Australia's working rivers

The role of infrastructure and water buybacks in recovering environmental flows

Prepared for Crane Group Limited

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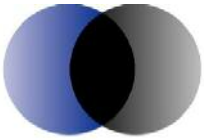

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Content

Boxes, figures and tables

Executive summary

Overview:

This paper provides a high level assessment of progress and trends in relation to major government commitments to reduce long-term stresses on river systems in Australia. It then considers the possible implications of these trends and their drivers for the mix of interventions being used in pursuit of these objectives.

Of particular interest is the implications for the role that might be played by new infrastructure investment – beyond projects already completed or under way – as part of a portfolio of measures designed to meet the objectives at "least net cost" to the community.

The paper focuses on the Murray-Darling system, and especially on the Living Murray plan, with its emphasis on recovering long term water for the environment. Much of the reasoning is, however, likely to be applicable to other river systems experiencing stress and subject to strategies to address these stresses.

Summary of Findings:

The broad picture assembled here can be summarised as follows:

- There is a range of factors likely to drive the current reluctance by holders of water rights to sell entitlement and to enter into tendering processes, especially the closed tendering processes, currently being used to source buy-back.
- The volumes of buy-back being sought are large in relation to normal trading of entitlement and will almost certainly put substantial pressure on market prices if these volumes are to be achieved rapidly.
- Current buy-back arrangements, involving closed tendering, are probably well-suited to acquiring modest volumes of water at prices below those that could be expected to emerge from a fully informed and operating market, but are likely also to limit the volumes offered at realistic prices.
- While this approach to buy-back may be a useful means of limiting the acquisition costs of some water, it is likely that a change will be needed to the strategy over time if the government's water volume objectives are to be met.
- Such a revision of strategy would most likely involve two complementary elements:

  - Clearly indicating to the market the government's willingness to pay prices substantially above current market expectations and accepting a higher average and marginal price of buy-back; and/or
  - Shifting the short and medium term reliance on buy-back towards greater relative savings from infrastructure.
- Infrastructure and buy-back instruments will compete with and complement each other at the margins. This implies a need for sound, thorough and compatible processes for weighing the costs and benefits of different initiatives.
- Infrastructure schemes are likely to have different implications for the distribution of costs and benefits than do buy-back schemes,
- Infrastructure schemes potentially have an important role to play in balancing the competing objectives of government policy in recovering water (the environment, irrigation communities and the national economic interest).
- In order to effectively manage the risk of paying too much to return the target flows to the environment, there is a solid *prima facie* case for considering urgent active investment in identifying and proving up an expanded set of infrastructure projects.

Summary of Conclusions:

There are good reasons for boosting the expectations placed on infrastructure projects as part of the overall water strategy. This infrastructure will involve a mix of additional private and public sector investment – with reductions in public sector investment likely to be driven by higher buyback costs and resulting greater private investment in infrastructure.

Getting the balance right will require a policy process that:

- Recognises the central need to *manage risks* in relation to the industry 'supply curve' in respect of water entitlement – including substantial uncertainty about the price levels needed to call forth a substantial and rapid willingness to sell.
- Evolves on the back of lessons from experience to date.
- Is prepared to make further strategic investments in the discovery, and initial assessment, of additional infrastructure prospects – to build a 'smorgasbord' of options that can be used to guide cost effective development of the buyback and infrastructure strategy.

The process should be open to unit costs substantially above current apparent market prices for water. This would allow both the wider portfolio benefits of infrastructure to be taken into account, and the likelihood of a rising market price for buyback.

Main arguments and conclusions

What follows is, in effect, a more detailed version of the Executive Summary, filling in the gaps in the arguments but without immersing itself into the more detailed empirics set out in the body of the report. It focuses on the key inferences and the lines of logic used – developing into the main conclusions we have drawn from the material and analyses in the main body of the report. This version is intended to be read essentially as a stand-alone document.

Purpose

This paper has been prepared for the Crane Group. It provides a *high level assessment of progress and trends* in relation to major government commitments to reduce long-term stresses on river systems in Australia − with a strong emphasis on the Murray-Darling system, and especially on the Living Murray plan, with its emphasis on recovering long term water for the environment. Much of the reasoning is, however, likely to be applicable to other programs and to other river systems experiencing stress and subject to strategies to address these stresses.

It then proceeds to consider the *possible implications of these trends and their drivers for the mix of interventions* being used in pursuit of these objectives. Of particular interest is the implications for the role that might be played by *new infrastructure investment* – beyond projects already completed or under way – as part of a portfolio of measures designed to *meet the objectives at least net cost to the community*.

The paper is intended as a contributor to a vital policy debate that is now in progress. It does not seek to be prescriptive but instead focuses on the logical implications of trends and their drivers – and on available mechanisms for responding to these implications. It does not include auditing of cost estimates, or modelling of river systems or recommendation of particular projects or packages of projects. Instead it relies heavily on *assembling information and insights from a range of sources* – and *probing the high level policy and strategy implications of this aggregate parcel of information*.

Established commitments

Governments across Australia have committed to a broad range of actions and processes to address concerns with the sustainability of existing patterns of usage and ecosystems across many Australian rivers. COAG processes and decisions, the National Water Initiative and the Rudd Government's Water for the Future plan, announced in April, are all part of this evolution of policy over recent years. In relation to the Murray-Darling system, the *Living Murray* plan

has committed the relevant jurisdictions to *recover 500 gigalitres* (GL) from 2004 to 2009, to improve river health at six iconic sites in the Murray-Darling Basin.

Since the announcement of the Living Murray plan, drought conditions and perceptions of future drought risks across the Lower Murray-Darling Basin have worsened dramatically, and shifted the hydrology record well outside the bounds of previously recorded experience. This has triggered deepening concerns for the long term future of the river and groundwater systems and the sustainability of the social, economic and environmental systems they support.

The tender in relation to the first $50m of a proposed $3 billion buy-back by the Federal Government under the Water for the Future plan has just ended, and is now to be assessed for any implications for the forward strategy. The plan has also committed $5.8 billion to the funding of water efficiency infrastructure projects.

Prior to the release of the results of the latest tender, 133GL of water had been recovered for the environment, almost entirely due to a package of water recovery measures incorporating infrastructure and regulatory changes in entitlements in the Goulburn Murray district.

A further 375.7GL of water for the environment could potentially be recovered for the environment from projects listed on the Murray-Darling Basin Commission's (MDBC) eligible measures register that are in various stages of implementation. Of these projects, infrastructure and water access entitlement buybacks account for approximately 142GL and 234GL, respectively.

Of the six buyback projects on the eligible measures register, three have been completed. Two of these projects are expected to be included on the environmental register in the next few months – achieving 11.5 per cent of the 234GL on the eligible measures register. With the addition of the third project to the environmental register, 20 per cent of the target would have been achieved. Therefore it remains to be seen whether the scheduled volume of buybacks of water access entitlements under the *Living Murray* plan will be achieved within the timeframe. The emphases in relation to infrastructure in the Water for the Future plan were essentially set out by Minister Wong – in her speech on the 29th of April 2008 – as the three threshold tests against which the government would henceforth test its investment in water infrastructure projects:

- sustainable futures for regional communities
- real improvements in river health and substantial and lasting returns of water for the environment

- improvements in the national economic welfare.

Application of these tests, with an eye to cost effectiveness, must take into account the competitiveness of these projects as candidates for inclusion in the total package of measures, including other infrastructure projects and further buyback.

Policy instruments

Voluntary buyback and *infrastructure projects*, combined with *regulatory change*, form the key instruments being used to address these river system stresses.

The Wentworth Group has suggested that the stresses may be severe enough to justify use of a carefully packaged and compensated *compulsory buy-back*. Compulsory acquisition was also identified as a possible instrument in a February speech by the head of the National Water Commission. While this could deliver rapid adjustment to the system stresses, this instrument has been excluded by the Federal Government from the Water for the Future process, with the Minister favouring "doing this co-operatively; our approach will be to buy water from willing sellers and to work with the states to achieve a basin wide plan that includes a cap."

A feature of compulsory acquisition of the type proposed by the Wentworth group is that it would increase both *the incentives and the financial capacity* for water users and businesses to invest in substantial *private infrastructure* as well as use *water trading* – as responses to the loss of entitlement. However, we would expect any move towards this approach to be *highly controversial*, for reasons of *perception as well as reality*. We have not further considered the role of this instrument in relation to near-term strategy.

Key arguments and perspectives

Against this background, the broad picture that has been assembled here can be summarised as follows:

- There is a range of factors likely to *favour reluctance by holders of water rights to sell entitlement* and to enter into tendering processes, especially the *closed tendering processes* currently being used to source buy-back. Included here are:
  - *substantial uncertainties* regarding the *rules of future market arrangements* and entitlement value, with likely trends probably implying *values rising* above current normal market levels;
  - *major farm business organisation and lifestyle implications* of a decision to substantially sell down entitlement without access to large water efficiencies;

  - uncertainty as to the *interaction between water entitlement and residual farm (or other enterprise) values*;
  - limited *access to good market information* on the prices at which other are willing to sell – even though such information is a logical part of the current value in holding entitlement;
- The *volumes of buy-back being sought are large* in relation to normal trading of entitlement and will almost certainly put *substantial pressure on market prices* if these volumes are to be recovered *rapidly*.
  - These price pressures will be accompanied by further pressures flowing from other *broadening of the effective demand base* for some entitlement as a result of water market reforms and growing appreciation of the *scarcity value of water* as a result of recent inflow patterns and allocation decisions.
- Current buy-back arrangements, involving closed tendering, are probably well-suited to *acquiring modest volume of water* at prices below those that could be expected to emerge from a fully informed and operating market;
  - However, the same processes are likely to *limit the volumes being offered* to levels below the planned levels of buy-back and may encourage a substantial proportion of the *bidding to be at levels above the market price* that would emerge from a better informed market.

    … Both effects entail *risks unless carefully managed*.
- Consequently, this approach to buy-back may be a useful means of *limiting the acquisition costs of some water*, but with the likelihood that a *change will be needed to the strategy over time* if the objectives are to be met.
- There are two natural elements in such a revision of strategy:
  - Posting to the market clear indications of a *willingness to pay prices substantially above current market expectations* and accepting a higher average and marginal price of buy-back; and/or
  - *Shifting* the reliance on buy-back *towards greater relative savings from infrastructure*.
- These instruments are in fact *complementary*, despite the obvious scope for some substitution between them:
  - As the marginal price of buyback rises, there will be accompanying *economic incentives for private investment* in water efficiency projects – on and off-farm – to free water to take advantage of the higher market price expectations.
  - In turn, these investments should *limit how high the price needs to rise* to secure a given volume of water returned to the environment.
  - The higher prices of additional buyback should also *improve the competitiveness of infrastructure projects with substantial public involvement*; projects not considered competitive against current market prices for

buyback could prove more than competitive in the face of a substantial market price rise.

