ecological character summary in RISs in this way because of the temptation to lower ecological objectives for political convenience. Instead, the Ramsar Convention parties need to establish guidelines and a new, independent review process for proposed changes in ecological character descriptions, to ensure that such changes are scientifically justified, transparent and accountable. Although Convention resources

are limited, the authors propose an amendment process based on a fully transparent review by the Ramsar Scientific and Technical Review Panel with recommendations to be approved by the Ramsar Standing Committee. Development of such a process should be a Convention priority for its 2012 Conference. The need for such a process is illustrated by the Commonwealth government's dilemma on management of the Coorong and Lakes Alexandrina and Albert site.

Example: The Coorong, and Lakes Alexandrina and Albert site

The Coorong and Lakes Alexandrina and Albert Ramsar site covers 140,500 ha near the mouth of the River Murray. The 1985 designation of this site is not based on a "natural", pre-European ecological character, but rather the ecology resulting from the construction of barrages early last century between the Coorong and the Lakes that, until very recently, artificially maintained the Lakes as permanent freshwater bodies at a consistent and higher elevation. Excessive diversions of water in the Basin aided by the current "drought" saw flows to the sea cease from 2002, resulting in the lake levels falling below sea level, becoming hyper saline, and acidifying.¹²⁹ While the Commonwealth government notified the Ramsar Secretariat of a change in ecological character under Art 3.2 in 2006,¹³⁰ it has not articulated its management objectives for the site ahead of the proposed 2011 Basin Plan that will allocate freshwater inflows. The Commonwealth and South Australian governments are, however, undertaking and planning a series of engineering interventions to manage acidity by further dividing the site with barrages to maintain smaller areas as freshwater wetlands while assessing the viability of letting the sea into most of Lakes Alexandrina and Albert as an option of last resort.¹³¹ While the Ramsar Secretariat has been notified of these assessments, the Commonwealth government has not followed other Ramsar Convention processes for the site (Table 4). Further, climate change-induced sea level rise could see this low-lying site inundated by seawater within 25 to 50 years.¹³²

The site would appear to qualify for Ramsar site listing under one or more of the criteria for any of the four potential ecological states – natural, post-barrage (when designated), degraded (current), or modified by climate change (in the future) – but what should the Australian governments manage for and what ecological character and RIS should the Ramsar Convention accept? Kingsford et al propose one set of management objectives that would place less emphasis on engineering interventions and

¹²⁸ DEWHA, n 22, pp 8, 13. ¹²⁹ Kingsford et al, n 69; Phillips and Muller, n 69.

¹³⁰ Zammit C, *Article 3.2 notification: Changes in Ecological Character at the Coorong, and Lakes Alexandrina and Albert Ramsar Site (Ramsar site 321)* (Department of Environment, Heritage and the Arts, Canberra, 2006).

¹³¹ Kingsford et al, n 69. ¹³² Kingsford et al, n 69.

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maintain a substantially freshwater and fluctuating lakes ecosystem, but this requires an environmental water reallocation of 700 GL to the lower River Murray alone. Although this proposal appears technically and financially feasible (see Table 6), a spokesperson for the Minister for Climate Change, Penny Wong, stated that it would be “highly irresponsible” and require a total ban on drawing any water from the Murray for the city of Adelaide or towns, cities and irrigation along the river.¹³³ Regardless of the ecological character objectives chosen, they will need to be different to those for which the site is currently listed, highlighting the need for a new Ramsar process as proposed in Fig 1 response option B. This article argues that the Commonwealth government must ensure a scientifically-based, transparent and accountable process to revise the RIS and ECD to reflect the new circumstances. Australia has an important moral responsibility to set a global example on how to maintain the ecological character of wetlands under the Ramsar Convention while adapting to climate change impacts – it has the technical and institutional capabilities to ensure that this is done.

CONCLUSION

Five “icon” and Ramsar wetland complexes along the River Murray are degrading and the major cause is poor water management, as evidenced by human consumption of 71% of available surface water. As the Commonwealth government has not invoked any “urgent national interest”, it is obliged to restore and maintain the ecological character of the full extent of these wetlands, which has been estimated to require reallocation of 40% of water diverted into the Basin. Australia has inconsistently applied Ramsar processes to these sites undergoing changes in ecological character. A number of aspects of the Commonwealth *Water Act* also appear to be incompatible with Ramsar Convention obligations; namely, the priority afforded “critical human needs” and proposals for sharing future water reductions due to climate change. Further, plans to maintain only portions of four River Murray icon and Ramsar sites as wetlands and a policy not to report sites suffering from climate-induced changes under Art 3.2 are breaches of Australia’s commitments under the Convention. Climate change may further reduce surface water availability by up to a third by 2030. Physically it would appear that there is enough regulated water to sustain the listed Ramsar sites, at the expense of some socio-economic values and possibly other wetlands. The Commonwealth government is obliged under the Convention to give priority to allocating water to maintain the ecological character of Ramsar sites.

This Murray-Darling Basin example exposes inconsistencies and gaps that the Ramsar Convention should seek to address at its 2012 Conference of Contracting Parties. Most importantly, the Convention has processes for restoring wetlands and for restricting or deleting sites, but not for managing unavoidable changes in ecological character for wetlands that continue to meet listing criteria. Climate change is not mentioned in key Ramsar decisions, illustrating the need to elaborate processes for adaptation to unavoidable, climate-induced impacts on Ramsar sites while retaining legal and other protections. The authors recommend a process whereby changes to a site’s RIS and ecological character description proposed by a national government are vetted by Convention institutions. This raises the question of how we should treat ecosystems in transition to a new state – such as some of the floodplain forests along the River Murray – and the novel ecosystems that arise from climate

change. Until now these have been regarded as degraded and undesirable, but will we need to determine criteria for valuing and conserving these ecosystems as part of a representative biodiversity conservation system?

¹³³ Wilkinson M, "Wetlands Disaster at the Mouth of the Murray", *The Sydney Morning Herald* (23 November 2009).

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Plan for China's Water Crisis Spurs Concern

Gilles Sabrie for The New York Times

The project will divert six trillion gallons of water a year from the Yangtze, seen from Wuhan, Hubei Province. [More Photos](#) » □ By **EDWARD WONG** □ Published: June 1, 2011

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A chronic drought is ravaging farmland. The Gobi Desert is inching south. The Yellow River, the so-called birthplace of





Chinese civilization, is so polluted it can no longer supply drinking water. The rapid growth of megacities — 22 million people in Beijing and 12 million in Tianjin alone — has drained underground aquifers that took millennia to fill.

Not atypically, the Chinese government has a grand and expensive solution: Divert at least six trillion gallons of water each year hundreds of miles from the other great Chinese river, the Yangtze, to slake the thirst of the north China plain and its 440 million people.

The engineering feat, called the South-North Water Diversion Project, is China's most ambitious attempt to subjugate nature. It would be like channeling water from the Mississippi River to meet the drinking needs of Boston, New York and Washington. Its \$62 billion price tag is twice that of the Three Gorges Dam, [which is the world's largest hydroelectric project](#). And not unlike that project, which Chinese officials last month admitted had “urgent problems,” the water diversion scheme is increasingly mired in concerns about its cost, its environmental impact and the sacrifices poor people in the provinces are told to make for those in richer cities.

Three artificial channels from the Yangtze would transport precious water from the south, which itself is increasingly afflicted by droughts; the region is suffering its worst one in 50 years. The project's human cost is staggering — along the middle route, which starts here in Hubei Province at a gigantic reservoir and snakes 800 miles to Beijing, about 350,000 villagers are being relocated to make way for the canal. Many are being resettled far from their homes and given low-grade farmland; in Hubei, thousands of people have been moved to

the grounds of a former prison.

“Look at this dead yellow earth,” said Li Jiaying, 67, a hunched woman hobbling to her new concrete home clutching a sickle and a bundle of dry sticks for firewood. “Our old home wasn't even being flooded for the project and we were asked to leave. No one wanted to leave.”

About 150,000 people had been resettled by this spring. Many more will follow. A recent front-page article in People's Daily, the Communist Party's mouthpiece, said the project “has entered a key period of construction.”

Some Chinese scientists say the diversion could destroy the ecology of the southern rivers, making them as useless as the Yellow River. The government has neglected to do proper impact studies, they say. There are precedents in

the United States. Lakes in California were damaged and destroyed when the Owens River was diverted in the early 20th century to build Los Angeles.

Here, more than 14 million people in Hubei would be affected if the project damaged the Han River, the tributary of the Yangtze where the middle route starts, said Du Yun, a geographer at the Chinese Academy of Sciences in Wuhan, the provincial capital.

Officials in provinces south of Beijing and Tianjin have privately raised objections and are haggling over water pricing and compensation; midlevel officials in water-scarce Hebei Province are frustrated that four reservoirs in their region have sent more than 775 million cubic meters, or 205 billion gallons, of water to Beijing since September 2008 in an

“emergency” supplement to the middle route.

Overseers of the eastern route, which is being built alongside an ancient waterway for barges called the Grand Canal, have found that the drinking water to be brought to Tianjin from the Yangtze is so polluted that 426 sewage treatment plants have to be built; water pollution control on the route takes up 44 percent of the \$5 billion investment, according to Xinhua, the official news agency. The source water from the Han River on the middle route is cleaner. But the main channel will cross 205 rivers and streams in the industrial heartland of China before reaching Beijing.

“When water comes to Beijing, there’s the danger of the water not being safe to drink,” said Dai Qing, an environmental advocate who has written critically about the Three Gorges Dam.

“I think this project is a product of the totalitarian regime in Beijing as it seeks to take away the resources of others,” she added. “I am totally opposed to this project.”

Ms. Dai and some Chinese scholars say the government should instead be limiting the population in the northern cities and encouraging water conservation.

The project’s official Web site says that the diversion “will be an important and basic facility for mitigating the existing crisis of water resources in north China” and that sufficient studies have been done. Wang Jian, a former environmental and water management official with the Beijing government and the State Council, China’s cabinet, agreed that the project “carries huge risks,” but he said there were no other options

given the severity of the current water shortage.

The middle route is to start major operations in 2014, and the eastern route is expected to be operational by 2013. The lines were originally supposed to open by the 2008 Summer Olympics, but have been hobbled by myriad problems.

The diversion project was first studied in the 1950s, after Mao uttered: “Water

in the south is abundant, water in the north scarce. If possible, it would be fine to borrow a little.”

In a country afflicted by severe cycles of droughts and floods and peasant rebellions that often resulted from them, control of water has always been important to Chinese rulers. Emperors sought to legitimize their rule with large-scale water projects like the Grand Canal or the irrigation system in Dujiangyan.

After the initial studies in the 1950s, the government did not look seriously again at the project until the 1990s, when north China was hit hard by droughts. In 2002, the State Council gave the green light for work to start on the middle and eastern routes; the western route, which would run at an average altitude of 10,000 to 13,000 feet across the Tibetan plateau to help irrigate the Yellow River basin, has been deemed too difficult to start for now.

Officials in Tianjin are so skeptical of the eastern route’s ability to deliver drinkable water that they are looking at desalinization as an alternative. Planners have more hope for the middle route, though the engineering is a much greater challenge — the canal has to be built entirely from scratch, with 1,774 structures constructed along its length to channel

the water, since there is no pre-existing waterway like the Grand Canal to follow.

At the start of the route, the water level of the Danjiangkou Reservoir on the Han River has been raised 43 feet to 558 feet so that the water can flow downhill to Beijing. The government said the rising waters and a need to combat soil erosion necessitated moving 130,000 farmers last year from around the reservoir. Similar relocations are taking place all along the main channel, which runs through four provinces.

About 1,300 residents of Qingshan township have been moved to Xiangbei Farm, desolate land where a prison once stood. The villagers now live in sterile rows of yellow concrete houses 125 miles east of their abandoned ancestral homes. A government sign in the middle of the settlement says: “The land is fertile and has complete irrigation systems.”

The farmers know better. Each person is supposed to get a small plot of land free, but the soil here is well known to be exceedingly poor. The people also complain that in the government’s compensation formula, their old homes were undervalued, so many have had to pay several thousand dollars to buy new homes.

“There’s nothing here,” said Huang Jiuguo, 57. “There’s no enterprise. Our children are grown, and they need something to do.”

For three days last November, thousands of residents of a resettlement area in Qianjiang city blocked roads to protest poorly built homes and lack of promised compensation, according to a report by Radio Free Asia. Officials ordered the

police to break up the rally, resulting in clashes, injuries and arrests.

Forced relocations, though, could pale next to larger fallout from the project.

The central question for people in Hubei is whether the Han River, crucial to farming and industrial production hubs, will be killed to keep north China alive.

In a paper published in the Bulletin of the Chinese Academy of Sciences, Mr. Du and two co-authors estimated that the diversion project would reduce the flow of the middle and lower stretches of the Han significantly, “leading to an uphill situation for the prevention of water pollution and ecological protection.” Though the study first appeared in 2006, the government has not altered its original plan, Mr. Du said.

Central planners decided on the amount of water to be diverted based on calculations of water flow in the Han done from the 1950s to the early 1990s; since then, the water flow has dropped, partly because of prolonged droughts, but planners have made no adjustments, Mr. Du said. The amount to be diverted is more than one-third of the annual water flow. “That will exert a huge damaging impact on the river,” he said.

The Han River is already facing enormous challenges — industries are discharging more and more pollutants, companies are dredging sand to feed construction needs in nearby cities and algal bloom has hit the river hard. The diversion of water to Beijing will add to the pressures. “If the water quality cannot be ameliorated effectively, the aquatic life populations will be further decimated,” Mr. Du and his co-

authors wrote.

The diversion from the Han is necessitating more complex projects to raise water levels. One side diversion brings water from the Yangtze to the Han. Another would bring water from the Three Gorges reservoir to the Danjiangkou reservoir.

Government officials in the south are keenly aware of the changes coming to the Han. In Xiangfan, officials have shuttered some small factories like paper producers and forced others to use more nonpolluting materials, said Yun Jianli, director of the environmental advocacy group Green Han River. “The local government is very concerned about the river and impact of the diversion project,” she said.

The political conflicts are obvious. Mr. Du, a member of the provincial consultative legislature, said officials in Hubei had been in constant negotiations with officials in Beijing for compensation. In the 1990s, the central government proposed a package of water projects valued at \$50 million at the time to help Hubei. After rounds of negotiations, the current proposal for supplemental water projects is estimated at more than \$1 billion.

The demands of the north will not abate. Migration from rural areas means Beijing’s population is growing by one million every two years, according to an

essay in China Daily written last October by Hou Dongmin, a scholar of population development at Renmin University of China. “With its dwindling water resources, Beijing cannot sustain a larger population,” Mr. Hou said. “Instead, it should make serious efforts to control the population, if not reduce it.”

Beijing has about 100 cubic meters, or 26,000 gallons, of water available per person. According to a standard adopted by the United Nations, that is a fraction of the 1,000 cubic meters, or 260,000 gallons, per person that indicates chronic water scarcity.

The planning for Beijing’s growth up to 2020 by the State Council already assumes the water diversion will work, rather than planning for growth with much less water, said Mr. Wang, the former official.

City planners see a Beijing full of golf courses, swimming pools and nearby ski slopes — the model set by the West.

“Instead of transferring water to meet the growing demand of a city, we should decide the size of a city according to how much water resources it has,” Mr. Wang said. “People’s desire for development has no end.”

Li Bibo, Jonathan Kaiman and Jimmy Wang contributed research from Beijing.



Water waste: The Murray River mouth needs only a third of the 2000 gigalitres proposed to be supplied to it each year.

Basin plan biased to SA

| July 27, 2011

THE federal Murray Darling plan is grossly biased, writes PETER HUNT

Murray Darling Basin's irrigators should be outraged by the Federal Government's obsession with delivering 2000 gigalitres a year to the Murray River mouth.

Any honest analysis of the basin plan shows it is heavily biased towards delivering water to South Australia.

It takes only two gigalitres a day to keep the Murray mouth open - 730 gigalitres a year.

The remaining 1270 gigalitres is "lost", mainly through evaporation off lakes Alexandrina and Albert.

These massive lakes cover 84,000ha and are artificially regulated via a line of barrages at Goolwa and where they meet the Coorong.

The [Murray Darling Basin Authority's](#) own publications state the main reason for the barrages is to maintain Adelaide's drinking water supply from Mannum, about 60km from where the river flows into Lake Alexandrina, near Wellington.

Yet South Australian governments have refused to move Adelaide's offtake further upstream, to above Loch One.

While the cost of building a new offtake and pipeline to Adelaide would be high, the savings would be immense.

The barrages could be removed or modified to allow seawater to move in and out without risking Adelaide's supplies.

Yet neither federal Labor nor their Liberal counterparts will debate the issue, due to fears of an electoral backlash in valuable marginal South Australian seats.

That refusal means the MDBA and the rest of the basin community must do all the heavy lifting.

It means NSW and Victorian governments will be forced to scrape together environmental works programs to cut the volume needed to water wetlands along their own share of the Murray and its tributaries.

It means irrigators and their communities will be drained of water that forms the foundation of their economies to recover and deliver an extra 2000 gigalitres to the Murray mouth.

[The Federal Government](#) will spend \$3.1 billion buying up NSW and Victorian irrigators' water and another \$5.8 billion on irrigation infrastructure to deliver 2000 gigalitres.

Imagine if just part of that money was spent on moving Adelaide's offtake above the lower lakes' system.

NSW and Victorian irrigators have repeatedly tried and failed to ignite debate on the issue.

Most lobbyists and industry leaders have resigned themselves to the "political reality" of the lower lakes debate. Yet now is the time to demand South Australia does its share to secure the basin's future.

Peter Hunt is *The Weekly Times'* state political reporter

Science to support water sharing planning in New South Wales

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Abstract

Water Sharing Plans (WSPs) have been developed for most of the regulated rivers and some ground water systems in New South Wales and 'Macro' WSPs are currently being developed for most of the remaining water resources of the state. Case studies for four contrasting individual plans are presented: the Murrumbidgee River (regulated surface water dominated by irrigation demand); the Cocks River (surface and groundwater with uses that include mining, electricity generation and supply for metropolitan Sydney); Lower Murray groundwater (consumptive use and over-allocation) and Toorumbree Creek (high conservation value with proposed irrigation demand). The design of Macro WSPs and progress with the first plan for the Lower North Coast is described. In April 2006 the National Water Commission published concerns about the New South Wales Water Reform progress and proposed conditions under which the withheld competition payment of \$13 million could be recouped. Concerns include the rigour of underpinning ecological science and the transparency of the process to stakeholders. The case studies describe how science has been used in the planning process so far and how improvements are being incorporated into Macro WSPs.

Keywords

Background

The catchments and sub-catchments chosen for the first round of Water Sharing Plans (WSPs) covered 36 stressed systems representing about 80 per cent of the water extracted in the state. Under the Water Management Act 2000, 31 plans were commenced in July 2004. Five alluvial groundwater plans were deferred and gazetted in December 2006 (NSW DNR, 2005). Macro Water Sharing Plans (Macro WSPs) are being prepared for most of the remaining unregulated rivers and groundwater where there is less intensive water use (NSW DNR, 2006b). In a recent audit of WSPs in New South Wales (NSW) the National Water Commission (NWC, 2006) concluded that the ecological science used was inadequate to inform decision making in some water systems; and that planning lacked transparency. Partly in response to these concerns, as lead agency in NSW, the Department of Natural Resources (DNR) commissioned two independent reviews. Consultants, URS, examined nine Stage 1 plans concluding that 'the extensive review provides clear evidence that NSW has fully met its obligations under the 1994 COAG Agreement and the ARMCANZ National Principles for the Provision of Water for Ecosystems' (NSW DNR, 2005). The Macro WSP process was also reviewed by an independent panel (Bowmer *et al.*, 2006). Suggestions for improvement were recently adopted by DNR and relayed to the NWC. However, the NWC remains concerned about WSP processes and has recommended a suspension of 13 million dollars of 2004-05 competition payments to NSW, but proposes that the penalty could be recouped if it can be demonstrated that for the remaining WSP systems there is an improvement in planning and that, where WSPs already exist, the outcomes of water sharing rules and environmental allocations are adequately monitored. In this paper our purpose is to reflect on the lessons learned in planning, especially in the context of concerns about underpinning scientific rigour, and look to future challenges and opportunities for improvement.

The Murrumbidgee (regulated surface water)

The Murrumbidgee River is a regulated river surface water system providing water for irrigation which underpins the regional wealth and employment. Water is also required to maintain the ecological function of

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the river and its floodplains, to support a Ramsar convention wetland and endangered fisheries, and to provide water downstream to the main stem of the River Murray. In September 1997 the Murrumbidgee River Management Committee was established and directed to set rules for water sharing between the environment and other water users, and between water users with different types of licences. The Committee's membership was drawn from five state agencies, nature conservation organisations, local government and indigenous representatives. The Committee met 32 times over more than five years (Bowmer, 2003). The committee was briefed by experts on

general principles of aquatic ecology, and reviewed the information available in the National Land and Water Resources Audit. Specific information on a river reach scale was obtained through two expert panels (Agribusiness Task Force, 2000; Buchan 2000) the State-wide program on Integrated Monitoring of Environmental Flow (NSW DNR, 2006a) and reports commissioned by the Committee which included: the status and restoration of fish populations (Lugg, 2000); non-flow options for wetland management (Maguire, 2000); the operation and benefit of the Environmental Water Allowance (Maguire *et al.*, 2000); and biological indicators for assessing river flow management (Watts *et al.*, 2001). Linear programming methods were used to assess the economic impact of the flow rules (Jayasuria & Crean, 2000) and choice modeling (Bennett & Morrison, 2001) provided insights on community preferences and preparedness to pay.

The daily flow Integrated Quantity and Quality Model (IQQM) was not available initially and a monthly model was used to develop the initial set of environmental flow rules. Knowledge deficiencies included the desirable frequency of wetland drying and watering, and the river height and duration needed to achieve wetland connection. Some of the requisite information has been published since flow rules were developed (e.g. Hardwick *et al.*, 2002; Page *et al.*, 2005). Because of the advantages of developing a set of automatic procedures for environmental flow release, a set of translucency rules was developed in which the release from the storage was triggered according to prevailing run-off patterns. The objectives were: to optimise the release of water in late winter to spring, avoiding 'waste' of environmental water through dam spilling; and to return some of the natural variability in the release pattern to scour sediment buildup and prevent algal blooms caused by low flow. However the benefits of this strategy were limited to the upper reaches of the river.

The Environmental Water Allowance is a volume of water that was set aside in storage and can be released at the discretion of NSW DNR with the advice of a reference group. Three releases were made: in September 1998, in August 2000 and in October 2001. The first release failed to raise river height sufficiently to inundate many wetlands especially in the lower reaches of the river. The second release was used to supplement ('piggy-back') onto a peak of unregulated tributary flow downstream of the storage and combined with weir pool manipulation to maintain peak height with travel downstream. Many of the lower and mid-level wetlands on the floodplain were successfully connected to the river, some for the first time for several years (Hardwick *et al.*, 2002). The last release was piggy-backed onto a surge peak provided for irrigation, with restriction on irrigation extraction during peak travel downstream, but achieved limited success. Following the success of the year 2000 EWA releases the Committee agreed by majority to increase the EWA account by transfer of up to 50GL from the translucency water allocation. Analysis of wetland inundation by 'piggy-backing', modeled retrospectively over 108 years of record showed an environmental benefit in numbers of extra events. These data will support the Reference Group to advise on targets and develop a set of automatic triggers for release of environmental water.

Coxs River (regulated surface water and groundwater)

The Water Management Committee was established in 2001 to develop a water sharing plan for the Coxs River surface and groundwater sources. It was also asked to

make recommendations on aquifer interference as a result of mining, inter-valley water transfers as a result of coal mining; and Deltas Electricity's Water Management Licence. The committee stakeholders represented power generation, coal mining, environment, tourism and recreation, farming and landholders, aboriginal culture, local councils and Sydney Water. A significant proportion of the water in the Coxs River is recycled and includes Lithgow sewage treatment plant effluent. The water is a source for metropolitan Sydney so issues of health and safety would be prominent in current public policy now, but were less so when the plan was prepared.

Prior to all decisions the committee sought technical, scientific and socio-economic information from a wide variety of sources including three state agencies, Jenolan Caves Trust, Delta Electricity, CSIRO, Western Research Institute and individual experts. The committee also accessed a range of background reports on stressed rivers (NSW DLWC, 1999); groundwater-dependent ecosystems (NSW DLWC, 2002); monitoring of environmental flow (Chessman & Jones, 2001); as well as specific reports on the Hawkesbury Nepean

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(NSW Healthy Rivers Commission, 1998) and hydrogeology of the Coxs River Catchment (Bish, 1999). Specific investigations on the Coxs River included reports on condition and proposed environmental flows (Young *et al.*, 2000) and on experimental environmental flows and ecosystem monitoring (Booth *et al.*, 1998).

In order to make decisions at a local level the surface water source was separated into five management zones which were named in recognition of the cultural significance of the Coxs River to the people of the Gundungurra nation. The determination of the bulk access regime and release options from Lake Lyell required major decisions. A daily hydrological model (IQQM), originally developed for Delta Electricity, was extended to 104 years of data, and, together with gauging station data, provided support for decision-making. Modelling demonstrated that construction of storages within the upper catchment had significant effects on flow regimes. Natural flow percentiles were used to define flow classes in each zone which were used in conjunction with the results of a volumetric conversion survey undertaken by DIPNR in 1998 on crop types and water usage to determine daily extraction limits for each zone. IQQM was also used to develop rules for environmental release from Lake Lyell that included drought triggers, transparent and translucent releases, flow duration, frequency of freshes, days of low flow, and daily flow variability.

The geological formations of the Coxs River, documented for coal mining in the region, provided the foundation of the groundwater science used. The ground water source was sub-divided into four hydrogeological boundaries. Assumed values for average rainfall and infiltration were used to develop recharge estimates and therefore sustainable yields for each aquifer. Permian and Triassic aquifers were found to be significantly larger than the portion located in the Coxs River hydrological boundary and WSPs for these large aquifers were limited by lack of scientific information.

More information was also required on the impact of mining on surface cracking and stream capture. To assist the committee in its deliberations and trade-offs between options an input-output model (based on West, 2003) was developed by the Western Research Institute to determine the contribution of various industries within the catchment. The model identified the critical role of coal mining and electricity generation in the catchment's economy and informed decisions about drought triggers and release rates from Lake Lyell Dam, and the Water Cap imposed on Delta Electricity.

Lower Murray (groundwater)

In most years extraction from the Lower Murray Alluvium aquifer was lower than sustainable yield but was assessed as 'high risk' by DLWC in 1998 on the basis that licensed entitlement (as opposed to use) exceeded sustainable yield approximately three-fold. In response, the Lower Murray Groundwater Committee was established, consisting of the Murray Groundwater Users Association, the Catchment Management Board, Nature Conservation Council, Berrigan Shire Council, Murray Irrigation and three state agencies. A comprehensive groundwater model was commissioned and peer-reviewed to aid confidence in decision-making about sustainable extraction rules.

Toorumbie Creek (unregulated surface water)

Toorumbie Creek is a sub-catchment of the Macleay River on the states mid north coast. The Mid North Coast Water Management Committee prepared a WSP for the Toorumbie Creek sub-catchment in 2000/01. The subcatchment was classified as having high conservation values by the stressed rivers assessment (NSW DLWC, 1999). There were no irrigation licences in the sub-catchment, but several licence applications had been received and there was interest from some local landholders to develop irrigated agriculture. The Committee's role was to determine how much (if any) surface water should be made available for irrigation purposes, whilst at the same time protecting the natural values of the system. An expert group, co-ordinated by DLWC, provided the Committee with more detailed information about Toorumbie Creek's natural values.

The Committee's final decision was based on attempting to balance the natural values of the creek against the potential socio-economic benefits of allowing new extraction. The Committee was preparing WSPs for sub-catchments areas (rather than entire river basins) and members were prepared to trade off between WSP areas. The Committee decided that Toorumbie Creek warranted greater environmental protection whilst water sharing rules for Commissioners Waters, another sub-catchment of the Macleay River, were designed to maintain access for the economic sustainability of water users. Hydraulic studies for fish requirements indicated that the proposed water extraction licenses could be issued with flow conditions set by the plan. However, the Committee grappled with a more fundamental issue concerning whether the conservation value of the creek warranted a complete exclusion of all irrigation. Conservation principles adopted from terrestrial

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ecology (Dunn, 2000) were used to compare Toorumbee Creek, with neighbouring sub-catchments. The Committee concluded that the relative levels of rarity and diversity in Toorumbee Creek did indeed warrant a total exclusion of water extraction (except for basic rights).

Retrospective analysis and lessons from earlier planning: The preceding case studies show that science was a major driver in the decisions of the Water Management Committees but additions and improvements were required as follows:

1. Consideration of the boarder landscape scale questions

Standard environmental flow methods may miss critical higher order decisions. For example, as plans moved from areas of higher to lower extraction, the emphasis has moved from restoration to preservation of flows. Concepts from terrestrial biodiversity conservation were employed in the Toorumbee plan. However, for more widespread application there is a need to determine the relative number of sub-catchments which require high levels of protection. Also, for example in the Murrumbidgee, there is a question about the extent to which the balance between safeguarding icon sites and maintaining river function can be optimised.

2. Science needs to be coached within a risk framework

Flow requirements using hydraulic methods based on wetted perimeter or flow depth are appropriate in systems modified by large dams or where there are high levels of extraction but in systems with a few extractors these methods do not reflect the true impact of extraction and lead to rules that are too restrictive.

3. Groundwater quality and surface water connectivity

Great gains have been made in the development of groundwater models to aid decision making for management of volumes of water in the major aquifers. However the models do not handle the important water quality characteristics of sodicity and salinity, nor have the capacity to report on the effects on soil structure and permeability of using groundwater of lesser quality, yet these predictions are vital for the overall sustainability of farming systems. In some cases, studies did not inform changing relationships between surface and groundwater use, or impact of groundwater use on river base flow or groundwater- dependent ecosystems.

4. Adaptive management When environmental water planning began in 1998-2000 it seemed appropriate to use a rule-based approach to environmental flows (i.e. translucency for release of water from storages to mimic some of the natural variability of flow for instream benefit). With better hydrological modelling capacity (IQQM) and new research information on the optimum frequency of river and wetland-floodplain connection it became possible to model a full range of options. As a result, for example in the Murrumbidgee, some of the translucency water was transferred to an 'environmental health allowance' which needs to be managed on a decadal, rather than annual, model. Also the recognition that floodplain connection can only be achieved in wetter years has resulted in a process of 'piggybacking' (combining environmental releases onto irrigation or natural tributary flow to achieve

wetland and floodplain connection). Using a similar principle, countercyclical trading was piloted by the Murray Wetlands Working Group (NSW MWWG, undated). *River Reach* (Murrumbidgee CMA and Murrumbidgee Irrigation; J. Howe, pers. comm.) also proposes the allocation of water to the environment in wetter years. □ 5. *Use of market mechanisms* □ Water sharing plans facilitate water markets and water trading. The *Riverbank* (NSW DEC, 2006a) program allocates water purchased from irrigators for specific environmental assets in the Gwydir, Macquarie, Murrumbidgee and Lachlan Valleys and provides a model for CMAs to engage in water purchase and trading on behalf of the environment. The emergence of environment as a customer raises questions about the optimum mechanisms for accessing environmental water through trading.