- Infrastructure schemes are likely to have *different implications* for the *distribution of costs and benefits* than do buy-back schemes, and potentially have a particularly *important role* to play, in conjunction with buy-back, in *balancing the competing objectives* (and 'tests') of government policy in recovering water.
  - While funds acquired through buyback are likely to be substantially reinvested within regions, there will be a *significant pattern of adjustment in expenditure patterns*, away from current services, and a *substantial proportion of these funds are likely to move outside the regions* where the water is currently being used.
  - Water efficiency investments in *large infrastructure projects tend to lock the incidence of these investments into the regions* and to take advantage of existing farm and post-farm facilities;
    - … implying possibly less dramatic implications for the structure of regional economies.
  - Indications from some suggested additional infrastructure projects considered in the course of this study are that there may be a *willingness to pay substantially in excess of the nominal cost* of acquiring the same level of water through buyback;
    - … Probably pointing in part to an awareness of this *wider strategic function and benefits of infrastructure projects* within the overall package of responses.
- There are indications that the scope for further utilising competitive infrastructure projects as part of the portfolio of measures – especially in relation to the Living Murray timelines and targets – is being increasingly *constrained by the shortage of identified possibilities with good prospects* for proving cost competitive.
  - To an extent, the *incentives to probe* possibilities beyond the targets set under the Living Murray plan have been *muted*; we have not concluded that the projects cannot be found and we strongly suspect the contrary to be the case.
  - If so, the above arguments and the assessment of projects in train or under serious consideration do suggest that *investment beyond currently envisaged levels could be highly cost effective*.
- We believe there is a solid *prima facie* case for considering urgent active *investment in expanding and proving up the known set of infrastructure projects*, at least in parallel with the *evolution of the buy-back arrangements*.
  - This is particularly important if the risks of paying too much to return the target flows to the environment are to be managed effectively.
- Expanding and proving up the known set of infrastructure projects might be viewed as an investment in infrastructure options to help calibrate a

sound evolution of the buyback policy and probably to feed into the aggregate policy and strategy response.

  - In effect, we are proposing that the response strategy needs to be based in modern *options-based principles for planning and managing investments under uncertainty* – in which there is appropriate accounting for the *value of the flexibility to introduce alternatives to buy-back* that may be facing rapidly escalating prices.
  - The effect could be both to *limit risks* of having to pay a lot more to avoid under-delivering on objectives, and to deliver a *significantly lower expected cost* of meeting objectives.

- Recognising that infrastructure and buy-back instruments will in a sense compete, as well as complement each other, at the margins implies a need for *sound, thorough and compatible processes* for weighing the costs and benefits of different initiatives.
  - This will require recognising the *wider strategic value of infrastructure projects as part of the mix* – especially in relation to dealing with government objectives in relation to *sustainable regional communities*.
  - It is crucial that any policy decisions in relation to *returning a share of water savings from infrastructure projects to users* not become an *obstacle to fair competition* in relation to the scope for competitive return of water to the environment.
    - … Any decision to share water (with a 50:50 proposal having currency) needs to be based on the conclusion that benefits will be greater with sharing than without, and these benefits need to be factored into any assessment of the *net cost* of water that would be returned to the environment. The scope for an infrastructure project to deliver these complementary benefits cost effectively should be recognised as a strength, not a weakness of the project – or else the sharing rules would warrant reconsideration.
    - … These considerations need also to recognise, and establish a policy on, the *potential revenue base* offered by a volume of water to be returned to users – but these are policy decisions that do not go to the heart of the competitiveness of the infrastructure project if it is to be weighed from the *perspective of net value to the community*.
  - On the other side, it is crucial that the impact of an infrastructure proposal for net water returns to the environment be soundly assessed;
    - … This must include, for example, assessment of the implications of channel lining and *reduced seepage* for groundwater inflows.
    - … Such assessment has implications for both the *unit cost of the savings* (the primary basis on which the project might compete with buyback) and for the *level of environmental return* attributed to the project.

- Members of the Wentworth Group have recently highlighted the potential *risks in commitment to large infrastructure projects* when there is uncertainty regarding where the reduction in usage demand as a result of buyback will fall.
  - In an important sense, *buyback offers greater flexibility to 'unravel'* a previous initiative in the light of later experience than do most infrastructure projects – though subject to likely strong community resistance.
  - Considered alongside the above strengths of soundly-based infrastructure projects, this appears to us to reinforce the case for a *sound portfolio response*, involving both buyback and infrastructure and substantial *flexibility as to the final mix* between the two.

Coming out of all this, our overall impression is that there will be good reasons for *boosting the expectations placed on infrastructure projects*, and supporting these expectations with *active investment in wider identification of prospects,* as part of the overall water strategy – assuming that compulsory acquisition remains out of bounds. This infrastructure will involve a mix of *additional private and public sector investment* – with reductions in public sector investment likely to entail higher buyback costs and greater private investment in infrastructure. Getting the balance right will require a policy process that:

- Recognises the central need to *manage risks* in relation to the industry 'supply curve' in respect of water entitlement – including substantial uncertainty about the price levels needed to call forth a substantial and rapid willingness to sell.
- *Evolves* on the back of lessons from experience to date.
- Is prepared to make *further strategic investments in the discovery*, and initial assessment, of *additional infrastructure prospects* – to build a *'smorgasbord' of options* that can be used to guide cost effective development of the buyback and infrastructure strategy.
  - This process should extend to possibilities likely to involve *unit costs of water recovered substantially above current apparent market prices* for water – to allow both the *wider portfolio benefits* of infrastructure to be taken into account, and to allow for the likelihood of a *rising market price* for buyback.

Solution to the problems of the Murray-Darling is also likely to need significant rainfall in the near-term. Recovering entitlement that has been allocated little if any water, and investing in distributional infrastructure where there is no water to deliver is not going to make a big difference to river health in the short term.

1 Introduction

1.1 Purpose

This paper has been prepared for the Crane Group. It provides a *high level assessment of progress and trends* in relation to major government commitments to reduce long-term stresses on river systems in Australia − with a strong emphasis on the Murray-Darling system, and especially on the Living Murray plan, with its emphasis on recovering long term water for the environment. Much of the reasoning is, however, likely to be applicable to other programs and to other river systems experiencing stress and subject to strategies to address these stresses.

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Crane Group is a leading supplier of infrastructure to the Australian irrigation sector. While it has a commercial interest in infrastructure projects it has commissioned this project to assist with policy debate on this important issue.

1.2 National water reform priorities

Long term water security has been a central concern of Australia's state, territory and federal governments for more than a decade. The first agreement occurred in 1994. The second agreement in 2004, known as the National Water Initiative (NWI), set goals with the expectation of achieving them by the end of 2010:

> .... overallocated water systems are to be returned to sustainable levels of use in order to meet environmental outcomes, with substantial progress by 2010 (COAG, June 2004b, p. 1)

Significantly, governments made a commitment to sustainability through the recognition of:

- the continuing national imperative to increase the productivity and efficiency of Australia's water use
- the need to service rural and urban communities
- the need to ensure the health of river and groundwater systems, including by establishing clear pathways to return all systems to environmentally sustainable levels of extraction (COAG, June 2004c, p. 1).

Building on this commitment to sustainability the Rudd Government announced four priorities in the *Water for the Future* plan, on 29th April 2008:

> ....taking action on climate change, using water wisely, securing water supplies and supporting healthy rivers (Minister Wong PW 56/08, 2008, p. 1).

In the address to the 4th Annual Water Summit the Minister for Climate Change and Water, Senator Hon. Penny Wong, outlined *Water for the Future*. Under this national plan, the Commonwealth Government will invest $12.9 billion over 10 years in strategic water priorities, sound water governance, policies and water reforms. The greater part of the plan's funding is directed to the purchase of water access entitlements ($3 billion)[1] and infrastructure projects ($5.8 billion)(Minister Wong PW 56/08, 2008, p. 1).

1.2.1 The Murray-Darling Basin

Much of the policy attention in the last decade has centred on the Murray-Darling Basin, as does this report.

In keeping with the strong commitment of Australian governments to restore the Murray-Darling Basin to sustainable use, the Council of Australian Governments (COAG) agreed to the funding of the *Living Murray* plan. This plan has seen the allocation of an overall $700 million in funding to recover 500 gigalitres (GL) of water by the year 2009. This and the *Water for Rivers* program (the latter jointly operated by the Commonwealth, Victorian and NSW governments) are among the few which have set water recovery targets.

1.3 Healthy rivers, healthy communities

Many of Australia's rivers are so important to the social and economic fabric of Australia that they could justifiably be referred to as working rivers.

[1] The initial tender offer under the *Water for the Future* buyback program, to purchase some $50 million in water access entitlements this financial year, closed on16 May 2008. (See (Minister Wong Media Release PW 22/08, 2008)).

The recent history of Australia's river systems reflects the fact that many are overworked. A key goal of the national water reform agenda is to restore these rivers to a sustainable level and pattern of use in order that they are able to support both the economic and social requirements of Australian society and the river systems' associated ecosystems.

The health of Australia's working rivers has deteriorated because of the unsustainable high rate of extraction and over-allocation in some cases, and changes in the pattern of natural river flows as a result of variations in rainfall and the impact of drought. According to the Wentworth Group of Concerned Scientists the health of Australia's working rivers has deteriorated:

> We have made understandable but profound mistakes in many areas of Australia, overallocating water by giving away too many licenses to take water from rivers and aquifers (Wentworth Group, 2003, p. 5).

The Wentworth Group believes that healthy rivers are:

> ….essential to protect our unique and valuable natural heritage, and also provide for the needs and aspirations of water users and the Australian people (Wentworth Group, 2003, p. 7).

The demands on the rivers for supply of high and medium security water for irrigation, urban supplies and industry often do not necessarily correspond with inflow patterns from seasonal rains and in some cases snowfalls. While storages can help to match inflow patterns with consumptive use, lower rainfall and drought have highlighted the negative impact on the environmental condition of working rivers.