Macro Water Sharing

For the next round of planning in New South Wales, the Macro WSPs, planners and scientists have incorporated knowledge and experience derived from the first round of planning, noting particularly the five issues listed above. Central to the planning is the construction of a decision path to systematically filter and focus the development of rules using value and risk considerations, including local and indigenous review in accord with recommendations (NSW DEC, 2006b). Undertaking Macro planning at a catchment scale has allowed catchment-wide trade-offs to be more transparent and better documented. Manuals outline the technical and scientific elements of the planning process and the background documents detailing the science used in the decision process will be available for each individual plan (e.g. NSW DNR, 2007).

The best available scientific information and basic concepts from a number of sources have been accessed in the design of the Macro WSP process. These include: ecological values (Bennett *et al.*, 2002);

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socioeconomic values and decision support processes (NSW Healthy Rivers Commission, 2003); and geomorphic types (DWAF, 2004; Pierson *et al.*, 2002). Although current information is often incomplete, sufficient information is available to establish a risk profile and determine the relative risk from extraction. This information has been used to develop both access and trading rules to protect higher risk rivers and streams. The plans define a range within which the final rules will fall giving a level of certainty to both users and the environment. For example, the Lower North Coast WSP specifies that the minimum estuarine flow for the Manning River will range between 50MI/day and 220MI/day. The final rule will lie somewhere between these two bounds. The completion of the Macro WSP does not mean that the science is comprehensive. However, plans can use available science now to reduce or eliminate risk while the detailed understanding is being developed.

The integration of surface and groundwater planning is a priority of the National Water Initiative. In connected systems surface and groundwater rules have been

developed concurrently. Where there is a close connection between surface and groundwater they are covered under the same plan.

Looking to the future, Standards and Targets, against which Catchment Action Plans will be audited, have been announced recently (NSW NRC, 2005) and the NWC is refining its expectations of the planning process (Cullen, 2006). Changes to water supply and demand are anticipated including: increasing demand from metropolitan populations; reduction in water availability through climate change and interception by farm dams and afforestation; and new sources of environmental water through purchase and trading by environmental managers (trusts and Catchment Management Authorities). There is also an expectation that a holistic approach to the water cycle should underpin planning, including integration of surface and groundwater management. Macro WSPs can account for some of these changes through the provisions in the plans.

Conclusion

In individual WSPs, as noted earlier, a range of methods including input-output analysis, asset and risk analysis, multi-criteria analysis, cost benefit analysis, linear programming and choice modelling were used to achieve trade-off and optimisation through the deliberations of individual agency and representative committees. In Macro WSPs the approach is to gather expert opinion and then subject it to local and indigenous review. Macro planning has built on experience with developing individual WSPs over the last five years. The process includes an overarching risk-based framework, explicit inclusion of regional and local knowledge and targeted and general public consultation facilitated by CMAs. The rationale for changes to access and trading rules at each stage will be documented and publicly available. An adaptive management procedure isolates areas of conflict for further research and investigation.

References

- Agribusiness Task Force (2000). *The Murrumbidgee: assessing the health of a working river*. Agribusiness Task Force & NSW Government, 71 pp. + App., 2000.
- Bennett, J., Sanders, N., Moulton, D., Phillips, N., Lukacs, G., Walker, K., & Redfern, F. (2002). *Guidelines for protecting Australian waterways*, Land & Water Australia, 191 pp.
- Bennett, J. & Morrison, M. (2001). Estimating the environmental value of New South Wales Rivers. *Third Australian Stream Management Conference*. (Rutherford, I, Sheldon, F. Brierley, G. & Kenyon, C. Eds) Brisbane, 27-29 August 2001, pp. 29-34.
- Bish S (1999). *Hydrogeological assessment for Coxs River Catchment*, Sydney - South Coast Region, NSW Department of Land & Water Conservation, Sydney.
- Booth, C. A., Church A.G, Erskine, W.D., Hoese, D.F., Jacobs, S.W.L., & Marr, A.J. (1998). *Experimental environmental flows and related ecosystem monitoring and research of the Coxs River below Lyell Dam*, Centre for Integrated Catchment Management, University of Western Sydney (Hawkesbury), Richmond.

Bowmer, K.H. (2003). Reflections on developing a water sharing plan, *Proceedings of the 2002 Fenner Conference on the Environment*. B. P. Wilson, B. P. & A. Curtis. Eds, Johnstone Centre, Charles Sturt University, Albury, pp. 201-222, <<http://life.csu.edu.au>>

Bowmer K. H., Bennett, J., Hillman, T., & Flett, D.W. (2006). *Peer review of the NSW Macro Water Sharing Planning approach*, NSW Department of Natural Resources, 54pp.

Buchan, A. (2000). (Ed.) *Murrumbidgee health report card workshop draft*, NSW DLWC Murrumbidgee Region Technical Report No 01/02, 63pp. +App. December 2000.

Chessman, B., & Jones, H. (2001). *Rural production and water sharing –Integrated monitoring of environmental flows: design report*, NSW Department of Land and Water Conservation, Parramatta.

35

Wilson, A.L., Dehaan, R.L., Watts, R.J., Page, K.J., Bowmer, K.H., & Curtis, A. (2007). Proceedings of the 5th Australian Stream Management Conference. Australian rivers: making a difference. Charles Sturt University, Thurgoona, New South Wales.

Cullen, P. (2006). *Water planning*. National Water Commission, 7pp <<http://www.nwc.gov.au/publications/docs/PeterCullenWaterPlanning.pdf>>

Dunn H. (2000). *Identifying and protecting rivers of high ecological value*. Occasional Paper No. 01/00. Land and Water Resources Research and Development Corporation, Canberra.

DWAF (2004). *Methodology for the determination of the ecological water requirements of estuaries*. Department of Water Affairs and Forestry, Pretoria, Republic of South Africa.

Hardwick, L., J. Maguire, M., Foreman, M., & Frazier, P. (2002). Providing water for Murrumbidgee billabongs – maximising ecological value, *Australian Stream Management Conference*, Brisbane, 5 pp.

Jayasuriya R., & Crean, J. (2000). The agricultural impacts of environmental flow rules in the Murrumbidgee Valley. Report to the Murrumbidgee River Management Committee. NSW Agriculture, Orange, 43pp.

Lugg, A. (2000). *The Bidgee-bringing back the fish*, NSW Fisheries, 32pp., May 2000. □ Maguire, J. (2000). *Non-Flow Options for Filling Wetlands, 1999 Trials*. Report to the Murrumbidgee River

Management Committee, February 2000, 21pp. □ Maguire, J., L. Hardwick, Foreman, M., & Buchan, A. (2000). *Murrumbidgee environmental contingency*

allowance, Technical Report 01/01 Murrumbidgee Region, NSW Department of Land and Water

Conservation, 17 pp. □ NSW DEC (2006a). *New South Wales RiverBank 2006-07 Business plan*

<<http://www.environment.nsw.gov.au/resources/2006442riverbankbp.pdf>>. □ NSW DEC (2006b). *Outcomes of Workshops: Considerations for Designing Aboriginal Consultation for*

Macro Water Sharing Plans. □ NSW DLWC (1999). *Stressed rivers assessment report*, NSW Department of Land and Water Conservation,

Sydney. □ NSW DLWC (2002). *NSW State groundwater dependent ecosystems policy*, NSW Government, Sydney. NSW Healthy Rivers Commission (1998). *Independent inquiry into the Hawkesbury Nepean River system*,

Healthy Rivers Commission, Sydney. □ NSW DNR (2005). *New South Wales supplementary submission to the National Water Commission*,

Volume 1 Report, NSW Department of Natural Resources. 105pp. NSW DNR (2006a). *Integrated monitoring of environmental flows*

<<http://www.naturalresources.nsw.gov.au/care/water/imef/>> □ NSW DNR (2006b). *Macro water sharing plans. The approach for unregulated rivers. Report to assist*

community consultation. NSW Department of Natural Resources, 56pp □ NSW DNR (2007). *Background document to the Lower North Coast Water Sharing Plan*. NSW DNR (undated). *Overview of Macro Water Sharing Plans Minister's message*

<http://www.dnr.nsw.gov.au/water/pdf/macro_ws_overview.pdf> □ NSW MWWG (undated). *Adaptive environmental water allocation management*. NSW Murray Wetlands

Working Group <<http://www.mwwg.org.au/allocation.php>> □ NSW NRC (2005). *Recommendations state wide standards and targets*. NSW Natural Resources

Commission, 150pp. <[http://www.nrc.nsw.gov.au/_documents/Recommendations%20state-](http://www.nrc.nsw.gov.au/_documents/Recommendations%20state-wide%20standard%20and%20targets%20September%202005.pdf)

[wide%20standard%20and%20targets%20September%202005.pdf](http://www.nrc.nsw.gov.au/_documents/Recommendations%20state-wide%20standard%20and%20targets%20September%202005.pdf)>. □ NWC (2006). Chapter 2. *New South Wales In 2005 National Competition Policy assessment of water reform*

progress. Canberra: National Water Commission. <http://www.nwc.gov.au/nwi/ncp_water_reform.cfm>. Page, K., Read, A., Frazier, P., & Mount, N. (2005). *The effect of altered flow regime on the frequency and*

duration of bankfull discharge: Murrumbidgee River, Australia. *River Research and Applications*, 21, 1-

12. □ Pierson, W. L., Bishop, K., Van Senden, D., Horton, P. R., & Adamantilis, C. A. (2002). *Environmental*

water requirements to maintain estuarine processes. Environmental Flows Initiative Technical Report

Number 3. Canberra: National Heritage Trust. □ Watts, R. J., Ryder, D. S., Chisholm, L., & Lowe, B. J. (2001). *Assessment of environmental flows for the*

Murrumbidgee River. Developing biological indicators for assessing river flow management. Project

MB 19/96/SW/RM NSW Water Management Fund, 323pp. □ West, G. (2003). *Input output analysis for practitioners*, Centre for Economic Policy Modelling, University

of Queensland. □ Young, W.J., Brock, M.A., Chessman B.C., Gehrke, P.C., Maher, W.A., Marr, A., Olley, J.M., & Warner,

R.F. (2000). *Assessments of river condition under the current flow regime and proposed flow regimes in the Lower Cocks River, New South Wales.* A consultancy report to the Cocks River review Joint Working Party, commissioned by the New South Wales Department of Land and Water Conservation.. CSIRO Land and Water, Canberra Consultancy Report 00/23.

36

Wilson, A.L., Dehaan, R.L., Watts, R.J., Page, K.J., Bowmer, K.H., & Curtis, A. (2007). Proceedings of the 5th Australian Stream Management Conference. Australian rivers: making a difference. Charles Sturt University, Thurgooda, New South Wales.

Agriculture and Resource Management Council of Australia and New Zealand
Standing Committee on Agriculture and Resource Management

ALLOCATION AND USE OF GROUNDWATER

A National Framework for Improved Groundwater Management in Australia

Policy Position Paper for Advice to States and Territories

Task Force on COAG Water Reform Sustainable Land Water Resource Management Committee

Occasional Paper Number 2 December 1996

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AGRICULTURE AND RESOURCE MANAGEMENT COUNCIL OF AUSTRALIA AND NEW ZEALAND

The Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), established in 1993, is one of a number of Ministerial Councils set up by the Commonwealth and State Governments to further co-operation and collaboration in particular fields of mutual concern. ARMCANZ consists of Australian Commonwealth/State/Territory and New Zealand Ministers responsible for agriculture, land and water resources, and rural adjustment policy issues.

The Council is a non-statutory body. It provides a forum for the exchange of views on the development of policies, guidelines and programs to assist the beneficial and orderly assessment, development and management of Australia's resources. It is supported by a permanent Standing Committee, the Standing Committee on Agriculture and Resource Management (SCARM). Membership of the Standing Committee comprises relevant Departmental Heads/Chief Executive Officers of Australian Commonwealth/State/ Territory and New Zealand agencies as well as representatives of CSIRO and the Bureau of Meteorology.

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ALLOCATION AND USE OF GROUNDWATER

A NATIONAL FRAMEWORK FOR IMPROVED GROUNDWATER MANAGEMENT IN AUSTRALIA

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3

PREFACE

This paper is the result of an undertaking in the Council of Australian Governments (COAG) Water Reform Framework Agreement of 1994.

Preparatory documentation for the Framework recognised the importance of groundwater in Australia's natural resource base as well as the need for the "industry as a whole to pay its way." Issues such as efficient and sustainable use of water resources, full cost recovery and provision of adequate water for the environment were seen as areas of reform necessary to assist Australia's competitive position in the world.

ARMCANZ has prepared this paper in response to COAG's specific request, in Section 3 of the Framework, for the Council to further investigate and report on groundwater. In so doing, ARMCANZ recognises that groundwater is already implicitly included in the many provisions of the Framework Agreement, 1994, but there are also further specific opportunities for reform in relation to groundwater that warrant consideration in the context of ongoing development of reforms built on, and around, the original Framework.

This paper offers advice to jurisdictions on further opportunities for reform in groundwater management, consistent with the principles agreed in the Water Reform Framework, 1994 and the Competition Policy, 1995, but additional to the specifics of these agreements. The paper also establishes inter-governmental agreement or guidance on some implementation issues relating to groundwater within the formal commitments of the Framework Agreement, 1994 and the Competition Policy, 1995.

The subject matter of the paper has been deliberately confined to dealing with issues associated with groundwater allocation, pricing and use, and has not considered issues of groundwater quality protection. Groundwater protection has been adequately covered in the Groundwater Protection Guidelines published in September 1995, as a module of the National Water Quality Management Strategy.

This paper should be read in conjunction with the National Principles for the Provision of Water for Ecosystems prepared jointly for ARMCANZ and the Australian and New Zealand Environment Conservation Council, and the ARMCANZ policy position paper on Water Allocations and Entitlement - a National Framework for the Implementation of Property Rights in Water. It is based on a more comprehensive report prepared jointly by ARMCANZ and the National Landcare Program - "Towards a National Groundwater Management Policy and Practice, October 1995."

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EXECUTIVE SUMMARY

The Council of Australian Government (COAG) has endorsed a wide ranging program of reform of the water industry. This program specifically includes groundwater in recognition of the economic and social importance of the resource and also because of major potential impacts on the wider natural resource basis.

The fundamental importance of groundwater across Australia for irrigation, urban, industrial, domestic and stock uses cannot be over emphasised. Across the nation, however, there are many groundwater management practices which differ from the spirit of intent of the COAG Water Reform Framework Agreement.

A joint NLP/ARMCANZ report "Towards a National Groundwater Management Policy and Practice, November 1995" addressed gaps and makes a range of recommendations aimed at improving groundwater management.

From the above report this policy discussion paper sets out specific advice to jurisdictions on appropriate arrangements to ensure that groundwater management practices are consistent with the intent of the Framework Agreement and identifies a range of key reforms directly related to the COAG reform agenda:

Policy and Management

- ☐ achievement of efficient sustainable use of groundwater in accordance with a nationally agreed approach to sustainability
- ☐ public identification of the sustainable yield, allocation and use of aquifers, with

allocations limited to sustainable levels where appropriate

- ☐ removing restrictions on groundwater use imposed by inefficiently designed or constructed wells
- ☐ establishment of systems to support transferability of groundwater entitlements
- ☐ improved integration of groundwater and surface water management
- ☐ expansion of the National Driller's licensing system (Data and Information
 - ☐ provision of adequate funding for groundwater investigation in high priority areas
 - ☐ requirements for drillers to provide well construction data for all wells drilled
 - ☐ management and licensing of high yielding wells (Pricing
 - ☐ introduction of arrangements to provide for full recovery of direct costs of groundwater management with consideration being given to consequences of differential pricing between surface and groundwater where relevant. (Other Matters
- ☐ identification by the Federal Government of its full costs of groundwater related activities
- ☐ elimination of conflict of interest situations within Government institutional arrangements
- ☐ assessment of opportunities for development of groundwater education program(s)

III

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ALLOCATION AND USE OF GROUNDWATER

A NATIONAL FRAMEWORK FOR IMPROVED GROUNDWATER MANAGEMENT IN AUSTRALIA

1. Introduction

In February 1994 the Council of Australian Governments (COAG) endorsed a Framework Agreement for reform of the water industry in Australia. This framework comprises several elements, one of which is "in relation to pricing that management arrangements relating to groundwater be considered by Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) by early 1995 and advice from such consideration be provided to individual jurisdictions and the report be provided to

COAG. "

The Report of the Working Group on Water Resources Policy to COAG (February 1994) elaborates further:

"ARMCANZ by early 1995 might also consider the licensing/charging arrangements surrounding groundwater use given the importance of this resource and the adverse impact its indiscriminate use can have on the wider natural resource base. Advice could then be provided to individual jurisdictions to be used by them in their development of appropriate groundwater arrangements with the details of this advice to be contained in the report to COAG at the appropriate time."

As part of the general COAG water reform process a broad range of other management reforms have been agreed which either directly or indirectly impact upon groundwater management. These reforms include consideration of:

- ☐ water pricing to recover costs
- ☐ development of water allocation or entitlement systems that will provide for water trading and which (include provisions for the environment
- ☐ integrating natural resource management, integrated catchment approaches and consultative mechanisms (COAG noted that reliable data on Australia's groundwater resources were deficient. It was also noted that pricing principles and tradeable arrangements consistent with practices in surface water resource use should be applied to groundwater. (On the fundamental premise that management of groundwater is included in the provisions of the Water Reform Framework 1994, and the Competition Policy Agreement on Water 1995 ARMCANZ has commissioned this paper to provide advice to the States¹ on how the general principles contained in the water reform framework might apply to groundwater management in Australia. This paper draws from a joint National Landcare Program (NLP)/ARMCANZ report entitled "Towards a National Groundwater Management Policy and Practice, October 1995". Readers are referred to this report for more detail concerning the issues discussed in this paper. It should be noted that ARMCANZ endorsement of this paper does not imply endorsement of the recommendations contained in the broader report. (This policy discussion paper identifies key issues and recommendations which represent advice from ARMCANZ to the States for their consideration and implementation. In addition, several matters which ARMCANZ needs to address at a national level are identified. The recommendations of this report are consistent with approaches agreed to in the COAG Framework Agreement as they apply to surface water management. (2. Need for Good Groundwater Management (Groundwater is of fundamental importance to the development and growth of Australia. It is extensively used for urban water supplies, agriculture, irrigation, industry and mining. It is also important in sustaining a range of environmental systems. (¹Note that whenever reference to the States is made, it should be taken to mean "States and Territories of Australia".

Use of groundwater has grown significantly since the 2nd World War and has raised the need for management. The irreversibility of groundwater processes demands serious consideration of the needs for management to ensure sustainability of the resource.

In more recent years, the interdependence between groundwater and the broader natural resource base has been increasingly recognised and management needs to take account of the interactions with vegetation, surface waters and other ecosystems.

While at the national level, only 15% of the nation's groundwater resources are being used, local overuse is becoming a major concern. This overuse and inadequate management is creating resource degradation through processes such as depletion, salt water intrusion and pollution. Often this degradation is irreversible.

Through 500,000 wells and an asset base valued at about \$6.5 billion, Australia has made a huge investment in groundwater development. This investment can be expected to continue to grow, particularly as environmental concerns on increasing use of surface water force the use of groundwater as an alternative. The need for improved management will correspondingly increase and become more complex as environmental and social issues have to be taken into account and use levels approach sustainable limits.

3. Roles and Functions of States in Groundwater Resource Management

The legislative responsibility for management of groundwater in Australia is vested in the States. Most States have chosen to adopt a similar model with the primary management responsibility resting with the Statewide water agency, which traditionally also had responsibility for water supply functions. These institutional arrangements are changing rapidly in many States where water supply agencies are being separated from those with groundwater management functions. In some States, groundwater management responsibilities are being taken into agencies with broader natural resource management responsibilities. Investigation and monitoring functions relating to groundwater are undertaken either within the primary water management agency or alternatively by the associated Geological Survey Department. A variety of other agencies in each State, notably the environmental protection agencies, have other groundwater related responsibilities.

An ethic which recognises the need for groundwater management to protect the resource for future generations and to protect the environment is common to all States, however management practices vary considerably.

4. Key Reforms □ 4.1 Sustainability

Although groundwater use, at a State or National level, is well below the total assessed sustainable yield, nonetheless, in many specific areas allocations and/or use is in excess of the sustainable yield. In addition there is no single understanding or definition of sustainable yield across Australia. As any definition of sustainable yield embraces a range of technical as well as social environmental and economic factors, it is necessary for considerable community input to make judgement of what is

sustainable. It is essential that sustainable yield incorporate water quality considerations. Many of the allocations (and use) across Australia are in excess of the sustainable yield. In some cases this "overdraw" of the resource is publicly acknowledged, whereas in other cases it is not. To ensure sustainability of the groundwater resources of Australia it is important to recognise those areas where use, allocation or other practices do not comply with the fundamental principles of Ecological Sustainable Development. A key requirement is the need to better define acceptable environmental impacts as part of the allocation process.

There are some specific (and exceptional) circumstances where management policies are consciously adopted to "overdraw" the groundwater. Examples include the use of hypersaline water and dewatering for mining purposes, in areas where water resources are extremely limited. It is considered that this is acceptable provided there is a publicly accepted strategic benefit, the resource is used efficiently, not wasted, and is tightly managed.

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Recommendation 1

Groundwater management policies should employ the principles of ecologically sustainable development and should be directed at achieving sustainable use of the resource. ARMCANZ should develop an agreed nationally consistent definition and approach to sustainable groundwater yield.

4.2 Drilling

The licensing of drillers varies considerably between the States. In some States, driller licensing is only required in declared areas or for artesian wells. Considerable work has gone into the development of a National Drillers Licensing system. However the system is insufficiently comprehensive as not all water drillers are required to be licensed, contaminated site and other environmental drilling is not included and means to protect groundwater from other drilling activities (geotechnical, mining, etc.) are not addressed. It is considered that the National Drillers Licensing system needs to be expanded. Initially, by the end of 1997, this expansion should cover all water production wells, with the end aim being to cover all drilling which can affect the groundwater resource.

Recommendation 2

All States should adopt the National Drillers Licensing system for water production wells by 1997 and should seek to expand the system to all drilling.

4.3 Groundwater I Surface Water Management

In many situations groundwater and surface water are interconnected and interchangeable resources where decisions made in one area affect the other. Consider, for example, the situation which exists in parts of Australia where no groundwater licence is required for a well adjacent to a stream, whereas the stream is fully allocated. Currently there are many cases where different approaches to pricing, allocations and trade in entitlements create poor management decisions, adverse

environmental impacts and less than optimum use of the total water resource. Single resource policies embracing conjunctive use and integrated management of groundwater and surface water through allocation and pricing mechanisms need to be more actively pursued by the States.

Recommendation 3

Groundwater and surface water resource management should be better integrated, including approaches to pricing (especially adjacent to public surface water regulated schemes), water allocations and trading to ensure consistency.

4.4 Inefficient Well Design

There are many cases throughout Australia where relatively shallow wells tap the top of an aquifer. This especially applies to domestic and stock wells. As a consequence, new and frequently deeper wells readily dewater existing wells and their owners seek redress in varying forms. As a policy position, these frequently old and inefficiently designed wells should not be used as a basis for "tying up" the resource. To limit new development on the basis of the shallowest well is considered to be economically inefficient and poor management as new users frequently cannot gain access to a largely under-utilised resource.

Recommendation 4

In preparing groundwater management plans, policies and strategies, States should ensure that the efficient utilisation of groundwater resources is not compromised by protection of existing users with inefficiently designed or constructed wells. This particularly applies to domestic and stock wells.

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4.5 Water Markets

The development of water markets in groundwater is in its infancy in Australia. This is to be expected as there are few areas in Australia where embargoes on allocations exist. However, there is considerable potential for groundwater trading to expand throughout Australia as it offers the potential to solve difficult management issues as demand for use increases. Markets offer an alternative to 'command and control' approaches to moving water use to areas of higher economic value and higher efficiency.

The COAG Framework requires the implementation tradeable property rights, and in its National Framework for the Implementation of Property Rights of October 1995, ARMCANZ endorsed as one of the principles: "that all consumptive and non-consumptive water entitlements be allocated and managed in accordance with comprehensive planning systems and based on full basin-wide hydrologic assessment of the resource. "

It is noted that this includes groundwater and would require the development of groundwater management plans involving processes of community consultation and the development of strategies to reduce use to sustainable levels. The framework also sets out other principles for dealing with allocations and entitlements.

It is essential that the surface water market framework is consistent with a groundwater water market framework, if conjunctive use and other resource policies are to be followed.

Recommendation 5

States should develop groundwater management plans based on a sound understanding of the resource. These plans should be the primary support for the development of groundwater allocation and property right systems to support intra-aquifer trading both within the States, and across State borders.

4.6 Sustainable Yield/Allocation/Use Linkage

It has been estimated that 26 million ML/year of groundwater is available on a sustainable basis in Australia. Of this, it is estimated that about 15% is actually used in an average year. The amount of water that has been allocated (or committed to use) is difficult to estimate because of the variety of means of defining allocations. However, it is expected that the total allocated or committed exceeds usage for several reasons, particularly the occurrence of unused or under-used allocations.

While overall usage is well within sustainable limits, use at the local scale in many areas is known to exceed availability, and the consequences of overdraw are being experienced or are expected in the future. Good groundwater management requires an understanding of the level of sustainable availability, allocation and use, particular at aquifer scales.

The COAG Framework requires that environmental water provisions should be formally made in allocation processes. In a groundwater context this frequently translates to a consideration of environmental impacts due to groundwater abstraction, and for provisions to be adopted which place constraints on other uses so as to achieve appropriate protection of ecological values. The need to provide for water for the environment is one of the factors that defines the sustainable yield of the resources in terms of the amount of water that might be abstracted for consumptive uses.

Groundwater management plans should be developed from an understanding of the relationship between sustainable yield, allocation and use on an aquifer basis, as a primary basis for management decision making.

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Recommendation 6

In developing groundwater management plans, State agencies responsible for groundwater management ensure those plans include identification of the sustainable yield and the levels of allocation and use of aquifers. These plans should also include an identification of environmental water provisions in accordance with the principles set out in the joint ARMCANZ and ANZECC National Principles for the Provision of Water for Ecosystems. Where allocations exceed the sustainable yield, the agencies should develop strategies to reduce abstractions to sustainable levels within time frames that minimise permanent damage to the resource.

4.7 Availability of Well Construction Data

The requirement to provide well construction data from the driller to the relevant State authority varies widely across Australia. Well construction data is fundamental data upon which good groundwater management depends.

One requirement should be made mandatory across the Nation - the provision of data and information to the relevant authority.. This must include location and construction data. However, States should have the ability to allow exemptions in exceptional circumstances and specific areas as appropriate. This is because **the aim is to better manage groundwater**, not to collect data per se. Hence if adequate data exists in an area then mandatory data reporting can be waived.

If the data collection is linked to conditions in drilling licensing, then the cost impost will be minimal to both government and private businesses with a very high level of competent compliance assured.

Recommendation 7

The provision by the driller, to the relevant State Authority, of well construction data for all wells should be a mandatory requirement, with provisions made for exemption in areas, or circumstance, where the information is not required.

4.8 Information from High Yielding Wells

Only two States require licensing of all high yielding wells Statewide. Licensing of extraction is the major management tool which is used throughout Australia. The ability to specify an allocation, extraction rate and other requirements is considered to be fundamental to good management. Licensing should be encouraged wherever management is required, either now or in the foreseeable future. In all areas where there are high yielding wells, monitoring and data collection should be undertaken to a sufficiently high standard to ensure adequate information is available to manage the water resource sustainability. Where licensing is used as the primary mechanism for data collection, the provision of necessary management information will generally require licensing of all high yielding wells.

Recommendation 8

In all areas where there are high yielding wells, monitoring and data collection should be undertaken to a sufficiently high standard to ensure adequate information is available to manage the water resource sustainably. Where licensing is used as the primary mechanism for data collection, the provision of necessary management information will generally require licensing of all high yielding wells.

4.9 Pricing

Most States are not able to fully identify their expenditure on groundwater resource management and a variety of different costing approaches are used to describe their expenditure. Nevertheless, the total expenditure for all of Australia is estimated to be of the order of \$32 million, of which explicit State Government funding accounts for some 65%. Fees and charges on groundwater users for resource management are either zero or at a very nominal level in most States, except

Victoria, New South Wales and South Australia. Nationally, the level of cost recovery for groundwater management is 10%. However the level of cost recovery for direct management costs (i.e. licensing, day to day management and administration) is 35%. A broad range and type of fees and charges exist for licence application fees, annual charges and other charges.

COAG has supported a policy of cost recovery for the Australian water industry. However, the Water Reform Framework of 1994 and the Report of the Expert Group on Asset Valuation and Cost Recovery specifically relate to cost recovery for water services provided by utilities. The agreements also address cost recovery of groundwater management for utility services, implicitly in the Framework and explicitly in the Report of the Expert Group. However, cost recovery in relation to private withdrawals is not directly addressed by the agreement and is seen as one of the reasons for commissioning advice through this report.

The proposed application of cost recovery principles to groundwater resource management is set out below. In this context the proposals are:

- ☐ For the purposes of considering cost recovery issues, groundwater management activities be classified as:

- ☐ •direct management activities - the operation of water allocation regulatory systems (i.e. licensing, day to day management and administration) as well as metering and water level monitoring that is carried out to directly support management

- ☐ •indirect management activities - policy, investigation, assessment, monitoring, maintenance of technical data bases and related activities

- ☐ Full costs of all direct and indirect groundwater management activities be identified by the States.
- ☐ User charging should be related to the costs of direct management activities but may also give consideration to appropriate apportionment of indirect costs which could be realistically assigned to users. In urban water supplies the charging should be in place by 1999. In rural water supplies it is desirable for charging to be in place by 2001 but if, in accordance with the COAG Reform Framework, there are circumstances where States choose not to charge the full cost to the users, the subsidy should be publicly reported. For private withdrawals, the target proposed is similar to that for rural water supplies, with a desirability that user charges are introduced progressively by 2001 and, where cross subsidies exist beyond that time, that they are made transparent. Where and as, trading in particular groundwater entitlements becomes a demand of the market it is desirable that provisions have been resolved in respect to cost recovery associated with those entitlements so that market transfers are likely to be properly valued in the market.
- ☐ In relation to the cost of indirect management activities not appropriately charged to users, the States should examine the means of explicitly recovering these costs from the community, as beneficiaries. Although no specific option for

community funding is proposed, the States should consider explicitly recovering these costs.