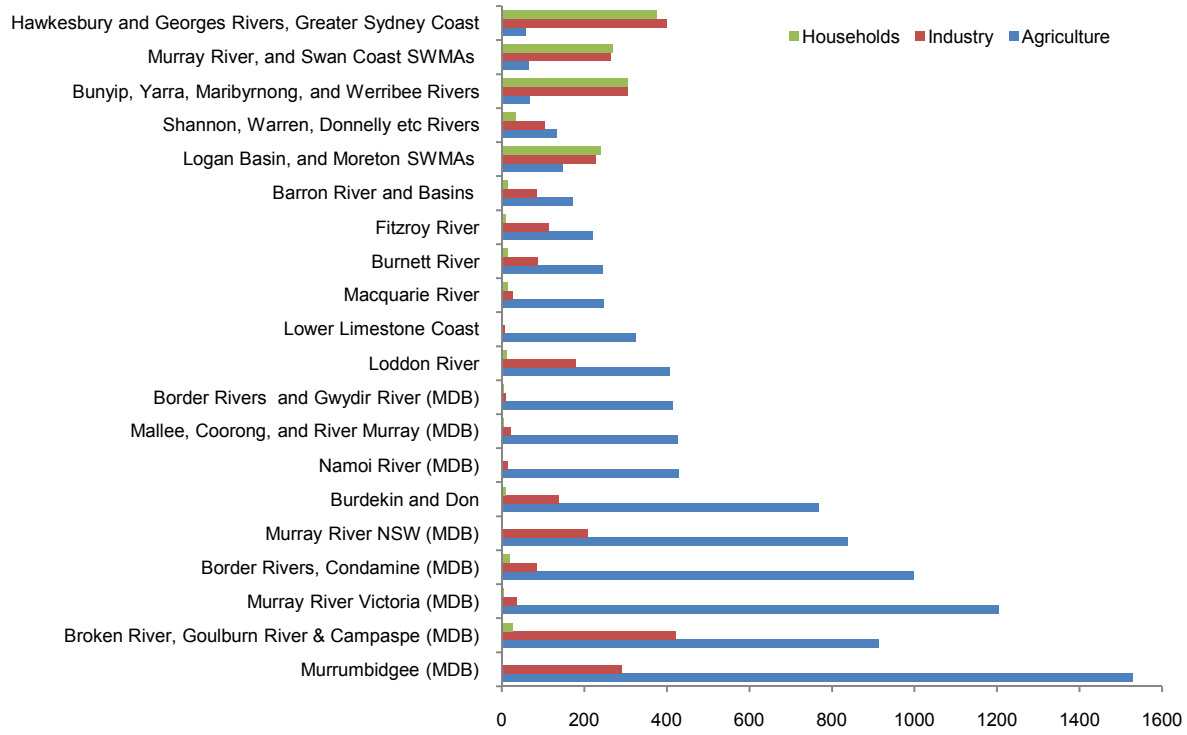
Australia's working rivers provide water to meet the needs of irrigators, households, and industry including mines, and hydroelectric generators. Figure 1 shows the top twenty working rivers and regions across Australia, including those in the Murray-Darling Basin.

The Murray-Darling Basin is Australia's hardest working river system, underpinning the economic prosperity of the 2 million people living and working within the Basin.

In terms of contribution to the economy, Murray-Darling Basin Commission (MDBC) statistics show that Murray-Darling Basin accounts for:

- annual economic output of the order of $23 billion or over 2 per cent of the national economy (MDBC 2008a)
- just over 34 per cent of gross value added from agricultural production (MDBC 2008b)
- over five per cent of the value of output from Australia's mining industry (MDBC 2008c).

Figure 1 **Water consumption (GL), major working rivers and regions**



Note: Total water consumption amounted to 18,767GL in 2004-5 including total distribution losses of 2002G
Data source:(National Water Commission 2005)

In seeking to restore river health, the Murray-Darling Basin Ministerial Council's vision is to bring about:

> …a healthy River Murray system, sustaining communities and preserving unique values.

Further, the Council recognises:

> … the importance of a healthy River Murray to the economic, social and cultural prosperity of communities along the length of the River (MDBMC, 2003, p. 1).

1.4 Water recovery measures

Options to recover water to achieve sustainable levels of use for Australian rivers include purchase of existing water access entitlements or water allocations, investment in water use efficiency measures directed at consumptive use and investment in water infrastructure to improve the management and delivery of water. The latter two measures can lead to a net

increase in water recovered through reducing losses due to evaporation and in some circumstances seepage[2].

In this report, we analyse and compare the relative contribution of two types of water recovery measures (infrastructure improvement measures and water buybacks) and the associated risks with respect to delivering the *Living Murray* target of recovering 500GL of water for environmental flows by 2009.[3]

These same water recovery measures are the foundation of the Rudd Government's *Water for the Future* plan. Of the $5.8 billion committed for key rural water projects to secure a long term sustainable future for irrigation regions and return water to the rivers, $1 billion will go towards funding stage two of the Food Bowl Modernisation program and $450 million will go towards developing national water accounts by the Bureau of Meteorology. In addition $3 billion will be used to purchase water from willing sellers in order to return it to the environment.

Infrastructure improvement measures can 'capture and return water losses and reduce system evaporation losses' (COAG, March 2008, p. 3).

It has been estimated by the Australian Bureau of Statistics (ABS) that water losses amounted to 1500GL or 23 per cent of water supplied by irrigation and rural water suppliers in 2004-05(ABS, 2006b)[4], or as Minister Wong recently described:

> 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.(Minister Wong, 2008, p. 9)

According to the Murray-Darling Basin Commission (MDBC)

> Water can also be recovered by improving or installing new infrastructure to allow better measurement and control of flows, or reduce evaporation and seepage. Sometimes this process involves removing outdated or superseded infrastructure. These types of projects generally lead to efficiency gains (MDBC 2008d).

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2 Some infrastructure seepage losses are returned to the river system via groundwater inflows and do not lead to a net loss of water to the river system.

3 Initially an intergovernmental agreement between the Commonwealth Government, and NSW, Victoria, Queensland, South Australian and ACT governments, committed $500 million over 5 years to recover 500GL between June 2004 and June 2009. (A brief chronological summary of government commitments is included in Appendix A).

4 The definition of water losses varies between water providers. It can include water lost through the supply infrastructure (resulting from leakages from underground pipes, evaporation from open channels and rivers, or burst mains), theft and customer meter errors. In 2004–05, the total volume of water reported to be lost from the water delivery infrastructure, including meter errors where identified, was 2,022GL (ABS, 2006b).

Thus infrastructure improvement measures can reduce net losses of water to the river system and create net additions to flows. These can be used to restore environmental flows, to reduce the impact of over allocation or be allocated in new water access entitlements. Where the economics are favourable, they can be an important component in a range of measures to restore the ability of over-allocated river systems to support economic and social activity and maintain river ecosystem. This is relevant to achieving the water use targets established under the Cap on further diversions from the Murray-Darling Basin that was agreed by participating governments in 1997. The water savings delivered by such measures are potentially an important part of the measures to ensure that water extraction levels in future stay within the requirements of the Cap.

Government purchases of water access entitlements[5] from willing sellers are the second type of water recovery measure. A permanent trade is a trade in a *water access entitlement*, and hence all future allocations associated with the entitlement (see key definitions in Box 1). In the context of sustainable long term use, it is this type of purchase of water access entitlements that is directly relevant to reducing over allocation in working rivers.

Purchase of seasonal allocations – so-called temporary water – may be also be used to sustain environmental flows when supplementary water is needed, for example, to replicate the pattern of natural flows or to sustain ecosystems. We have not considered the extent of purchases of seasonal allocations for environmental flows in this report but we recognise that the also play a role in providing water for the environment and could contribute to a strategy for achieving the goals of the *Living Murray*.

We also note that, *in theory at least*, a rolling portfolio of temporary water purchase could be included as a component in a strategy to reduce the Cap, as well as better mimic short-term variations. This might be seen as entailing a level of risk, but it would be analogous to a business maintaining a rolling portfolio of borrowings as part of its commercial strategy, where accepting risks of variation in the price of debt. The same strategy might be considered as an interim measure, pending maturation of markets to a point where permanent transfers might be more acceptable to entitlement holders.

[5] In this report Government purchases of water access entitlements are referred to as *buybacks* so as to differentiate them from other trading transactions.

Box 1 **Key definitions**

In the writing of this report we have made use of the agreed national definitions on water use and management, which include the terms "water access entitlement" and "water allocation". These are defined as follows.

- A water access entitlement is a perpetual or ongoing entitlement to exclusive access to a share of water from a specified consumptive pool as defined in the relevant water plan. These are often described as permanent water access entitlements.
- A water allocation is the specific volume of water allocated to a water access entitlement in a given season, defined according to rules established in the relevant water plan. These are often described as temporary or seasonal water allocations.

Data source: (ABS, 2006a)

The following section reviews the progress that has been made towards the water recovery target thus far.

2 Achieving the 500GL target

2.1 Progress to date

The MDBC reports its progress on water recovery measures, on its website[6] and in its annual reports. To date 133GL has been recovered for the environment since 2004 (27 per cent of the target of 500GL (see Table 1)). The slow progress reflects in part the fact that there were no water recoveries for the environment in the first two years of the *Living Murray* plan. The recovery targets for each state or territory and the state of implementation are shown in Table 1.

Table 1 ***Living Murray* central register, water recovery measures**

	Projects under investigation	Developmental Register	Eligible Measures Register	Environmental register	Recovery Target
		Projects in development	Ready to be implemented	Recovered Water	
	GL	GL	GL	GL	GL
NSW	40	0.70	226.20		249
VIC			79.00	120.00	214
SA	22			13.00	35
ACT	2				2
Aus Govt			0.50		
MDBC		20	70.00		
Total	64.00	20.70	375.70	133.00	500

Data source: Murray-Darling Basin Commission (www.mdbc.gov.au) as at May 2008

The measures on the MDBC central registry do not all fall neatly into the categories of infrastructure and buybacks – some are combination of both or involve regulatory changes to entitlements. This is illustrated by the two measures that have contributed to water for the environment- as registered on the environmental register thus far:

- South Australia contributed 13GL of water sourced from government entitlements (through a legislated change in entitlements).
- The Goulburn Murray Water Recovery Package recovered 120GL, to be credited to the Victorian Government's target, through creating a new separate tradeable medium reliability water access entitlement, and allocating 20 per cent of the savings (120GL) to the environment.