- The options for the recovery of the costs of management of stock and domestic wells needs to be considered by the management agencies, to ensure an appropriate level of funding, that will be seen to be equitable with other users. This especially applies to intensively managed areas. (The relationship with surface water riparian users needs to be established if equity in a one resource policy² is to be resolved.)
- Specific government initiatives or other cases where clear benefits to the community are demonstrated (e.g. drought relief, salinity subsidies, capping Great Artesian Basin wells) be explicitly identified and not included in groundwater management costs.
- Provision of other services be on a full user pays basis unless alternative funding arrangements are clearly identified. (As most groundwater users currently do not pay for the management of the resource they are using, the introduction of full recovery of direct costs would represent a significant change. Although this is likely to be met by considerable public reaction, users should expect in return, (^{2A} one resource policy refers to surface and groundwater resources being treated similarly in a policy and administrative sense.

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through other COAG reforms, their entitlements to be better specified, particularly with regard to the renewal processes and dilution by continued allocation of entitlements. Public communication on the issue will be important. As users come to consider trading their entitlements on the market, the fairness of cost recovery so that public subsidies are not being sold, will be more easily argued.

It should also be noted that with the move to user-pays systems and full cost-recovery, there will be continuing pressures to reduce expenditure on investigations. Sound groundwater management depends fundamentally upon an adequate information base and an adequate information base requires resourcing. States will need to ensure that there is sufficient understanding of the groundwater resources and their vulnerability to quantity and quality degradation available as a basis for planning. Increased effort in groundwater resource quantification and assessment in priority areas is seen as a key action to ensure sustainability of the resource and the wider natural resource environment.

Recommendation 9

The full cost of groundwater management should be identified by the States. The cost of direct management activities should be recovered from users and, within the context of the overall water cycle, appropriate apportionment of indirect costs be given consideration. Outside urban water supplies, the remaining subsidies should be transparent where full cost-recovery is not achievable. The necessary charges should

be implemented progressively by 2001 and particular attention should be given to timely resolution where, and as, trading in groundwater is likely to be demanded by the market. Public communication on these matters will be important.

With reference to Recommendation 3 above, States should give consideration to the consequences of differential pricing between surface water and groundwater. States should examine means for meeting the indirect costs of groundwater management, including investigations which are not appropriately apportioned to users; options may include a direct but transparent subsidy. Recovery of management costs from domestic and stock well owners is to be considered by the States as part of their overall cost recovery strategy.

4.10 Federal Government Expenditure

The Federal Government is involved in groundwater as follows: □1. Policy Development and National Co-ordination - DPIE and others □2. Direct Investigations / Research - AGSO, CSIRO, Universities □3. Investigation / Research Grants - LWRRDC, NLP, MDBC □4. Specific Initiatives, e.g. capping GAB wells, salinity, capital works, drought relief

The total expenditure, at a full cost level, by the Federal Government is difficult to identify.

The clear identification of Federal Government funds directed to groundwater will assist the Federal Government and the States in negotiating priorities for Commonwealth funding of groundwater management activities.

Recommendation 10

The Federal Government should publicly identify its full costs of involvement in groundwater activities to assist the negotiation of priorities for Commonwealth funding of groundwater management activities.

4.11 Institutional Arrangements

A component of the COAG Water Reform Framework is the need to separate regulatory from commercial and service functions. Major organisational changes are under way in many of the States with a variety of models for groundwater investigations and management emerging.

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Conflict of interest can occur in several ways:

- Commercial or sectoral interest conflicts: - the allocation of water might be made to favour commercial considerations, or the specific sectoral interests of an agency, to the disbenefit of State interests. This applies to both surface water and groundwater.
- Internal 'self assessment' conflicts: - a new issue has emerged in recent times as a result of organisational changes. The policy/management/regulatory part of a Government organisation has the responsibility to review and technically

assess the work undertaken within another part of the same organisation. Often this "other part" has a specific commercial consulting/research focus. This issue can occur at both a State and Federal agency level.

- Funding conflicts: - there may be a financial conflict whereby there is competition for internal resources for a function that does not derive sufficient revenue to cover its (full) costs. (State and Federal agencies need to be aware of the potential for conflicts of interest to arise through institutional arrangements in developing and implementing organisational arrangements for groundwater management. The separation of commercial functions from policy/ regulatory/ resource management function is one means of minimising potential conflicts of interest. Ensuring water management decision making processes, particularly in allocation, are carried out in an open and public way can also assist in this. (Recommendation 11 (State and Federal agencies should develop and implement organisational arrangements and processes which specifically eliminate conflict of interest situations In groundwater assessment and management. (4.12 Education (Good groundwater management must essentially be user based and user driven. As such it must be intimately linked with comprehensive advisory, consultation and education mechanisms which are community focused. (A variety of State based education mechanisms in groundwater currently exist. These are of variable effectiveness. The need to increase general community awareness of groundwater processes is considered to be essential to facilitate good groundwater management. This especially applies to understanding the implications of the interaction between groundwater and the environment. National Water Week, run under the auspices of ARMCANZ, provides an opportunity to focus on groundwater issues and raise public awareness. (There is also a need for education of groundwater practitioners to ensure skilled resources are available for future management. (Recommendation 12 (SCARM should assess the opportunities for Increasing public awareness of the value of groundwater, Its vulnerability to over-use and damage through other activities and the need for groundwater management as key issues, and encourage the States to develop appropriate awareness programs. (5. Responsibilities for Implementation and Timetable (The above recommendations primarily represent advice from ARMCANZ to the States for their implementation. (The joint NLP/ARMCANZ report referred to in Section I contains many other recommendations to assist in improving approaches to groundwater management. These should be considered and implemented at the discretion of the States. It is clearly acknowledged that significantly different hydrogeological and management environments exist between the States, and any approaches they adopt should therefore be specific to their particular circumstances. For example, introduction of a regime of groundwater fees needs to reflect local conditions and circumstances. The States need to decide what is more appropriate for their specific situations.

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Nonetheless, groundwater knows no State borders and major management problems can (and do) emerge where different practices exist either side of a State border. Also, it is important to note that many of the recommendations are interlinked and not

implementing some recommendations will undermine or even negate other recommendations. This especially applies to the recommendation concerning charges and cost recovery.

The COAG Water Reform timetable generally involves adoption within 3 years, i.e. by 1998, of major reforms. The pricing reforms proposed above are consistent with the COAG timetable for the full implementation of pricing reform. This 5 year time frame will be needed for groundwater pricing in particular, because of the significant community consultation required before the reforms can be introduced and the desirability to introduce the changes gradually. It is proposed that the States develop programs for implementation of these recommendations, including community consultation, within their general water reform timetables.

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ⁱ In Australia, snowfall comprises a negligible proportion of total precipitation.

ⁱⁱ In many cases there is considerable ambiguity in the stipulation of an “acceptable level of stress”, as the actual volumes and timing of ecosystem water requirements are often poorly understood. This is an area where much more effort is needed, both by scientists and water managers.

ⁱⁱⁱ The National Groundwater Committee defines sustainable yield as an extraction regime (measured over a specified planning timeframe) that allows acceptable levels of stress and protects dependent economic, social and environmental values (National Water Commission 2006). This definition explicitly recognises the existence of tradeoffs between competing uses (Goesch et al. 2007:5).

^{iv} About one third of the original ~3000 inland mound springs, fed by waters of the Great Artesian Basin, have disappeared entirely due to excessive use and waste of groundwater. These springs contained endemic invertebrates and possibly fish (Ponder 2002, 2004) which are now extinct. “over-usage of water and the lack of appreciation of spring values, until recently, have caused the extinction or degradation of many springs, resulting in the extinction of endemic taxa” (Ponder 2002:7). The Elizabeth Springs Goby is now listed under the *Environment Protection and Biodiversity Conservation Act* as ‘critically endangered’ and may not survive even in the medium term (Unmack & Wager 2007) due to reductions in artesian pressure combined with several other threats. According to Boulton et al. (2003): “In many cave streams and karst aquifers, sedimentation, pollution and changes to the water

table have caused extinction or reduction of the dependent biodiversity.” With respect to cave fauna, the caves in Yanchep National Park provide an example. Groundwater feeding the caves over millennia allowed the development of cave fauna endemic to the Yanchep site. Groundwater pumping, together with a decrease in rainfall over several years, combined to lower the water table and halt the water flow to the caves. Several endemic fauna have disappeared with their water habitat (Andrew Storey, University of Western Australia, pers.comm. 24/9/07) in spite of the cave community being listed as a threatened ecological community under both State and Commonwealth legislation, and some belated flow supplementation provided.

^v Australia has two continental scale drainage basins: the Murray-Darling, and the Lake Eyre Basin.

^{vi} ‘Entitlements’ are the maximum licence allocations. For most licences, annual (or seasonal) allocations are set as a percentage of entitlements. In a wet year, with major storages full, an irrigator would expect to receive an allocation close to 100% of the licensed entitlement.

^{vii} Sleeper extraction licences are those which have never been activated; dozer licences have been used but are not currently in use.

^{viii} MDBC (1997) Table 3, p. 7,

^{ix} MDBC (1997) Table 1, p. 3.

^x MDBC (2003) Table 4 p. 6.

^{xi} MDBC (2003) Table 2, p. 4.

^{xii} National Audit: *Water availability*. At

http://audit.deh.gov.au/anra/water/docs/national/Water_Availability.html viewed 22 Aug 2007.

This page quotes a source document: *An audit of water use in the Murray-Darling Basin, June 1996*.

^{xiii} MDBC (2003) Murray-Darling Basin water resources fact sheet. MDBC, Canberra.

^{xiv} National Audit: *Water availability*. At

http://audit.deh.gov.au/anra/water/docs/national/Water_Availability.html viewed 22 Aug 2007.

^{xv} The Victorian State Government had, for example, just introduced its new *Catchment and Land Protection Act 1994*.

^{xvi} Schedule F, Murray-Darling Basin Agreement 1992, as amended 2000.

^{xvii} The Basin was divided into 24 ‘valleys’ or allocation units in the *Water Audit Monitoring Report 1994/95* (MDBC 1997). The number of valleys is now 30, as some of the original valleys have been divided.

^{xviii} These amendments are set out in NCC (1999:12) and ARMCANZ (1996b:3-5).

^{xix} Murray-Darling Basin Commission values statement, *MDBC Annual Report 2003*, p.8.

^{xx} The Lower Balonne forms part of the Condamine catchment in the far north-east of the Basin.

^{xxi} Within the CSIRO (2008) study framework, the figure of 840 GL/yr does not take into account the need to supply environmental flows to groundwater-dependent ecosystems, and is thus a significant under-estimate of the ‘real’ figure. The CSIRO study, although couched within the framework of an attempt to estimate sustainable yields, ignores necessary environmental flows. The study took this approach as the tight timelines imposed meant that no agreement could be reached with State agencies on appropriate calculation methods for environmental flows, and thus sustainable yields.

^{xxii} The Commonwealth Government has a web page specifically on the Action Plan:

<http://www.napswq.gov.au>. Accessed 20/8/07.

^{xxiii} In 2002, an expert panel recommended additional environmental flows of over 3,000 GL/yr to obtain a high chance of reviving a healthy River Murray – to say nothing of the Darling system (Jones et al. 2002).

^{xxiv} GTRG (2004:8:5) suggest additional precautionary approaches: “In calculating sustainable yield, a precautionary approach must be taken with estimates being lower where there is limited knowledge. Application of the calculated sustainable yield as a limit on extractions must be applied through a process of adaptive management involving monitoring impacts of extraction. Sustainable yields should be regularly reassessed and may be adjusted in accordance with a specified planning framework to take account of any new information, including improved valuations of dependent ecosystems.”

^{xxv} Assuming the direction of groundwater flow is towards the river and that there is at least the possibility of direct hydraulic connection between the groundwater system and the river.

^{xxvi} The *World Charter For Nature* was a UN General Assembly resolution, supported by most UN member nations including Australia.

^{xxvii} The *Rio Declaration* formalised the outcome of the 1992 UN Conference on Environment and Development.

^{xxviii} "It should be noted, however, that there is considerable variation in monitoring across groundwater units. For example, under the New South Wales Water Management Act 2000, anyone wanting to access groundwater for any purpose other than stock and domestic use is required to meter use (DNR 2006b)." (Goesch et al. 2007:9).

^{xxix} Many agencies responsible for water management, until very recently, consciously fostered a culture where licence compliance was seen as unimportant. This phenomena was Australia-wide, and the legacy remains as a massive problem today. Southern Rural Water, a Victorian regional water manager under delegated State powers, provides an example. In 2000, four years after the introduction of the CoAG groundwater reforms, SRW had no formal compliance and enforcement program for groundwater users, other than responding to complaints. Licences for irrigation groundwater withdrawals issued by SRW at that time did not require irrigators to meter extractions. SRW (see draft *Wy Yung Groundwater Plan*) had published a recommendation that withdrawals in excess of licence allocations should be "paid for at the standard rate per megalitre" (SRW 2000) – and in this they relied largely on self-reporting. The effect of these policies sent a message to irrigators: *use as much as you like; don't worry about the licence allocation*. Moreover, in spite of acknowledging the highly connected nature of the Wy Yung aquifer and the Mitchell River, SRW made no attempt to integrate management of groundwater and surface water, or to provide for environmental flows to groundwater-dependent ecosystems (Nevill 2001b). Perhaps not surprisingly, their plans and studies were not subject to effective peer review. Recent changes to SRW policy appear to be another example of 'too little too late'. Their 2007 *Draft Water Plan* does commit to metering all groundwater licensees using in excess of 10 GL/yr, however the Plan makes only vague commitments to delivering integrated management and environmental flows, and makes no reference to enhanced compliance and enforcement programs. The Plan provides no data on several critical management issues, for example there is no summary showing how aquifer 'sustainable yields' are calculated, what these yields are for the aquifers under SRW management, what the degree of exploitation of these aquifers is, or where natural recharge and discharge is occurring, and how these areas are protected. There is no discussion of the identification of groundwater-dependent ecosystems in the SRW region, or how their needs will be estimated and accommodated, or even regional data on river base flow index (BFI). The SRW *Nullawarre Groundwater Supply Protection Area Explanatory Paper to the Groundwater Management Plan* makes the recommendation that where groundwater users have breached their allowed irrigated acreage (area was used as a control measure instead of volume for unmetered users) SRW should, rather than take prosecution action, simply swap to a licensed volume approach. While there is logic behind removing the acreage restriction, this casual approach to enforcement reinforces the long-standing culture of non-compliance amongst irrigators.

Even where agencies have not been deliberately fostering a culture of non-compliance, water theft is common-place. This is a direct result of the casual nature of water authority compliance programs in the recent past, and, although these are changing, placing the full responsibility for water theft with irrigators is not yet appropriate.

The NSW Department of Water and Energy conducted a number of targeted compliance audits in September 2007. According to Garry Wills (Director of Compliance – pers.comm. 2/10/2007) these audits revealed a considerable number of water theft incidents. For example an audit of 35 properties in the Corowa and Deniliquin areas of southern New South Wales resulted in the issue

of 21 infringement notices on 15 properties. Infringement notices for individuals amount to \$750, for corporations \$1500 (these are effectively on-the-spot fines which may be paid or contested in court). In most cases, water meter wheels had been removed or put on backwards. Repeat offenders face court, where fines up to \$132,000 (\$275,000 for corporations) may be imposed, plus penalties where the breach of licence condition continues of \$66,000 per day (\$132,000 for corporations). Persistent offenders may have their licences revoked. At this stage these maximum penalties, or licence revocation, have not yet been applied.

^{xxx} CoAG 2004 *Council of Australian Governments Meeting 25 June 2004*. p.1of 6.

www.coag.gov.au, accessed 20/8/07.

^{xxxi} Report of the meeting titled *Australian water Ministers meeting Christchurch 24 November 2007*. from <http://www.nwc.gov.au/> accessed 20 August 2007.

^{xxxii} Nevill (2007) provides another example of good policy poorly implemented: this time with respect to statutes and policies directed towards the conservation of freshwater ecosystems.

^{xxxiii} Federal Liberal Party (2007) *Our 2020 plan for Australia's local roads*.

<http://www.liberal.org.au/about/documents/LocalRoads.pdf>, viewed 7/11/07.

^{xxxiv} Federal Liberal Party (2007) *Our 2020 plan for South Australia's transport future*.

<http://www.liberal.org.au/about/documents/SATransport.pdf>, viewed 7/11/07.

^{xxxv} Metering is urgent. The estimate of \$100 million is a very rough guess based on an assumption that each back-fitted meter would cost around \$1000. Metering costs will need to be shared between the licensees, State water agencies and the Commonwealth Government – if there really is a commitment to handle this issue at the national level. Compliance programs will need to take into account costly investigations and court proceedings, as well as the more obvious costs of staff, travel, training, awareness raising, equipment purchase and maintenance. and bookkeeping. An estimate of total costs (Commonwealth, State and irrigators) required in the \$100 – 400 million range may not be unrealistic.

^{xxxvi} The MDBA replaced the MDBC on 15th December 2008.

^{xxxvii} See for example long-standing problems with the implementation of legislation and policies aimed at the protection of freshwater ecosystems, discussed in Nevill (2007).

^{xxxviii} Allowing, of course, for systematic revision as part of the adaptive management cycle.

^{xxxix} Advice on the development of integrated surface / groundwater management plans is available, for example, from IAHA (2004). Notably, the IAHA guidelines stress the need for precautionary and adaptive approaches.

^{xl} The agency responsible for determining environmental allocations for groundwater dependent ecosystems must have a strong statutory duty to protect identified values of such ecosystems in a precautionary fashion.

^{xli} Relevant time lags between pumping and reference point impact must be properly calculated and taken into account.

(Note: this article implies China is supporting Eth's Grand Renaissance Dam, which we believe to be an error)

<http://www.globalpost.com/dispatch/news/regions/middle-east/egypt/120406/egypt-losing-its-grip-the-nile>

Losing the Nile

Egypt has long held unrivaled historic rights over nearly all of the Nile River's resources. But now all that could be changing as upstream states like Ethiopia and Burundi seize on Egypt's post-revolution political uncertainty to finally wrest at least some control of the world's longest river. The result could be

mean dire food and water shortages for Egypt, and maybe another revolution.

Egypt is losing its grip on the Nile Political uncertainty in post-revolution Egypt is allowing other Nile states to wrest control of the world's longest river.

CAIRO, Egypt and MARAWI, Ethiopia Amid the barren, earth-dug canals and emaciated livestock that stalk the dirt roads of Ethiopia's northern highlands, Teshale, a 25-year-old farmer, waits idly for the rain to come.

His small, parched field of maize is sometimes wheat, if the weather permits he relies solely on the areas seasonal rainfall to produce its harvest, which fails to turn even a meager profit.

If Teshale could just harness some water from the mighty Blue Nile River nearby, which eventually cascades north to meet the White Nile in Sudan, flowing onward to Egypt, he might finally be able to halt his endless cycle of poverty, he says.

Until now, Ethiopia has lacked both the technical capacity and the diplomatic support to trap its Blue Nile waters which give Egypt's Nile 86 percent of its own flow for domestic use. A 1959 colonial-era treaty brokered by Great Britain gave Egypt, and to a lesser extent Sudan, unrivaled historic rights over nearly all of the Nile Rivers resources.

But now all that could be changing as upstream states like Ethiopia and Burundi seize on Egypt's post-revolution political uncertainty to finally wrest at least some control of the world's longest river.

More from Global Post: Could Egypt be out of water by 2025?

Just 16 days after President Hosni Mubarak stepped down in February 2011, Burundi reneged on its erstwhile promise to Egypt not to sign a new treaty that seeks to adjust water rights in the basin. If ratified by other basin states, the agreement would strip Egypt of its majority share of the river's water.

The most serious threat, however, comes from Ethiopia, already Egypt's regional rival. In May 2011, Ethiopia announced plans to build a massive, \$4.8 billion hydropower dam is known as the Grand Renaissance is along the stretch of river within its own borders, despite Egypt's opposition to the project.

Most of us here are eager to use the Nile. But every farmer expects Egypt to be the enemy said Manichey Abey, a 33-year-old Ethiopian farmer.

While hydropower dams used to generate electricity in theory eventually allow the dammed water to flow through, Egyptian officials remain wary of Ethiopia's intentions. They demanded in October of last year the creation of a tripartite committee, now at work, to study the new dam's effects and are worried the project could set an unwelcome precedent for more ambitious schemes in the

future.

At 6,000 megawatts, the dam would be the largest hydroelectric power plant in Africa, with a reservoir capable of holding roughly 65 billion cubic meters of water.

It will be a renaissance for the Ethiopian system, Abey said. The Nile is the main source of Egypt's economy, and if the amount of water they use is reduced, it will be a big problem. But we have the right to use it.

More from Global Post: Video: Ethiopia claims its fair share of the Nile

Such ambitions by upstream states are contributing to the gradual loosening of Egypt's 5,000-year grip on its nearly sole source of freshwater, threatening not only the desert nation's ability to grow enough food for its expanding population, but also its political stability and regional hegemony.

Egypt's uprising ushered in a period of political and monetary volatility, stalling the economy, shaking up relations with the US and kicking off a year of sporadic protests and clashes between protesters and Egyptian security forces.

All of this has diminished the Egyptian government's traditional ability to stonewall both financing and diplomatic support for independent Nile Basin projects.

Ninety-five percent of Egypt's water comes from the Nile. We depend on the Nile more than any other country, said Hani Raslan, an expert on water politics at the government-affiliated Al-Ahram Center for Political Strategic Studies in Cairo.

But right now, the [Egyptian] government is only a transitional government, he said. It has nothing to do with the long-term plan or the Nile, and is only paying attention to our internal affairs.

The importance of the Nile to Egypt is hard to exaggerate. Like a slender, green thread, the waterway fastens Upper Egypt in the south to Lower Egypt in the north, and has nurtured agricultural civilizations in its verdant Delta for millennia.

More from Global Post: Could a lack of food and water spark Egypt's next revolution?

As a result, and also because of significant US financial and military patronage over the years, Egypt has long been able to dominate the terms of Nile basin negotiations, thwarting independent water projects by other countries and manipulating international customary water law to maintain the status quo, water experts said.

Egypt did have, until fairly recently, some kind of ideological hegemony [in the

Nile Basin], said Richard Tutwiler, director of the Desert Development Center at the American University in Cairo, a research facility aimed at serving Egypt's desert communities.

They were able to frame the entire issue of Nile waters in their own context, both within the basin, but more importantly outside the basin and in international forums and so forth, he said.

For years, Egypt also skillfully influenced international financial institutions such as the African Development Bank and World Bank to sustain its outsized water quota, says Christine Anderson, former associate professor of international water law at the American University in Cairo.

The UN moved on to an international water law treaty standard incorporating equitable distribution [of water resources], Anderson said. But the IMF and World Bank upheld their regional alliance structures in Egypt's favor thus preventing any forward movement for the rest of the Nile states.

Since Egypt's revolution, however, its new rulers have made decisions that run afoul of the organizations that once helped it maintain its control over the Nile.

Last spring, for instance, Egypt's headstrong military rulers scoffed at the International Monetary Fund's offer of a \$3.2 billion loan package only to later backtrack and ask again for the funds. They also brazenly put American democracy activists and their Egyptian colleagues on trial for attempting to subvert the state, souring relations with the US, the IMF's largest stakeholder.

More from Global Post: Photos: Just miles from the Nile, Ethiopia's farmers struggle to find water

Analysts say Western donors are wary, and that the Egyptian Government's erratic behavior may temper support for its Nile dominance in the future.

In addition, Anderson said, China's willingness to finance a number of Ethiopia's dams, including the new Grand Renaissance Dam, has startled Egyptian officials, and indicates a potential new regional order in which US largesse may no longer secure Egypt's place as the Nile Basin's most powerful state.

Egyptian officials, for their part, remain defiant.

Egypt has been asking these countries to come together so we can reach an agreement on the Nile, said Al Ahram's Raslan, adding that because Egypt receives negligible rainfall, its water quota should remain the same under any new agreement.

But no one is responding to Egypt's call. These countries, especially Ethiopia, are making a grave mistake, he said, because Egypt is not a weak country. If it was ever in real peril, it won't be silent.

Abbott attacked over basin stance

Sarah Scopelianos | April 10, 2012

http://www.weeklytimesnow.com.au/article/2012/04/10/467965_politics-news.html

THE government is attacking opposition leader Tony Abbott for not being clear about his party's stance on the Murray Darling Basin draft plan.

Federal Water Minister Tony Burke said Mr Abbott needed to clarify his previous statements where he had said he would not support a "bad plan" and would only support a "good plan".

READ MORE: [Murray 'better off without plan'](#)

Under the draft plan which is open to public comment until Monday, about 2750 billion litres of irrigations' water will be diverted to the environment. □□ "This year I will deliver to Parliament a plan for the Murray Darling Basin. While there are many views on whether the numbers should be higher or lower I think most people can agree that we need a national plan for this river system," Mr Burke said. □□ "For too long we have dealt with this river system as though it could be managed by state boundaries. But years of over extraction have taken their toll. □□ "The time has come for our political leaders to put this issue above party politics. We need to make sure that we approach the next drought with more resilience than the last. □□ "Tony Abbott – if your support is conditional, you can't keep those conditions secret."

Mr Abbott attended Griffith's public meeting last year telling angry irrigators: "We are here to say we will not support a bad plan. That is the commitment I give to you today."

Weekly Times Now has called Mr Abbott's office for comment.

Earlier this week [Victorian Farmers Federation](#) president Andrew Broad said the draft plan would wipe \$2.7 billion a year from the state's economy. "The [MDBA's](#) draft plan strips water, jobs, wealth and the hopes of the next generation out of rural Australia," Mr Broad said. □□ He called for more money to

be invested into irrigation and water infrastructure and using water more efficiently in operating the river and watering wetlands. □

http://www.circleofblue.org/waternews/wp-content/uploads/2012/04/USBR_Supply-and-Demand-Study-comments.pdf?utm_source=Circle+of+Blue+WaterNews+%26+Alerts&utm_campaign=7253f07970-Federal-Water-Tap-RSS_EMAIL_CAMPAIGN&utm_medium=email

The following is yet another article worth reading and taking its advice, though the graphs have failed to be reproduced.

Policy Forum: Water Pricing and Availability

Robust Reform: The Case for a New Water Entitlement System for Australia

M. D. Young and J. C. McColl* Policy and Economic Research Unit CSIRO Land and Water

1. Introduction

The attention being given to water resources by the Council of Australian Governments (COAG) and the Murray-Darling Basin Commission (MDBC) suggests that much Australian water use is inefficient. Australia may be the driest inhabited continent in the world, but from an economic perspective, the nation's water resources are abundant. Thomas and his colleagues, in a thorough assessment of the role of water in the economy, could find little to suggest that water is a constraint upon opportunities for economic growth (Australian Academy of Technological Sciences and Engineering 1999). Mismanagement not shortage is the issue.

The focus of this article is on institutional arrangements for the efficient allocation and management of water. It offers a template for the development of a consistent water allocation system across Australia and a means to implement it. The search is for arrangements that are dynamically efficient, have low administrative costs, and are robust in an institutional sense.

* The contribution of many irrigators, water managers and policy analysts to this article is acknowledged. Geoff Edwards, Alistair Watson, John Freebairn, Peter Cullen, John Radcliffe, Steve Hatfield Dodds and Darla Hatton MacDonald made contributions beyond the call of duty.

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2. Biophysical, Economic and Institutional Challenges

2.1 Biophysical Status

Unlike water in many other parts of the world, Australian surface water supplies tend to be highly variable. Consequently, to endeavour to manage this extreme flow variability, Australia has invested large amounts in the development of dams and distribution systems. As a result, very few of our surface water and groundwater systems, in any way, resemble their natural state. As Watson (in this issue) observes, references to what existed prior to 1788 lack an understanding of the reality of the landscapes that now characterise Australia.

Australians incorrectly perceive rivers as narrow conduits. Many of our most serious problems in water management stem from a past failure to understand

ground-surface water connectivity and the generally long time that groundwater systems take to respond to changes in land and water use. In fact, most Australian rivers are inextricably connected to a surrounding groundwater aquifer. These groundwater aquifers supply most of the base flow. As much as 50 per cent of the water flow- ing in the River Murray, for example, is thought to have spent part of its life as groundwater. Recent work by the National Land and Water Resources Audit (2001) has classified groundwater systems into local, intermediate and regional. When perturbed, local groundwater systems typically return to a new equilib- rium within 20 years and intermediate systems within 100 years, while regional aquifer systems can take over 500 years to express them selves fully in a river.

There is much debate about the current status of Australia's water resources. Biophysical assessment—almost devoid of economic analysis—reveals an adverse report card. Two key biophysical observations that are driving polit- ical debates include statements that:

- by 2020, unless significant action is taken, it is expected that River Murray salinity at Morgan over 50 per cent of the time will fail to meet World Health Organisation desirable drinking water standards (MDBC 1999); and
- between 20 and 40 per cent of irrigation water needs to be returned to the stem of the River Murray so that it can be restored to a healthy working river (Murray-Darling Basin Ministerial Council 2002). □

Recent statements and actions by politicians suggest they perceive the community as willing to support the use of significant public funding to fix many of these biophysical problems. Many commentators seem aware that the business case for fixing systems like the River Murray is compelling (Young et al. 2002). Leave more water in the river, manage flow for both market and non-market benefit and remove flaws in allocation systems and gross domestic product will increase. As was the case with tariff reform, leaving more water in the River Murray and decreasing salinity impacts is a profitable investment. Many irrigation communities fear that personal welfare will decline as a result of environmental flow enhancement. Whether these fears become reality depends upon implementation detail.

2.2 Economic and Institutional

Australia has a plethora of water-licensing systems onto which mechanisms for managing externalities, rationing scarcity and trading have been bolted. If trading is to become the norm, then the case for introducing a nationally consistent system being made by Minister Anderson and others is compelling. Consistency reduces transaction costs and opens up economic opportunity. Differences among States are dramatic. Some New South Wales licences allow

unused water to be carried forward to the next year, while Victoria and South Australia maintain ‘use it or lose it’ policies. New South Wales is now guaranteeing entitlement reliability. Victoria is the only State providing access to so-called ‘sales’ water.

Even the terminology used is inconsistent. Queensland and South Australia call access entitlements ‘allocations’, Victoria and New South Wales only use the word ‘allocation’ to define the quantity received in a specific year (Carmichael and Cummins 2001).

2.3 Hydrology

During the 1990s, recognition that water re- sources are limited led to:

- capping—the introduction of a limit on new licence allocations; and
- trading—the introduction of mechanisms to encourage economically inefficient water users to sell water entitlements and alloca- tions to economically efficient water users.