[6] www.mdbc.gov.au

- This year a further 25GL of water is to be recovered from reconfiguration of the irrigation distribution systems, involving infrastructure works. This means that from December 2009 onwards a total of 145GL per annum will be recovered for the environment.

With just over one year to go to June 2009, there is 367GL of water yet to be recovered. However, as shown in Table 1 there is a set of water recovery measures totalling 375.7GL (on the eligible measures register), which according to the MDBC are currently "being implemented".

Thus there are sufficient measures on the register for the *Living Murray* target to be met by June 2009 **if** they can be implemented in this timeframe **and** the water recovered is delivered for the environment.

The Wentworth Group has suggested that the stresses on the system may be severe enough to justify use of a carefully packaged and compensated *compulsory buy-back*. Compulsory acquisition was also identified as a possible instrument in a February speech by the head of the National Water Commission. While this could deliver rapid adjustment to the system stresses, this instrument has been excluded by the Federal Government from the Water for the Future process, with the Minister favouring "doing this co-operatively; our approach will be to buy water from willing sellers and to work with the states to achieve a basin wide plan that includes a cap."

A feature of compulsory acquisition of the type proposed by the Wentworth group is that it would increase both *the incentives and the financial capacity* for water users and businesses to invest in substantial *private infrastructure* as well as use *water trading* – as responses to the loss of entitlement. However, we would expect any move towards this approach to be *highly controversial*, for reasons of *perception as well as reality*. We have not further considered the role of this instrument in relation to near-term strategy.

The measures being implemented are considered in more detail in the following sections. We have classified the measures into two groups for the purposes of this report depending on whether they are principally buyback or infrastructure measures. The latter may be either stand alone or part of a package of improvements in water supply management. For the purposes of our analysis we have identified that 233.8GL or the proposed activities are water buybacks and 141.9GL are infrastructure measures.

2.1.1 Infrastructure measures

Generally infrastructure measures have longer lead times, compared with market purchases, but there is greater certainty as to their impact when they come on stream. They also usually represent an irreversible commitment of

funds so care is needed to manage (though not necessarily eliminate) any risks their value is not reduced by future changes in water use in regions.

In the immediate future, up to June 2009, the MDBC expects to recover 141.9GL of water from the seven infrastructure investments identified in Table 2 and appearing on the eligible measures register.

Table 2 **Infrastructure measures**

State / Territory	Water Recovery Infrastructure Projects (currently being implemented, under the *Living Murray* plan)	Expected Recovery GL	Project completion date
NSW	The Great Darling Anabranch stock and domestic pipeline	47	January 2007
NSW	Bungunyah-Koraleigh water supply pipeline	3	Includes some buyback/change in entitlements
NSW	Ricegrowers Association - On Farm Water Efficiency A1, B1, C1	12.4	A1 complete June 2008
VIC	Goulburn Murray Water Recovery Package	25	2009
VIC	Lake Mokoan Water Recovery Package	24	2009
VIC	Shepparton Modernisation Project	30	2009
Commonwealth Government	Water Through Efficiency Tender	0.5	August 2007
Total		141.9	

Note; All volumetric measures on the register are in long term cap equivalent gigalitres, as specified in the Living Murray Business Plan

Data source: Eligible Measures Register MDBC.

In terms of progress towards the target of 500GL, we sought publicly available information on the progress of existing projects, finding that most of the measures in Table 2 are on track to recover water, if not by June 2009 then in calendar 2009.

- Information obtained from authorities in NSW and Victoria indicate that their infrastructure projects (with total water recovery of 127GL) are on time to recover water in calendar 2009.
- Of the 12.4GL of water associated with Ricegrowers Association projects, we have been advised by the Association that the first of the infrastructure projects is to be completed by June 2008, yielding 2.5GL for the environment. However, investments in the next stages are still under consideration.
- According to the MDBC the Australian Government *Water Through Efficiency Tender* closed in February 2007, with three NSW General Security tenders totalling 0.45GL being accepted. Entitlements were to be transferred to the environment on 21 August 2007. However, it appears

from MDBC data that this water has not yet been registered on the environmental register.

2.1.2 Buyback measures

The six buyback commitments under the *Living Murray* identified in Table 3 and included on the eligible measures register seek to recover 233.8GL of water for the environment.

Table 3 **Water buybacks**

State / Territory	Water Buyback "being implemented" under the *Living Murray* plan)	Target Expected Recovery (GL)	Progress
NSW	Murray Irrigation Limited Supplementary Water Access License	17.8	Purchase completed
NSW	Market Purchase Measure	125	Tender open from FY 2007-08 to 2008-09
NSW	Catchment Management Authorities	9	Innovation project, experiencing delays
NSW	Poon Boon Lakes entitlement recovery (package of measures)	12	9GL has been recovered
MDBC	Pilot Environmental Water Purchase	20	Purchases completed
MDBC	Environmental Water Purchase Project	50	Will proceed after the pilot has been reviewed
Total		233.8	

Note; All volumetric measures on the register are in long term cap equivalent gigalitres, as specified in the Living Murray Business Plan

Data source: Eligible Measures Register MDBC

Of these six projects three, with water access entitlements of 46.8GL, have been completed to date. The NSW Government buyback of 125GL remains open and will remain so until fully subscribed or until June 2009. At this stage it appears that none of the 46.8GL purchased has been finally returned to the environment. However, it is understood that NSW Government will apply to have 26.8GL added to the *Living Murray* environmental register in the next few months[7].

In addition to the *Living Murray* buyback commitments, the Commonwealth Government has opened a separate tender offer under *Water for the Future* to purchase some $50 million in water access entitlements this financial year (with tenders closing on 16 May).

[7] This is the combined total of the Murray irrigation and the Poon Boon Lakes entitlement purchases.

The total volume of water access entitlements currently traded annually in the southern Murray-Darling Basin ranges between 90GL and 180GL (BDA Group, 2006, p. 14). Thus the NSW Government buyback offer of 125GL and the $50 million of *Water for the Future* demand will, for a time, put additional pressure on the price of permanent water access entitlements.

On the other hand, distressed sales of water access entitlements and or land in districts where the impact of the drought has been the most severe and enduring could in the shorter term at least increase the quantity of water access entitlements available for sale.

In the context of the $3 billion allocated to buybacks through *Water for the Future,* Professor Mike Young of the University of Adelaide and formerly of CSIRO is reported to have expressed concerns about the demand pressures which will arise:

> You are talking about government buying four times the current size of the market. Doing that without increasing the price of water is going to be very, very difficult (ABC Online, March 2008).

In the light of the scale of forward commitments by governments to recover water for the environment from buybacks, it is important to understand if there are any features of water markets that might contribute to a lack of willing sellers.

3 Value of water for consumptive use

A well functioning and efficient market is characterised amongst other things, by a multitude of buyers and sellers.

As will be discussed below water markets are in the process of maturing, as water reforms are implemented and the removal of inefficient regulation unfolds under the NWI. Nonetheless it must be acknowledged that trade in water markets would still be restricted by physical constraints, even in a mature, efficient water market. Not all catchments are physically connected, and it is generally recognised that it would be a prohibitively expensive exercise to pipe water over the distances required to facilitate a genuine national market.

Furthermore, there are forces beyond those revealed by financial analysis that influence the willingness of sellers. For example, some farmers may choose not to sell their water access entitlement s because of their value for the farming lifestyle itself or because of strong cultural or family ties to the region.

3.1 Water reform timetable

Since 2004, progress has been made under the NWI as the Federal, state and territory governments have undertaken:

> … progressive removal of barriers to trade in water and meeting other requirements to facilitate the broadening and deepening of the water market, with an open trading market to be in place by 2010 (COAG, June 2004c, p. clause(iv)).

According to the National Water Commission water trading, within and between states, is effectively reallocating scarce water supplies, in difficult circumstances. However, the Commission has expressed concerns about market confidence:

> The Commission is conscious that water markets in Australia are still maturing and may for that reason be vulnerable to loss of confidence as a result of poor behaviour by market intermediaries. The Commission is also aware that poor transparency, lengthy approvals times and lack of common trading processes across jurisdictions may contribute to the loss of market confidence (National Water Commission, Waterlines Occasional Paper No 3, July 2007, p. 6).

Through commitments made under the NWI, and now complemented by *Water for the Future*, the Rudd Government has established a timetable for water regulation reform. It has also released draft water market regulations for public comment (Minister Wong Media Release PW 48/08, 2008).

The ACCC has been delegated functions under the *Water Act 2007*. As the Chairman of the ACCC, Graeme Samuel, has explained:

> What we want to do is to see water trading freed up so it can trade not only across regions but also across state borders. In other words, take the Murray-Darling Basin as a total water catchment area and to see water trading freely across the basin to its best allocated use (ABC Online, 2008).

Figure 2 **Timetable for water reforms**

Data source: (ACCC, 2008)

In the immediate future the ACCC will advise the Rudd Government on the barriers to trade imposed by the operators of irrigation infrastructure. This advice on water *market* rules is to be provided to Minister Wong no later than August 2008.

The ACCC is to provide advice on water *charge* rules to the Minister by January 2009. According to the ACCC, this advice will consider

> ...the development of rules relating to bulk water charges, charges of irrigation infrastructure operators and charges levied to recover the costs of water planning and management (ACCC, 2008, p. 1).

Only then will the ACCC address water *trading* rules, which encompass all matters relating to trade in water rights. According to the ACCC these trading rules will be a major focus of the ACCC's work in 2009-10, following which it will advise the new Murray-Darling Basin Authority, which will in turn consider this advice in developing the long term *Murray-Darling Basin Plan, 2011*.

3.1.1 Implications for buybacks

Thus for the foreseeable future buybacks are likely to be operating under existing rules.

A detailed listing of the current rules and their impacts on the efficiency of trading in water markets is documented by the Productivity Commission's report on Rural Water Use and the Environment (Productivity Commission, August 2006). More recently, Basin water market and trading principles' have been introduced with the passage of the Water Act 2007 and include arrangements to facilitate intra and interstate trade, water access entitlement tagging, and exchange rates or other trading mechanisms (Commonwealth Government, 2007).