Capping has, at best, been partial. In most States, groundwater resources remain uncapped and, in the Murray-Darling Basin, further groundwater development suggests it will reduce the surface water availability by some- where between 2 and 7 per cent. Water supplies are also being eroded by farm dam development, forestry and other forms of landuse change. None of the caps in place are designed to cope with climate change. Moreover, many trading arrangements are inconsistent with the hydrology of water use. In particular, few recognise that when water use is technically inefficient, most of the water eventually returns to the river for use by others and the en- vironment. Under present arrangements, most irrigators are allowed to keep the ‘savings’ from increases in water-use efficiency and expand irrigation. Increases in water-use efficiency and most water recycling simply erode the

cap. As indicated in Table 1, increased

Table 1 Simple Analysis of the Likely Effects of Policy Changes Resulting from Failure to Take Full Account of Hydraulic Process in the Southern Connected River Murray System

System flaw and assumed consequence

Net effect on flow (gigalitres)

Water-use efficiency savings are used to increase irrigation rather than river flow.□(Assume average water-use efficiency increases by 10 per cent over the next 20 years.)a –723

Sum of allocations is greater than the cap.□(Assume that half the gap enters the market.)b –

Land-use changes like increased forestry reduce water yield. □ (Assume that the government subsidies and incentives for plantation forestry remain and that, as planned, the area under plantation is trebled by 2020.) c –600

Salinity interception schemes remain outside the cap. □ (Assume new schemes stop an additional 20 gigalitres per annum from entering the River Murray.) d –20

Groundwater and surface water access entitlements are not linked. □ (Assume cap eroded by 4 per cent.) e –349

Total loss –2065 Add back 1500 gigalitres sourced from irrigators to enhance environmental flows +1500 Net change in mean flows in the River Murray –565

Notes: (a) This assumes that a mean of 8734 gigalitres is used for consumptive purposes in the Murrumbidgee, River Murray Stem and Goulburn-Broken systems. 1500 gigalitres are withdrawn from irrigation but water-use efficiency for the remainder increases 10 per cent as irrigators invest in technology and infrastructure that reduce evaporation and transpiration and capture and use run-off. The extent of this investment will be substantially dependent on future market process and costs. (b) At present, the sum of individual allocations is 20 per cent above the cap in New South Wales and 10 per cent above the cap in South Australia (see Figure 1). Assume removal of trading impediments plus increased scarcity brings 50 per cent of this presently unused ‘cap gap’ into use.

(c) It has been estimated that over the next 20 years increased forestry stimulated by financial incentives will reduce recharge across the entire Murray-Darling Basin by 1300 gigalitres. Conservatively, assume that this reduces mean flow by 600 gigalitres. □ (d) At present, salinity interception schemes are not defined as consumptive water use even though the water pumped away and evaporated otherwise would have flowed into the River Murray.

(e) Results from MDBC studies are rumoured to have estimated that increasing groundwater development will erode the cap by somewhere between 4 and 7 per cent.

Figure 1 Diversions from the Southern Connected River Murray System, the Sum of all Allocations and the Average Cap

Note the Graph did not copy

water-use efficiency is not the answer to the maiden’s prayer.

Historically, licences were issued on the understanding that the water allocated would be used in most but not all years. As a result, administrators typically allocated licences so that the sum of all access entitlements was between 10 and 20 per cent over the cap and, in some groundwater systems, by as much as four times sustainable yield. Across the River Murray system total surface water allocations typically exceed the cap by nearly 20 per cent (see Figure 1). But the issue is not just one of over-allocation, there is also an equity issue. In many cases, development of water resources has been either partial or did not occur at all. In a nontrading environment this did not matter. Introduction of trading, however, has activated this so-called dozer and sleeper water. Many

people fail to realise that, in the past, this ‘unused’ water was left in public storage dams and then made available to others. The introduction of trading means that some of those who had obtained water at its supply cost now have to pay market prices to access the same water. They are not enjoying this new expensive experience.

Another serious flaw in most volumetric systems is a failure to account for the impact of increased forestry and other land-use changes that reduce water yield. Current estimates of the likely impact of the government-endorsed and subsidised vision of trebling plantation forestry across Australia by 2020 is expected to reduce flows in the Murray-Darling Basin by around 1300 ggalitres (Hairsine 2003, pers. comm.).

Without the benefit of access to sophisticated groundwater models, Table 1 attempts to provide a sense of the magnitude of the flaws in entitlement and allocation systems in the River Murray system. Water in this system is seriously over-allocated and through what is now being called the ‘Living Murray’ process many people are expecting governments to decide to reduce the average amount of water used for irrigation by around 18 per cent or 1500 ggalitres. Our overall conclusion is that there appears to be a 2000 ggalitre gap, which is not being adequately considered in the current policy debate. Markets are excellent servants. Give markets an opportunity to reveal a loophole and they will. If governments proceed to reduce irrigation entitlements by 1500 ggalitres and take no other action, the result in 20 or so years time and after all the system flaws have revealed themselves will be *less not more* environmental flow. More sophisticated modelling is likely to result in significant revision of these estimates but, after extensive consultation with groundwater experts and inspection of economic and biophysical models, we are confident that the estimate in Table 1 is of the right order of magnitude.

One other largely unaddressed issue is the National Competition Policy recommendation that water prices should include the cost of externalities. As recommended to the High Level Steering Group on Water (Siebert, Young and Young 2000), for externalities to be costed it is necessary first for governments to define a minimum duty of care against which obligations to others can be measured. Across Australia this is not occurring. In the Murray-Darling Basin, for example, salinity trading occurs only at the State level with the consequence that irrigators see the cost of salinity management as a fixed and, mainly, public cost. The opportunity for individual irrigators to internalise significant costs of salinity management is not yet available. As a result, salinity continues to get worse. In the same way as it makes sense to cap water and allow individuals to trade allocations, so it makes economic sense to cap salinity impacts and allow individuals to trade them.

2.4 Policy Challenges

Essentially, the policy challenges now faced by Australian water resource and environmental managers collapse to:

- the search for a robust set of institutional arrangements, defined in the broadest sense possible, to enable the efficient allocation and management of water resources and both *consumptive and non-consumptive* water use through time; and
- the search for an efficient and equitable transition pathway to such a set of institutional arrangements.

3. Robust Institutional Arrangements for Water Allocation and Management

3.1 Robustness

Institutional robustness requires a focus on new allocation mechanisms. Robust systems have an architecture that can be expected to produce efficient and politically acceptable outcomes in an ever-changing world (Jen 2003). Robust systems persist, are adaptable, and can stand the test of time.

The concept of a search for a robust set of institutional arrangements is not common in microeconomic analysis. From an economic perspective, one of the greatest contributions to thinking about robustness comes from the inaugural economist-Nobel Prize laureate—Jan Tinbergen—in the form of the Tinbergen Principle (Tinbergen 1950). This principle states that to attain a given number of independent policy targets through time there must be, at least, an equal number of policy instruments. Thus, if arrangements for managing water allocation and use are to be robust, the components of existing systems must be separable from one another. In unseparated systems, whenever any problem emerges, the entire system comes under review, negotiations are complex, and an opportunity is provided to reopen old agendas. The clue to the robust resolution of many of Australia's water resource problems lies more with separation than in integration.

3.2 Balancing Market and Non-Market Uses

In the past, it has been common for legislators to grant absolute priority to the environment, transport and recreation, and only licence water access to the remainder. Thus, licences were allocated for a term and ministers were always allowed to reduce allocations without compensation. Performance criteria associated with this prior assignment, however, are vague. The first-best solution would be to define a set of minimum baseline conditions and then establish a mechanism that allows some trade-off among objectives as supply and demand conditions change by season and through time. In the long run, dynamically efficient water use requires either a very flexible rule-based cap or

a structure that allows administrators to ‘trade’ an environmental allocation. In over-allocated systems and as licences are secured to improve the state of the river, one dynamic option is to place part of all existing access entitlements in an independent environmental trust and then allow its manager to trade counter-cyclically, selling allocations in a drought and buying them back in wetter years.

3.3 Water Access Entitlements, Allocations and Use Conditions

In 1994, COAG recommended separation of water licences from land title, allowing water access entitlements and allocations to be deployed to uses generating greater economic returns (COAG 1994). Faced with the requirement to deliver water trading or lose access to Commonwealth money, most States chose simply to bolt water-trading arrangements onto existing licence systems, with little attention to equity, investment security, water quality and river health implications. The result has been the emergence of a host of new problems that are, amongst other things, the focus of a report to COAG from the chief executive officers of Australian water management agencies (Natural Resource Management Ministerial Council 2003).

Unfortunately, COAG introduced the words ‘property rights’ into the performance requirements imposed on States in 1994. In retrospect, some parties as implying creation of compensatable property rights have interpreted the use of this ‘economic jargon’. Similarly, ‘clear specification of entitlements in terms of ownership, volume, reliability, transferability and, if appropriate, quality’ (COAG 1994) has been misinterpreted as an instruction for States to guarantee volume and to ensure that changes necessary to effectively regulate negative externalities, accommodate changes in social values and maintain river health will be compensatable. In retrospect, it would have been more efficient to fully specify interests and transparently assign risks among the parties involved.

Building upon this concept of fully specifying risk, and upon the Tinbergen Principle, the features of a robust set of water-licensing arrangements separated from land title have been identified (Young and McColl 2002). Key features of the proposed system include:

- (i) formal unit shares issued in perpetuity and defined as an unequivocally guaranteed, mortgageable claim to a proportional share of any periodic water allocations;
- (ii) separate management of all allocations using low-cost bank-like accounting and trading protocols that define the quantity that may be traded or used in ‘net’ not ‘gross’ terms;

(iii) independent authorisation of irrigation via use licences that reserve pollution rights to the Crown and define all duties associated with water use at a site in a manner that remains consistent with conditions expressed in statutory catchment management plans (see Figure 2); and

(iv) provision for definition of the amount of water allocated for environmental purposes partly as a prior right and, where appropriate, partly as a tradeable allocation enabling an environmental manager or trustee to decide when and if a water allocation may be sold to a water user, left in the system for the benefit of recreational users, used for the production of ecosystem benefits or to maintain estuaries.

The system also requires that access entitlements be allocated to a single entity. In some parts of Australia, water access entitlements have been distributed both to water supply companies and trusts in the form of a bulk licence and to irrigators as an individual licence. Robust systems recognise that only one interest can be primary. All other interests must be defined via an encumbrance on the water access entitlement or use licence. From an efficiency perspective, it does not matter whether the primary interest is held by a water supply company periodically selling water to irrigators, or by individual irrigators. Either way, each party can be expected to contract with the other party to gain access to the services they require. If irrigators are the primary holders, bulk access entitlements are unnecessary for all but supply system losses. Other design details include options to enable trade between surface and groundwater and, also, the development of markets for channel capacity and salinity. Where annual and perennial land-use systems coincide, there is an option for high security and general security shares to be issued.

4. Transitional Arrangements

4.1 Sequencing

Australian water politicians are currently showing a preference for the removal of impediments to permanent water access entitlement trading and securing an additional 1500 ggalitres for environmental flows in the River Murray. Similar targets can soon be expected to emerge for the Darling system and several stressed coastal rivers. The presence of market impediments and the comparative absence of externality cost obligations, however, means that the value of water access entitlements, allocations and use licences are less than they would otherwise be. In over-allocated systems, like the River Murray, the result is a sequencing opportunity and a sequencing trap. Remove market impediments before a robust entitlement and allocation system is put in place and the cost of reform increases. However, if water is secured for the environment at the same time as market impediments and entitlement flaws are removed, then the market gains from this process can be used to reduce the case for transitional assistance payments.

Failure to pursue these reform sequencing opportunities and, in particular, to implement the politically easy options without addressing the underlying flaws is likely to result in the emergence of problems that will hinder opportunities to make further progress. As a general rule, it will be less costly for governments to acquire additional water to enhance the environment before impediments to permanent water trading are removed and before a new flawless water access entitlement system is put in place.

Given the presence of significant unrealised rents encapsulated in impediments to water trade, conceptually the simplest option would be to compulsorily acquire all water licences at current value, put in place the necessary reforms and then sell a new suite of water access entitlements to highest bidders. For the remainder of this article, we assume that the ‘acquire, fix and roll-out a new flawless system’ approach is not politically feasible. If it were, then the need for transitional assistance payments may be minimal.

4.2 Restoring Environmental Flows

At least in the short term, for groundwater and river systems that are not over-allocated, existing systems can be retained and run conservatively.

In over-allocated and overused systems and if markets are allowed to operate, ultimately water access entitlements or reliability will need to be reduced.

Relatively cost-effective options of securing water access entitlements include:

- (i) a pro rata reduction implemented administratively by reducing expected reliability and/or, in Victoria, by reducing the volume of water periodically offered for sale;
- (ii) a pro rata reduction in the volume stated on each licence;
- (iii) acquisition of water licences by using market-like processes including open- market, voluntary-tender and compulsory- tender mechanisms;
- (iv) compulsory acquisition of either a proportion of each licence or closure of specific categories of water use and/or areas of irrigation; and
- (v) contracts involving investment by government in infrastructure upgrades (supply system and/or on-farm) in return for the surrender of all or part of one or more licences.

Each option has its benefits, its costs, its equity and its political implications.

Pro rata reduction approaches can be expected to increase market activity and incur deadweight transaction costs as those who cannot afford to give up water buy it back. In systems where two or more types of licence exist, it is possible to reduce the reliability of just one type of licence. Whatever approach is taken,

under pro rata reduction mechanisms, the most economically efficient water users can be expected to purchase water access entitlements or allocations from less efficient water users and from those simply investing and trading in entitlements and allocations.

Pro rata reduction by licence volume reduction is expensive as each licence has to be physically amended and registers in most States are not yet fully electronic. Legislation, however, could be put in place to enable licence conversion to be made whenever a licence is dealt with for another purpose and/or is replaced with a robust one. If pro rata reduction of each licence is combined with reissue of a robust access entitlement and use licence, total administrative costs will be less as double handling would not be necessary.

The lowest market acquisition approach known is the compulsory-tender approach used for sulphur trading in the United States. Under this mechanism, all licence holders are required to offer a proportion of their access entitlement for sale but can nominate any reserve price they choose. The result is the rapid emergence of a deep and mature market characterised by lower transaction costs than any other voluntary market process can deliver (Young et al. 2002). Sophisticated selection and incentive-for-cooperation approaches could be used in combination with this mechanism. In some areas, for example, the most efficient outcome may involve offering an additional payment when all use licences along a supply channel are surrendered. Prices need to vary by licence type and use. Where serious 'gross/net' flaws exist, total costs will be lower if a higher price per unit is paid for volumes secured from the least efficient water users so that volume-negative impacts on river flow are minimised.

A significant feature of compulsory acquisition systems is that they are exempt from capital gains tax. Compulsory acquisition powers, if granted, could prove a particularly attractive option along channels that, as a result of environmental flow enhancement and trading, are being abandoned.

Contracts involving the upgrade of supply or on-farm infrastructure in return for the surrender of water access entitlements are possible but, unless there are significant imperfections in the local water market, the outcomes sought could be more efficiently achieved by the purchase of water access entitlements. Private investors and water users could then make the necessary changes in competition with all other competing investments. A water supply company or trust, for example, may choose to sell part of its bulk licence and use the revenue to reduce evaporation losses by laying pipes.

From a governance perspective, it is important to consider how any water access entitlements secured for the environment are managed. As indicated earlier, our preference is for all water secured for the environment to be placed in an independent Murray-Darling-Basin-wide trust empowered to maximise

environmental outcomes by trading water. The trust, for example, might sell some allocations in a drought and use the resultant proceeds to buy back a larger volume of water in subsequent years when water is cheaper.

How these options are mixed together is a matter that will occupy many government minds. After consideration of the options the Wentworth Group (2002) has suggested a mixed approach with irrigators having the access entitlements following conversion to a robust form reduced by 1 per cent per year for 10 years with the remainder of environmental flow water being purchased using a compulsory tender or other similar mechanism.