Despite the framework for market rules that have been provided, parties currently trading or likely to trade in water markets face an uncertainty as to the detailed nature of the rules that will apply after 2011. This is probably a more significant issue than the fact that the rules are not yet in place.

For the purposes of this report, it is sufficient to recognise that the limitations on who can participate in water trading are gradually being dismantled as the NWI is progressively implemented, including removal of:

- legislation prohibiting the purchasing of water by government agencies and non-landholders
- restrictions on ownership of water to people who own or occupy land that has access to individual water access entitlements, and government agencies (including state-owned water utilities)
- restrictions on participation in water trade that differ for interim water allocations and for water allocations(Productivity Commission, August 2006).

These limitations all affect levels of demand with implications for the market value of traded water.

In its first biennial assessment in October 2007 the National Water Commission described the operation of water markets in the following terms.

> Registers of the states in the southern MDB (where trade across borders is physically possible), are not yet compatible. There are also concerns about time delays and high transaction costs of operating in the market. The ability of the individual southern MDB registers (both state-run and those of private irrigation entities) to interact in a relatively simple, smooth and timely manner when entitlements are bought and sold across irrigation area boundaries and state borders is still being established. Changes are being made to, and planned for, entitlement registers in many states over the coming year or so. Therefore compatibility will need to be sought, and tested, as this occurs (National Water Commission, 2007, p. 19).

Given that water markets are in transition, the issue is whether sellers will hold off participating in buybacks because they believe that greater competition in the foreseeable future could increase the market price of their water access entitlements.

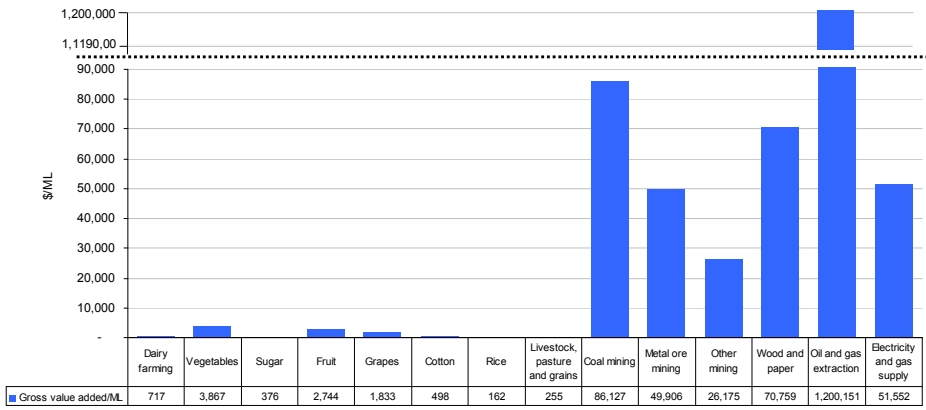
Two growing competitors in water markets are industry and urban water suppliers, where there is evidence that both of these users place a higher value on water than many rural users.

Value added of water to industry

In a 2007 report prepared for the then Department of Industry, Tourism and Resources (DITR), ACIL Tasman considered the water needs of the mining and petroleum, energy and pulp and paper industries (the MPEPP industries). The report found that:

> While total water use within these MPEPP industries is relatively small, these industries make an important contribution to both water use and infrastructure development in the areas in which they operate, and are the single largest user of water in some catchments (ACIL Tasman, 2007, p. xi).

Figure 3 **Value added per ML of water used by industry 2004-05**



Data source: (ACIL Tasman, 2007)

We estimated the average value added of water used in these industries in comparison with agriculture generally, and irrigated agriculture in particular.

The results of this analysis are shown in Figure 3. where it is shown that in 2004-05 the average value added per megalitre of water used was around $86,000/ML for coal mining, $71,000/ML for wood and paper, $52,000/ML for electricity and gas supply (ABS category) and $50,000/ML and $25,000/ML for metal mining and other mining, respectively. This compares with the value added generated per megalitre of water used in agriculture, which is Australia's largest user of water ranged from around $162/ML for rice production to $3,870/ML for vegetable production.

Note that at the level reported in Figure 3 the data used to undertake these calculations are highly aggregated. There is evidence that the value added generated per megalitre for certain irrigated fruits, vegetables or grapes etc could be much higher than reported here, for example, other estimates have suggested that the value of water in some irrigated agriculture sectors (for example, horticulture) may be as high as $15,000/ML (ACIL Tasman, 2007, p. 7).

These figures are not measures of sector efficiency but do point to the pressures that arise from constraints on access to water. In some cases these values appear to be high enough to justify further investment in water infrastructure.

Pressures on urban water needs

In an earlier study of the prospects for water markets, ACIL Tasman argued that there would be benefit in better integration of urban and rural water markets (ACIL Tasman, 2003a, p. 38), a conclusion that is consistent with the Productivity Commission's recommendations (Productivity Commission, August 2006, p. 204). Even now, urban water suppliers are important players in a number of water markets as purchasers of water.

The 2005 report for the Business Council of Australia (BCA) *Water under pressure* found that trade across both rural and urban sectors could reduce the need for the water restrictions or demand management approaches that have become increasingly common in Australian urban areas. It provided the evidence reproduced inTable 4 based on earlier work by Professor Mike Young (Business Council of Australia, 2005).

Table 4 **Projected urban price increases, 2005 to 2032**

$/ML	Current water price	Projected price (with no new supply sources)	Projected price with rural-urban trading
Sydney	1,360	7,560	2,840
Melbourne	1,170	5,580	1,600
Brisbane	1,270	9,780	2,060
Adelaide	1,300	1,410	1,730
Perth	1,120	10,590	4,410
ACT	1,110	3,060	1,540

Data source: Exhibit 13, converted from kilolitres in the BCA report to price per megalitre (Business Council of Australia, 2005)

A number of these urban centres are now committed to significant 'water factory' technology, involving both recycling and seawater desalination. The effect of these technologies can be to reduce demands on stressed river systems by

delivering fresh sources of water – though usually at a cost significantly higher than current irrigation sector pricing would support.

Clearly over the near to medium term the water market will be in transition. For some time it has been progressively maturing from being heavily regulated with high barriers to trade and few intermediaries to one in which market mechanisms and innovative products will enable water will find its highest valued use.

Not until the long term *Murray-Darling Basin Plan* is settled in 2011 will the on-going rules for trading in water rights be settled under the terms of the March 2008 COAG agreement. If today's potential sellers place a higher value on their water access entitlements than the prices offered in the current market, including under buybacks, they may choose to wait until the rules are agreed and more participants enter into the market. This higher value may reflect the 'option value' in holding on to entitlements while these changes occur. With emerging evidence that demand is growing this is likely to translate into an expectation of higher prices in the future once the market is fully operational.

In the mean time, owners of water access entitlements still they have the option of selling annual water allocations, which can trade up to $1000/ML or more, depending on the season.[8]

3.2 Willingness to sell permanent water

In this section we discuss a range of reasons that have been identified as negatively impacting on the willingness of sellers to sell water entitlements. Much of the information comes from the survey analysis undertaken in the Southern Goulburn Murray irrigation district by Professor Bjornlund of the University of South Australia in 2003.

Professor Bjornlund notes that permanent water trading has exhibited a slow rate of growth not only in absolute terms, but also relative to temporary water trades. Professor Bjornlund notes:

> Temporary trading in the study area started out with fairly low volumes during the first five years (1989-94) and has since accelerated significantly to a level between… 10 and 16% of the total volume of water rights… Permanent trading also began with relatively low volumes during the first five to six years… At present … representing about 1% of the total volume of water rights. Hence it appears that the market for temporary water has been adopted far more widely than the market for permanent water, moving about 10 times as much water annually. It has been argued that the

[8] Prices for allocations traded in the past year of between $500/ML to $1000/ML, depending on the month. Prices are high when irrigation needs are high, and sellers of allocations are relatively scarce – from August through to October (Waterfind).

> slow uptake of the market for permanent water constitutes an impediment to maximizing community benefits from the limited resource (Bjornlund, H; Rossini, P, 2003, p. 64).

The literature suggests various factors that explain why a preference for temporary water has emerged over permanent water trading (see (Bjornlund, H; Rossini, P, 2003) for a discussion). In what follows we concentrate on issues that restrict or discourage the sale of permanent water entitlements to the market and thus could limit the extent to which environmental flows will be recovered.

3.2.1 Policy uncertainty

One source of policy uncertainty that potentially limits the willingness of entitlement owners to submit offers to the government tender or to offer at high prices, is related to the use of closed tender processes. Current buy-back arrangements, involving closed tendering, are probably well-suited to *acquiring modest volume of water* at prices below those that could be expected to emerge from a fully informed and operating market. However the same process may not be as appropriate for larger volumes of water − and may actually limit expressed willingness to supply entitlement to a buyback process.

A closed tender process limits information on realised prices to the market. By not having price and value information readily available buyers may decide not to bid or to bid high prices to reduce the risk that they might sell at a lower price than the market ultimately realises. This adds to the costs of price discovery which may act to discourage some sellers from engaging in permanent water trading at the present time.

Another important source of uncertainty is related to future changes in the Murray-Darling Basin cap, as announced in the *Water for the Future* (Minister Wong, 2008, p. 4). Changes to the cap will lower the future supply of water. It is possible that the cap on water diversions from the system will be lowered. However, the size of the reduction and how the reduction will be implemented remains uncertain.

This type of uncertainty is documented to have resulted in speculation leading to an increase in the number of unused entitlements in the Murray-Darling Basin (CIE, 2004). This essentially, occurs because entitlement holders decide to hold on to their unused water entitlements in expectation that these will increase in value in the future. It is also a risk management strategy in the light of uncertainly associated with changes that might flow from future policy adjustments.

The net effect of these uncertainties is to reduce the willingness for entitlement holders to bid in environmental water tender processes or to encourage them to bid at high prices.

3.2.2 Trading rules

According to Bjornlund (2003, p.66), 40 per cent of traders of permanent water interviewed in south-eastern Australia said that they were discouraged from entering the market because of uncertainty about trading rules. For example, the extent to which the holder of a water access entitlement is able to transfer the entitlement to another party, in whole or in part, varies across different entitlements and between States. Moreover, these trading rules are typically specified in other instruments such as primary and subsidiary legislation, water resource plans, and irrigation scheme constitutions (ACIL Tasman, 2003a).