4.3 Water-Market and Access Entitlement Reform

In most parts of Australia, market and market-like arrangements for trading water access entitlements, periodic allocations and use licences are in their infancy. Markets for channel capacity and salinity are virtually non-existent. Separation of entitlement, allocation and use systems into their components open up opportunities to sequence implementation. In particular, separation gives an opportunity to speed development of the so-called 'temporary' market and, at least, freeze expansion of the market for access entitlements until hydrological flaws are removed. Whenever a permanent trade occurs, the market price paid reflects the value of the opportunity to exploit all existing flaws in perpetuity. Whenever a temporary trade occurs the market price paid only reflects the value of the opportunity to exploit the flaw in that year. The value of the flaw is not capitalised.

Minor changes in the way access entitlements are defined can result in a major increase or decrease in value. Until the entitlement system flaws identified in this article are corrected, we recommend, at least, a freeze on any expansion of permanent trading.

Consider the impact of a 1000 megalitre trade from flood irrigation near Swan Hill in Victoria to drip irrigation outside the Murray-Darling Basin in the Barossa Valley in South Australia. At the Swan Hill location, use would have been fairly inefficient with water-use efficiency running at about 40 per cent. Around 400 megalitres would have been evapotranspired and 600 megalitres would have returned eventually to the river. When traded through to the Barossa, the full 1000 megalitres would be used and 600 megalitres lost to the River Murray. If a temporary trade is allowed this 600 megalitre flaw is exploitable for one year while a permanent trade locks in the impact of this and any other flaws forever. Risk is transferred from the individual to society. The first step in the reform process is to redefine traded allocations in 'net' not 'gross' terms and then allow unencumbered allocation (temporary) trading across the entire system using periodically revised exchange rates.

In parallel with the policy changes that only allow people to trade net

allocations, policies that require forestry and other land-use changes that reduce water yield need to be introduced.

The next step in the sequence is to lower temporary-trade transaction costs and trading settlement times by separating use licences from water access entitlements as is happening in New South Wales. Once this is achieved temporary trade can proceed unimpeded by environmental externalities as these are managed via use licence arrangements not allocation policy. Trading should be possible over the Internet and settled within days not weeks. Between-region and between-licence-system exchange rates would need to be revised periodically. Private leasing of water access entitlements for several years would be possible, but would not need government approval. The 'lease' would simply take the form of a private contract to transfer all allocations received to the lessee.

Next, decisions need to be made on the volume of water to be secured for environmental services, the methods to be used to source it and the most appropriate way to convert the access component of each licence into access entitlement shares. Dealing with access licences is administratively expensive as guaranteed registers need to be established and each mortgagee and each interested party contacted. In many cases, it will be advantageous as part of this process to reduce the number of types of entitlement listed. With few exceptions, there is little justification for more than two types of access licence: high security and general security. Once two levels of reliability are in place, water users can mix the two entitlements to achieve whatever degree of reliability they prefer. As access entitlement risks are most efficiently pooled at the scale that they occur, entitlement shares should be issued across connected water resources and not by state or administrative region.

The last step is to develop markets for salinity and other water quality impacts. At present, markets for salinity are very imperfect. Salinity impacts permits need to be separated from use licences. Again, we recommend issuing salinity shares and allocations (see Figure 2).

5. Concluding Comments

The extent of the net financial impact of entitlement reduction and upgrade to a robust entitlement, allocation and use system will depend both on the volume secured for environmental purposes and the extent and nature of the existing imperfections. Clearly, the aggregate package should seek to equate marginal social benefits with marginal social costs (see Freebairn in this issue) using valuation techniques that account for the consequences of market and non-market preferences.

If market and market-like mechanisms are used, then the financial resources necessary will need to be sourced. Determining how much financial burden

should be borne by water licence holders and how much by the rest of the community is a distributional issue. Significant benefits from the suggested reforms will flow to irrigators in the form of valuable, fully specified and fully tradeable water access entitlements and allocations recorded in a register whose integrity is unequivocally guaranteed.

Choice of procedural process and style of communication with irrigators is critically important. As governments begin the process of securing water for the environment, irrigators will be less inclined to leave water in the river. At present, around 10 to 20 per cent of water is neither traded nor used! Failure to address the fundamentals of system design could result in outcomes worse than those already occurring. Back-of-the-envelope calculations suggest that the sum of the flow losses caused by existing hydrological flaws is greater than the volumes likely to be secured for the River Murray in the near future. Unless these flaws are fixed, expect less not more water in the river in 20 years time. It is time for a small group of three or four people to be commissioned to design and fully specify a robust system that could be implemented initially in one State and then rolled out across the nation.

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References

Australian Academy of Technological Sciences and Engineering 1999, 'Water in the Australian economy', Australian Academy of Technological Sciences and Engineering, Melbourne.

Carmichael, A. and Cummins, T. 2001, 'Water talk: Lets start speaking the same language', proceedings of ANCID Conference on Irrigation is a Great Business, Bunbury.

Council of Australian Governments 1994, 'Report of the Working Group on water resources policy, communique', February.

Jen, E. 2003, 'Stable or robust? What's the difference?', Working Paper, Santa Fe Institute, Santa Fe.

Murray-Darling Basin Commission 1999, *The Salinity Audit of the Murray-Darling Basin: A 100-Year Perspective*, Murray-Darling Basin Commission, Canberra.

Murray-Darling Basin Ministerial Council 2002, *The Living Murray: A Discussion Paper on Restoring the Health of the River Murray*, Murray-Darling Basin Commission, Canberra.

National Land and Water Resources Audit 2001, *Australian Dryland Salinity Assessment 2000*, National Land and Water Resources Audit, Canberra.

Natural Resource Management Ministerial Council 2003, 'Report to the Council of Australian Governments by Chief Executive Officers' Group on Water', April.

Siebert, E., Young, D. and Young, M. D. 2000, 'Market-based opportunities to improve environmental flow: A scoping paper', report to Environment Australia, Policy and Economic Research Unit, CSIRO Land and Water, Adelaide.

Tinbergen, I. 1950, *On the Theory of Economic Policy*, Elsevier, Amsterdam.

Wentworth Group of Concerned Scientists 2002, *Blueprint for a Living Continent: A Way Forward from the Wentworth Group of Concerned Scientists*, World Wide Fund for Nature.

Young, M. D. and McColl, J. C. 2002, 'Robust separation: A search for a generic framework to simplify registration and trading of interests in natural resources', Policy and Economic Research Unit, CSIRO Land and Water, Adelaide.

Young, M. D., Young, D., Hamilton, A. and Bright, M. 2002, 'A preliminary assessment of the economic and social implications of environmental flow scenarios for the River Murray System', report prepared for Murray-Darling Basin Commission, Policy and Economic Research Unit, CSIRO Land and Water, Adelaide.

[2003 The University of Melbourne, Melbourne Institute of Applied Economic and Social Research

GROUNDWATER

According to the CSIRO document 'Water Availability in the Murray-Darling Basin' October 2008:

- Water Availability in the Murray-Darling Basin October 2008' their finding make it quite clear that 'water resource development has caused major changes in the flooding regimes that support nationally and internationally important floodplain wetland systems in the MDB. Integrating the flow impacts down through the connected rivers of the Basin shows that total flow at the Murray mouth has been reduced by 61 percent; the river now ceases to flow through the mouth 40 percent of the time compared to 1 percent of the time in the absence of water resource development.
- The median water availability decline would reduce total surface water use by 4 percent under current water sharing arrangements but would further reduce flow at the Murray mouth by 24 percent to be 30 percent

of the total without-development outflow. In volumetric terms, the majority of the impact of climate change would be borne by the environment rather than by consumptive water users.

- Groundwater currently represents 16 percent of total water use in the MDB but under current water sharing arrangements groundwater use could increase by 2030 to be over one-quarter of total water use. One-quarter of current groundwater use will eventually be sourced directly from streamflow leakage which is equivalent to about 4 percent of current surface water diversions. Current groundwater use is unsustainable in seven of the twenty-
- High-use groundwater areas in the MDB and will lead to major drawdowns in groundwater levels in the absence of management intervention.
- Expansion of commercial forestry plantations and increases in the total capacity of farm dams could occur by 2030. 'Best estimate' projections of these developments indicate only very minor impacts on the total runoff reaching rivers across the MDB. However, the volume of surface water used by these developments, and the within-subcatchment streamflow impacts, may be significant.

They go on to say:

- The aquifers of the MDB include the sedimentary aquifers of the Murray Geological Basin and the Darling Drainage Basin, the porous sandstone of the Great Artesian Basin and fractured hard rock. (they also say that the GAB sandstones are extensive but believed to be separate preventing interaction)
- Current (2004/05) estimated groundwater extraction (for the MDB GMUs) is 1832GL/year. However, this estimate excludes extraction from confined aquifers of the GAB and some areas outside management units and hence extraction may be up to 25 percent higher. And higher during drier periods.
- Current groundwater extraction will eventually reduce streamflow across the MDB by 447 GL/year. Thus one-quarter of total groundwater extraction will eventually be sourced directly from induced river recharge which represents 4 percent of current total surface water use. Around 91 percent of the streamflow impact will have occurred by 2014 and 40 percent of the impact will occur in the Namoi, Lachlan, Murrumbidgee and Murray regions.
- An estimated 91 GL/year out of the total eventual streamflow impact from current groundwater extraction is not captured in existing surface

water model calibrations. This volume is additional to the groundwater extractions impacts determined in the surface water assessments that underpin existing surface water sharing plans and highlights an overestimation of the future surface water resource.

- Future groundwater extraction could (according to current groundwater management plans) reach 3956 GL/year by 2030. The greatest increases could occur in the NW South Wales macro groundwater sharing plans—mainly in fractured rock aquifers. (representing 24 percent of total water use in the MDB and far higher in dry periods).
- Future increases in groundwater use are expected to significantly affect baseflow in small tributaries, turning some into ephemeral streams. Significant increases are also expected in some major alluvial aquifers. These changes would increase the streamflow leakage induced by groundwater extraction. The total additional streamflow impact of future groundwater extraction is estimated to be 393 GL/year meaning total impact could reach 840 GL/year. Importantly, the projected future level of groundwater extraction could not be sustained in some areas (Border Rivers, Lower Namoi, parts of the Lower Macquarie and the Lower and Upper Lachlan) due to large reductions in groundwater levels. There are also indications that future extraction in the Upper Murray may not be able to be sustained.
- Climate change has the potential to alter the rates of rainfall recharge to groundwater.

CONCLUSION

The Draft Basin Plan fails to address what the required amount of water in the system must be to meet the requirements of Australia's obligations under treaties that include the Ramsar Convention on wetlands and the Convention on Biodiversity, instead it has come to a weak compromise without stating clearly what the real amount must be and the reasons for minimization of amount. The CSIRO has stated that *'the SDLs that the MDBA is proposing do not achieve the majority of targets, and that the MDBA should model higher SDLs in order to properly assess what higher SDLs level could achieve. The report states "the proposed SDL would be highly unlikely to meet specified ecological targets even in the absence of future climate change."* Vict EDO 2012 and see CSIRO Science Review of the Environmentally Sustainable Take for the Murray Darling Basin November 2011 p30.

My other concern, like that of the Wentworth Scientists, the Victorian EDO and others, is that there is no peer reviewed scientific data that the MDBA used that supports their increase in groundwater extraction from 1744GL to 4340GL, an increase of 2596GL which is unsustainable. In fact contrary to the MDBA decision to increase groundwater extraction, the Victorian Auditor-General in

his report entitled '*Sustainable Management of Victoria's Groundwater Resources*' October 2010 basically says that there is not enough information on how much water there is, on how much is extracted and the rate of recharge as well as no information on the connection between groundwater and surface water is lacking.

The MDBA is simply not allowed to consider anything that does not comply with the Water Act and this means that under *Section 21 (4)(a)* they must take account of ecologically sustainable development and the best available scientific knowledge and at the same time at *Section 21 (2)(i)* have regard to the Precautionary Principle. They have also failed to have regard to the NWI report on groundwater, at '*The National Water Initiative-securing Australia's water future: 2011 assessment*', p 100, and the requirement to consider groundwater and surface water interconnected, and by increasing extraction levels will have a direct impact on surface water. They have failed to reflect their decisions have included these requirements and therefore failed to adhere to the Water Act. By ignoring the Act and increasing groundwater extraction levels they will in fact ensure that what is happening with overallocation in the MDB will be exacerbated in the future, because of climate change, because of population growth, because of a lack in scientific evidence and because the MDBA had failed to cap groundwater at a sustainable level. It is so much easier to give than take away.

Since the Draft Basin Plan will not meet the environmental requirements it clearly compromises the Water Act. The MDBA has failed to consider climate change in terms of a permanent step change and a drier scenario and instead used historic data from 1895-2009 considering impacts within the range of natural variability which will compromise the Plan. Another significant weakness is the Draft Plan's failure to set binding environmental targets, and water quality and salinity targets which States are required to meet and the MDBA instead chose to interpret the provisions of the Water Act weakly and without setting binding targets. The non-compliance trigger of 20%+ and the MDBA's refusal to consider impacts of cumulative credit building results in a Draft Plan that can have impacts on downstream users and ecosystems.

Finally, because I have run out of energy to pick the Plan apart and I am sure others have done so, I would like to request that the MDBA re-examine the Plan in light of the facts:

1. This Plan is a legal document and to change it will require almost two years
2. The Plan does not comply with the objects of the Water Act's objects
3. The MDBA has allowed operational constraints to override the key objectives

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4. The increase of groundwater extraction is ridiculous and there is no peer reviewed scientific evidence that it is set at long-term sustainable levels
 5. International agreements will not be met
 6. Environmental targets, water quality targets and salinity targets have been given the weakest interpretation making it impossible for the management objective to be realized in accordance with the Act
 7. Cumulative SDLs, water hoarding will reduce availability of water for downstream users and ecosystems in low flow years
 8. By consistently interpreting the provisions of the Water Act as weakly as they could the MDBA is failing to ensure the Plan meets the objectives and purposes of the Act due to pressure from politicians and vested interests and those who trade water for profit
 9. The MDBA and Minister must use the opportunity to re analyze the Plan and strengthen the areas that others and I draw to your attention without regard for inter-State and political expediency, because only then will the Basin Plan ensure that it does what it is meant to do environmentally, socially and economically not just now but well into the future.
 10. I do not believe that setting a low cap and reassessing it in 5 years time gives any type of security for anyone and in fact what it does it demonstrate that the MDBA is not strong enough, or does not have the will to follow the required obligations that are set up in the Water Act and so they will fail right at the outset.
 11. The most concerning aspect of this Plan is its inconsistency with the Water Act and will place in jeopardy the management objective and outcomes that are to be realized under a strong piece of legislation which has clearly set out what it is to achieve.

Thank you for the opportunity to make what I hope is a contribution and I expect that the MDBA and the Minister and other vested interests and the media will put politicking and false information aside and the States will put aside vested interests, and make a real effort to stick to their agreements regarding NWI and other COAG agreements and international agreements, which they seem to have forgotten about when it rained. This is an opportunity and if you do not take it in good faith, with an open mind, and having regard to scientific facts, ESD, the Precautionary Principle as well as Climate Change (not enough emphasis on this, if any at all and this must be changed-no use hiding ones head in the sand like an ostrich) and the obligations under the Water Act 2007 then the MDB and its environment, the people living in it and those dependent upon it will suffer impacts of climate change and overallocation of the system that can and must be avoided.

Maria Riedl



Murrumbidgee flooded at Hay, the levee bank held-March 2012

Two weeks later the same river receding





Murrumbidgee in flooding flood plains March 2012



Open channels from the Mulwala Channel-November 2011



Channel between Finley and Deniliquin-November 2011



Earthern Channel November 2011

Rice and flooding-February 2011



Large rice paddock flood irrigated November 2011



Mulwala Channel with healthy willow trees November 2011