There has been significant progress since this paper was written. As mentioned earlier, through commitments made under the NWI, now complemented by *Water for the Future*, the Rudd Government has reconfirmed the timetable for water regulation reform. However, the NWI schedule does not anticipate these reforms including water trading rules being completed before the end of 2010 (commencing in a new Murray-Darling Basin plan in 2011). Thus for the foreseeable future buybacks are likely to be operating under trading restrictions currently in place.

3.2.3 The impact of water sales on the capital value of property

According to Bjornlund:

> (I)rrigators do not trade (because) they see their entitlements as an integral and inherent part of their farm... 79% of the sellers of permanent water and 64% of the sellers of temporary water said that the potential impact on property values influenced their decision to use the temporary market (Bjornlund, H; Rossini, P, 2003, p. 65) .

Econometric evidence suggests that selling water entitlements can permanently reduce the capital value of property and reduce future options available to farmers (Bjornlund, 2001). In this study, Bjornlund shows a significantly positive relationship between land value and the capability of irrigation. This relationship has to do with the fact that land value is a function of its potential use, such that the value of irrigated land is above that of dry land.

This factor discourages permanent water sellers from entering the market until they judge that the price received will fully compensate for the loss in capital value of their total assets.

3.2.4 Administrative inefficiencies

Administrative inefficiencies add to the transaction costs sellers face when deciding whether to enter the market. Transaction costs are high where there are lengthy and costly processes for selling of water entitlements. For example time delays are caused by the need to advertise sales to protect other parties with an interest in the water right, while costs are associated with the need to produce whole farm plans or to improve irrigation and drainage infrastructure to fulfil regulatory requirements (Bjornlund, H; Rossini, P, 2003). Additionally, unlike most markets, the water market requires government approval to finalise a trade.

The rationale for these approvals and the potential to disallow trades is to ensure the trade does not have adverse environmental impacts (e.g. unacceptable changes to river flows or adverse salinity or drainage impacts) and does not diminish the entitlements of others. However, these policies generate administrative costs related to the amount of time taken for regulatory approvals. These add to the transaction costs associated with selling permanent water entitlements and are an impediment to sellers entering the market.

3.2.5 Taxation

Sellers will consider their after tax financial position when they are considering their options for the permanent or temporary sale of water rights. Under long standing tax principles the proceeds from a sale of a water allocation is treated as income, which can be offset against other costs or losses, while the sale of water access entitlements may be subject to capital gains tax.

Bjornlund found that sellers of perment water face important taxation issues that discourage them from entering the market:

> Taxation policy was cited as an important reason for using the market for temporary water by 10% of sellers... (Bjornlund, H; Rossini, P, 2003, p. 65).

As discussed above, the water market is currently in a period of transition, particularly in the Murray-Darling Basin. Once the long term *Murray-Darling Basin Plan,* including the on-going rules for trading in water rights is settled in 2011, it can be expected that the market will operate much more transparently and more efficiently than at present. Therefore, some sellers may elect not to sell permanent water access entitlements and instead sell annual water allocations in the short to medium term while retaining the option to sell the permanent access entitlement in a stronger market.

3.2.6 The drought and climate change

Bjornlund indicates that as a result of the drought and climate change, water has become one of the few assets which farmers can rely on as a source of

income. Many farmers have given up irrigation, but have chosen to stay on the family farm generating a household income from saes or trading in water allocations (Bjornlund, H; Rossini, P, 2003). In some ways, water trading has become a diversification/drought hedging strategy for some farmers.

Additionally, droughts will not only increase the potential future value of permanent water access entitlements to buyers, but will also increase their value to sellers. If farmers perceive a rising risk of drought in future, they are more likely to hold on to their current water entitlements or increase their asking price. A fully operational market would respond to that by exhibiting a higher price for permanent water entitlements. The capability of the current market to respond to such changes is doubtful given its surrounding restraints.

3.3 Water market prices

3.3.1 Availability of market information

For willing sellers in any market the relevant indicator of final price is what value buyers place on different quantities of a commodity – the demand curve in economic terms.

Reliable information on market prices of water access entitlements is scarce, in part because of:

- the low volumes traded
- the constraints of commercial sensitivity
- the fact that there are multiple exchanges in which transaction take place and are recorded.

Compared with trade in water allocations, trade in water access entitlements is significantly smaller. According to the latest figures from the ABS (2004-05) total trade in water access entitlements only constituted approximately 12 per cent of all water traded in 2004-05.

Where governments are purchasers through a tender process, there is little incentive for them to inform the market of the prices they are paying for water purchases. Where government owned water suppliers and their privately owned counterparts (as in NSW and South Australia) have been traders in water access entitlements, disclosure of prices has been the exception rather than the rule. For example, the ABS published information on water trading as part of the water account in 2004-05(ABS, 2006a). While information is available for all states and territories on numbers of transactions and volumes traded, only Queensland and Western Australia reported an average price of water access entitlements of $1,750/ML and $680/ML respectively.

In comparison with other markets in which transactions between buyers and sellers take place, such as real estate, shares and land, information on water market price outcomes is more widely dispersed, and is often not in the public domain.

According to the Productivity Commission:

> While online water brokers are helping to inform water traders, gaps remain in data collected at an aggregated level. In some regions in Victoria, for example, water traders may use Watermove, Waterfind, Waterexchange, an independent water broker, or private negotiation to facilitate water trading. For water access entitlements, sales may also occur in conjunction with the transfer of land. Hence, it can be difficult to determine the prices paid and volumes traded in a region or jurisdiction in aggregate, across all sources (Productivity Commission, August 2006, p. 72).

The ABS has also commented in similar terms.

> There are difficulties obtaining price data for water trading on a consistent basis, as not all trades involve a monetary transaction, the administration fee charged by the authority processing the trade may or may not be included in the price of the water trade, and for permanent trades that result from land sales, the value of the water access entitlement is often included in the price of the property and cannot be easily distinguished. The availability and comparability of pricing data on water trades should improve as water registers develop further (ABS, 2006a, p. 8).

3.3.2 Assessment of current market price

In Section 4 of this report, we compare the cost of buybacks with the cost effectiveness of infrastructure measures as alternative means of recovering water for the environment. This requires some assessment of market values – though not with a high degree of precision.

We have only limited information as to the prices paid to sellers in the MDBC pilot purchase of 20GL. According to the MDBC

> .....the prices offered ranged from $790/ML to $3500/ML. The top price went up to $6000/ML (ABC Online, March 2008).

We expect prices for water access entitlements trade to vary across the Murray-Darling Basin for a number of reasons.

Firstly, there is a degree of market segmentation within the Basin due to geographic boundaries and physical and administrative constraints.

Secondly, the price for water access entitlements will be influenced by differing hydrological yields from catchments in different regions. This is a function of the rainfall patterns and the hydrological characteristics of each catchment.

Thirdly, prices for "general security" and "high security" water access entitlements differ, because of differences in the reliability of being able to

access the water allocation associated with each water access entitlement. General security water access entitlements are a category of licence only in NSW. They differ from high security water access entitlements as follows:

> The reliability of full allocation per unit share for general security access licences is less assured than high security access licences and is much more variable between river systems (ABS, 2006a).

On the other hand,

> The reliability of full allocation per unit share for high security access licences is assured in all but severe periods of drought and has priority over general security and supplementary water categories (ABS, 2006a).

Fourthly, the prices quoted on the various water exchanges or in the public domain may not be consistent as to whether they include or exclude fees and charges for example termination fees. Including termination fees in the reported price could add between $400/ML and $600/ML to the sale price of a water access entitlement. For example Coleambally Irrigation charges $398.25/ML in termination fees for general security water access entitlements and $569.10/ML for high security water access entitlements[9] (Coleambally Irrigation, 2008).

For the purposes of determining representative prices for the Living Murray and similar activities, cap equivalent impacts are relevant. That is the prices should reflect the cost of Cap Equivalent water returnable to the system as a result of investments or purchase.

In the analysis that follows, we have used information on the trade in water access entitlements available from Murray Irrigation Limited and on the Murrumbidgee Water Exchange. Both publish the trading price history for water access entitlements and water allocations.

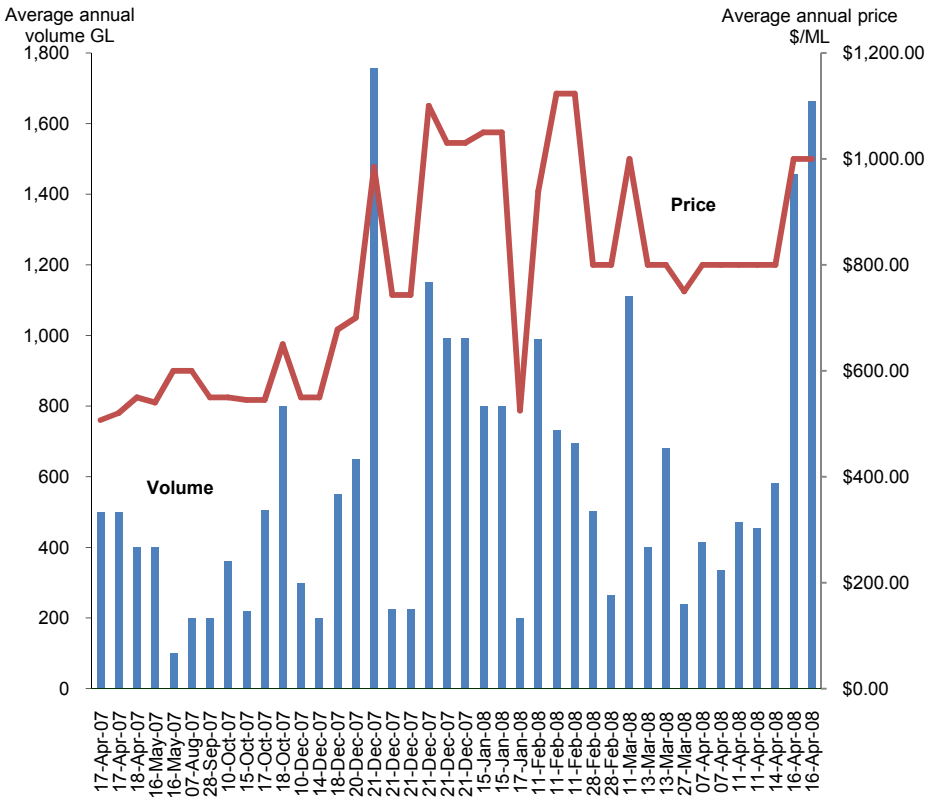
- Murray Irrigation Limited provides irrigation water to over 2,400 farms in southern NSW, from Mulwala in the east to Moulamein in the west, taking in nearly 748,000 hectare of farmland north of the Murray River (Murray Irrigation Limited, 2008).
- The Murrumbidgee Water Exchange is a service offered by the Murrumbidgee Horticulture Council Inc., which is a not for profit industry body representing the interests of high security irrigators and the wine grape, citrus and stone fruit growers of the Murrumbidgee Irrigation Area (the Exchange).

[9] Termination fees differ from exit fees and are consistent with the policy established by the Murray-Darling Basin Agreement in Schedule E Protocol on Access, Exit and Termination Fees.

– The Exchange reports prices for both general and high security trades in water access entitlements.

The Murray Irrigation Water Exchange reports the transactions in general security water access entitlements (excluding termination fees) between March 1996 and May 2008, including volume and price. High security water access entitlements are not traded on this exchange. The trading history for the last twelve months is shown in Figure 4 from April 2007 to April 2008.

Figure 4 **General security access entitlements 2007-2008**

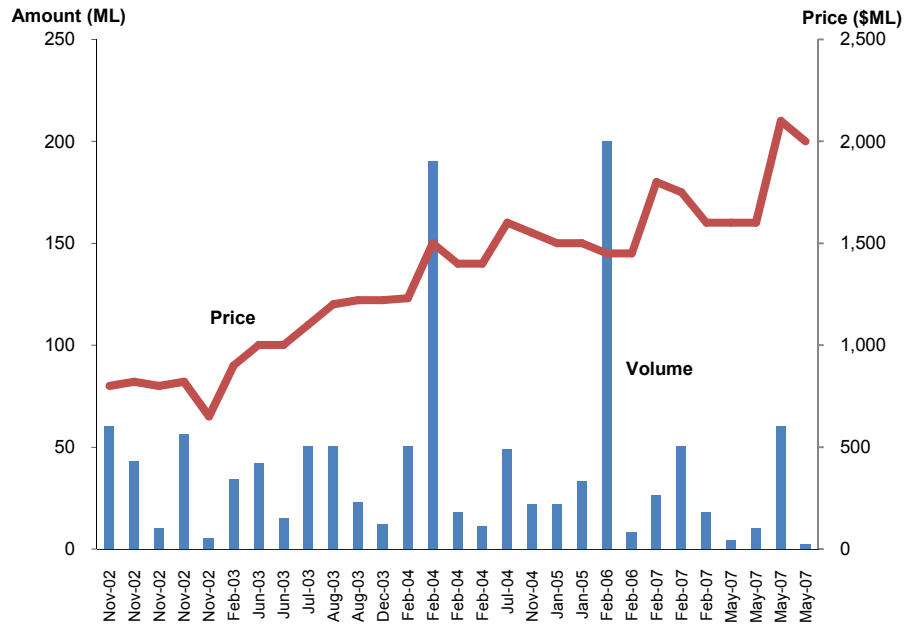


Data source: Murray irrigation Water Exchange

The trading history reported on the Murrumbidgee Water Exchange for change in that region is available only up to May 2007. The trading history of high security water access entitlements in this region is shown in Figure 5[10]

[10] Note that the Murrumbidgee Water Exchange publishes this information with the proviso that it does not include all transactions over the period 2002-2007.

Figure 5 **High security water access entitlements**



Data source: *Data source:* Murrumbidgee Water Exchange

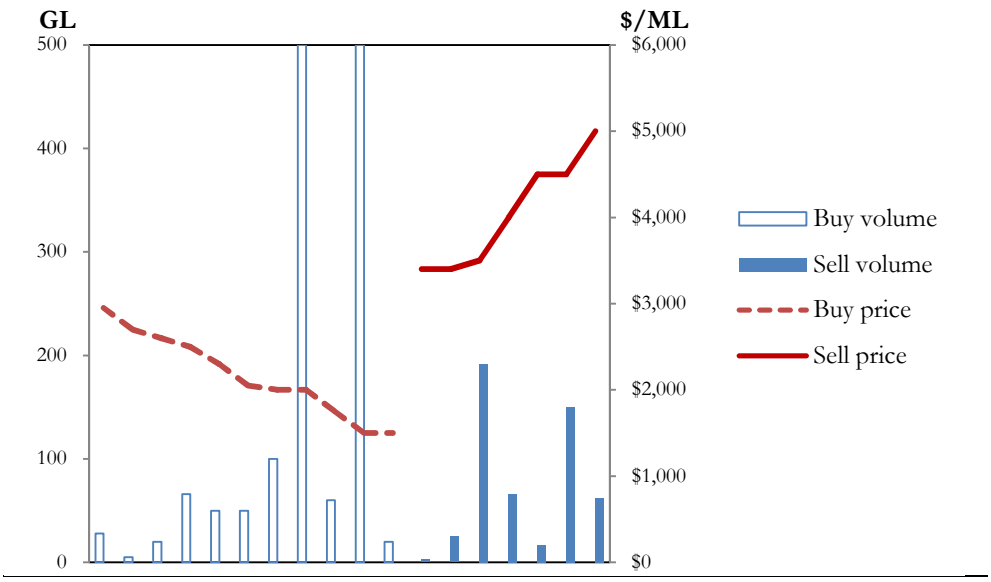
The Exchange also reports current offers to buy and offers to sell high security water access entitlements – both the volumes and the price nominated by the buyers and sellers. The current offers – May 2008 – offers are shown in Figure 6.

According to the information supplied by the Exchange, there is a gap between the selling price and the price on offer from buyers, represented in Figure 6. If these buyers and sellers are representative of the recent transactions on this exchange, then Figure 6 shows the demand for and supply of water. There is a price gap between the lowest price at which a potential seller is willing to sell – $3,400/ML – and the highest price at which there is a willing buyer – $2,950/ML.

To add to the indicative information of prices for high security water access entitlements, recent reports in the press are of market prices in the Lower Murray of $2,300/ML (ABC Online, 2008). Discussions with brokers confirm that the price levels in the last twelve months in the southern Murray-Darling Basin have ranged from $1,600/ML to $2,400/ML.[11]

[11] Brokers consulted include Waterexchange (https://www.waterexchange.com.au) Watermove (http://www.watermove.com.au), Waterfind (http://www.waterfind.com.au) and Percat Water (http://www.percatwater.com.au) WaterNET (http://www.waternet.com.au).

Figure 6 **Buy and sell spread (high security) water access entitlements**



Data source: Murrumbidgee Water Exchange

In the absence of consistent, extensive information on market prices of high security water access entitlements in the public domain, in this report we rely on the information available to infer the likely cost of water access entitlements to be purchased in buybacks.

Accounting for environmental water

Water recovered for the environment is recorded on environmental water registers in each state and territory as well as in a Basin wide data base. The common volumetric measure registered for a particular recovery work or measure is referred to as the Long-Term Cap Equivalent LTCE). The final amount credited is the LTCE volume.

The LTCE Volume is calculated using a Cap Factor which is a measure of the long-term average usage of a particular type of entitlement under a given scenario as a proportion of the total volume of the entitlement. For the purposes of the *Living Murray* "First Step", the default Cap Factors are based on the ultimate development which assumes full activation of high security products.(MDBC, 2006).

The Cap Factors for water products in NSW, Victoria, South Australia and the ACT are provided in Table 5.

Table 5 **Cap Factors**

	Basis of crediting and reporting calculations
PRODUCT	CAP FACTOR
New South Wales - Murray	
Murray High Security	0.9500
Murray General Security Murray Supplementary Licence Murray Conveyance	0.8084 0.00 0.9317
New South Wales - Lower Darling	
Lower Darling High Security	0.9500
Lower Darling General Security	0.8084
Lower Darling Supplementary Licence	0.37
New South Wales - Murrumbidgee	
Murrumbidgee High Security Murrumbidgee General Security	0.9500 0.6369
Murrumbidgee Supplementary Licence	0.00
Murrumbidgee Conveyance	0.9635
Victoria - Murray	
Murray District Security (Water Right and Sales) Murray Private Diverter Security (Licence and Sales)	1.1907 1.1258
Murray Water Right or Licence or Bulk Entitlement	0.9500
Victoria - Goulburn	
Goulburn District (Water Right and Sales) or Bulk Entitlement Goulburn Private Diverter Security (Licence and Sales)	1.2960 1.1835
Victoria - Loddon/Campaspe	
Lodden Private Diverter Security (Licence and Sales)	1.2165
Campaspe District Security (Water Right and Sales)	1.4419
Campaspe Private Diverter Security (Licence and Sales)	1.4419
South Australia	
SA Country Towns SA Reclaimed Swamps SA All Other Purposes	1.00 1.00 0.90
Australian Capital Territory	
ACT Unregulated	1.00

Data source: *(MDBC, 2006)*

The Cap Factors vary between 0.9500 for high security water to between 0.6369 and 0.8084 for general security water in NSW. Cap factors for district security water in Victoria can be as high as 1.4419 for district security water.

If these Cap Factors are applied to the above prices for general security water, its price for cap equivalent water would be increased by the inverse of the Cap Factor to apply. For example the price of $1000/ML of entitlement would be increased to between $1,239/ML and $1570/ML of Cap Equivalent.

For simplicity of presentation, we have focussed on high security water access entitlements as an indicator of the demand for buybacks of water for

environmental flows. Nonetheless, lower security water access entitlements have been purchased to recover water for the environment. For example the NSW Government purchase of water from Murray Irrigation Limited. Murray Irrigation agreed to sell a proportion of its supplementary, or "off allocation" water licence (100,000ML of its 221,000ML supplementary water access licence) to the NSW Government for $20 million (Murray Irrigation Limited, 23 March 2007). In turn the NSW Government will apply to have this water registered on the MDBC environmental register, converted from 100GL to 17.8GL. Given that the Murray Irrigation supplementary licence has a zero cap factor, then the volumetric equivalent is understood to have been arrived at by a special crediting agreement.

There is clearly a spectrum of market prices, by region, reliability and across sellers. For this reason, in the next section we show a price band of between $1500/ML and $2,500/ML of high security entitlement, where we compare the cost effectiveness of infrastructure with the cost effectiveness of buybacks. We consider that it is plausible to assume that the current market price of high security water access entitlements would fall within this band.

As a crude point indicator of current Cap Equivalent value of entitlement, we use a figure of $2,000. This is purely to support a broad discussion of the ballpark comparisons of infrastructure projects to buyback at prices around current market levels.

The extent of the Commonwealth Government's commitment to addressing unsustainable use of our working rivers through buybacks is to be commended.

Nonetheless it may be that sizeable volumes of water for the environment can only be achieved through buybacks once the water trading and other reforms are cemented in place – from 2011 onwards. Hence, in the next section we investigate whether accelerating or bringing forward investment in water recovery infrastructure may be a better option in the immediate to medium term.

4 Cost effectiveness of infrastructure

In the longer term, under the *Water for the Future* the Commonwealth Government has foreshadowed spending up to $5.8 billion in infrastructure measures (Minister Wong PW 56/08, 2008).

The Government may choose to allocate savings in full to the environment, or to share water savings, as follows:

> Water savings will be shared 50 per cent with irrigators to help meet the challenge of declining water availability and to position the agriculture sector for the future. The

> remaining 50 per cent will be used to address over-allocation and to sustain river health (Department of the Environment, Water, Heritage and the Arts).

However, the current position of the Government on this policy question is not unambiguously clear at present.

Both on-farm and off-farm measures have been implemented under the *Living Murray* and will also be considered under the Rudd Government's *Water for the Future* plan. Both forms of, or combinations of, these two measures will improve water efficiency and thus have the potential to contribute water for the environment.

In this section of the report we have concentrated on off-farm investment measures because these measures target the distribution losses from water suppliers' infrastructure losses and, given the current state of water markets and the uncertainty associated with climate change impacts (and particularly drought concerns) are more likely to deliver the potential for substantive environmental flows in the short to medium term.

Whether the water savings are shared or not is a policy question. Presumably a decision to share would reflect a judgment that the benefits of sharing will exceed the costs. At the same time, the sharing could be seen to offer a revenue base to contribute to a project and this may favour some 'size economies' in developing projects.

What is crucial is that a policy of sharing not be converted into a handicap attached to infrastructure projects relative to buyback strategies, where the buyback has no requirement for sharing and none of the benefits of sharing. Sharing on a 50:50 basis could be seen as doubling the costs of delivering a given level of return to the environment. However, if the sharing is justified, then there will be at least offsetting benefits, and the net cost per unit of water returned to the environment should not be any higher. If there are size economies, the effect may be to deliver a lower net unit cost.

Water efficiency investments in *large infrastructure projects also tend to lock the incidence of these investments into the regions* and to take advantage of existing farm and post-farm facilities – implying possibly *less dramatic implications for the structure of regional economies.*

Members of the Wentworth Group have recently highlighted the potential *risks in commitment to large infrastructure projects* when there is uncertainty regarding where the reduction in usage demand as a result of buyback will fall. In an important sense, *buyback offers greater flexibility to 'unravel'* a previous initiative in the light of later experience than do most infrastructure projects – though subject to likely strong community resistance. Considered alongside the above strengths of soundly-based infrastructure projects, this appears to us to

reinforce the case for a *sound portfolio response*, involving both buyback and infrastructure and substantial *flexibility as to the final mix* between the two.

4.1 Private and public investment

In an ideal world water for the environment might feasibly be obtained through three means: purchase of existing entitlements, private investment in water use efficiency projects and public investment in water use efficiency projects.

With a fully operating market, private investors could invest in infrastructure projects that create water savings which could be sold either on the water market or directly to a consumer through a contract. This would require a full suite of accounting, record keeping and water registers to be in place. This course of action will be constrained until such time as a fully operational and efficient market is in place.

Until this is realised, the most likely source of off-farm water use efficiency investments is from public investment in infrastructure projects as outlined in the Living Murray agenda. This report therefore focuses on the relative effectiveness of water buy back as compared with infrastructure projects.

In doing so we do not underestimate the potential for private sector investment in off-farm water use efficiency measures to deliver further water for the environment, or consumptive use, once a fully operation market is established. Indeed, we expect to see growing incentives within water business and other entrepreneurs in line with our expectations of a rising market value of water freed for sale.

This report therefore addresses the relative effectiveness of acquiring water for the environment in the short to medium term for water buybacks as compared to public infrastructure projects.

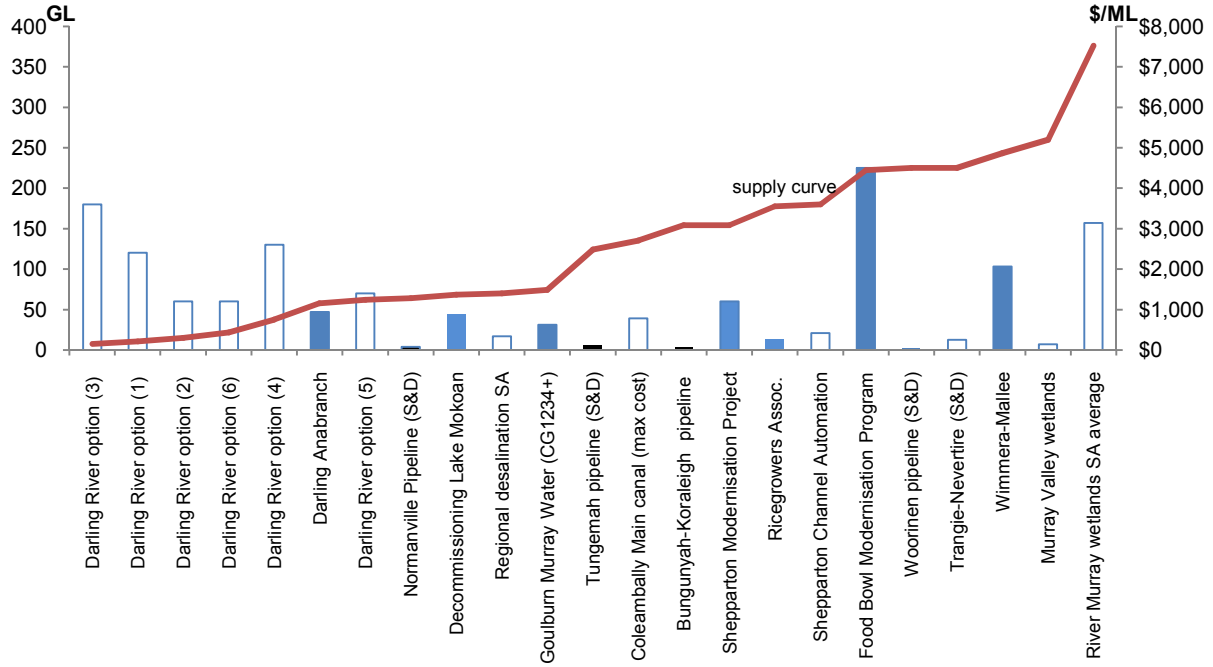
4.2 Cost benefit analysis

Potential infrastructure projects, including those reviewed earlier in this report in Table 2 (see page 11) can be ranked against one another according to their unit cost. When these projects are ranked to show the rise in unit cost in $/ML (the marginal cost of additional supply) for each successive gigalitre of water recovered for the environment (ie, in a Cap Equivalent basis), we can construct a notional supply curve as in shown in Figure 7[12].

[12] Note that higher prices and volumes are associated with higher supply elasticities.

In this figure the left-hand-side vertical axis measures the quantity of water recovered for the environment, in gigalitres per annum, from each of the infrastructure projects. The unit cost (in $/ML) of implementing each project (the supply curve of infrastructure projects) is measured against the right-hand-axis.

Figure 7 **Supply cost and benefit (GL per annum for the environment) of ranked infrastructure projects**



Note: The upward sloping line traces marginal cost of each infrastructure project. The methodology adopted in this report follows that set out in an earlier work (ACIL Tasman, 2003)

Data source: *(MDBC 2008d)(Maunsell Australia, 2007) (Victorian Government, 2004)*and ACIL Tasman estimates

The solid columns in Figure 7 indicate current projects including those in Table 2 on the MDBC eligible measures register for which public information is available, and where the water recovered is measured in long term cap equivalents.

Current projects in total are anticipated to recover close to 460GL of water for the environment[13].

As discussed earlier (see section 2.1.1) current measures under the *Living Murray* are expected to recover 142GL for the environment in the near future[14].

[13] Total is 450GL rounded up to the nearest ten – the exact total is 458.6GL.

[14] Neither the contribution of the current Goulburn-Murray Recovery Package of 25GL or the Water for Efficiency Tender is shown here, as they are a combination of efficiency

In addition, included in Figure 7 are the Food Bowl Modernisation program, the Wimmera Mallee system project (see Box 3 below) and the Goulburn Murray Water channel automation projects, together with further savings in later years from the *Living Murray* projects, which together could recover a further 306GL over the medium to long term.

We note that at least so far as the Food Bowl Modernisation program is concerned, a question mark was raised over the potential savings by the Auditor General, earlier in 2008, because of the process by which the initial estimates were arrived at. Subsequently, the Auditor General noted that the water losses reported were lower than published and that the target water savings were achievable. (Auditor General Victoria, 2008). These lower savings have not to our knowledge been published.

The Commonwealth Government is to subject the savings to due diligence and is expected ultimately to measure recoveries in long term cap equivalent volumes. We are aware of some concerns that these due diligence processes might indicate net recoveries less than the indicated figures – and, if true, this would imply even higher unit costs. However, for the purposes of the immediate discussion here is the fact of serious consideration being given to projects assessed as having unit costs substantially in excess of current indicator prices for entitlement purchase.

There are a number of projects in NSW that are undergoing assessment. However, the results are not yet publicly available and therefore are not included in Figure 7.

We have included the completed Normanville, Tungamah and Woorinen stock and domestic pipeline projects here in Figure 7, although their overall contribution is small (11GL combined). They serve to illustrate that the costs of stock and domestic infrastructure projects may vary widely, yet are able to be justified when all benefits are taken into account.

Beyond the current projects, we have identified examples of future projects for which there is publicly available information. These appear in outline in Figure 7. In total these unfunded projects, which are at various stages of feasibility assessment, have a nominal potential to recover 976GL of water for the environment, as measured in long term cap equivalents – though the likelihood of all this volume proving up and being competitive is probably modest.

These projects include:

measures that involves some infrastructure works. Hence a cost cannot be calculated on a comparable basis.

- Five projects from the MDBC (see Box 2). We note that a number of these and other projects undergoing feasibility may go through a number of iterations before progressing to the eligible measures register, or being rejected.
- In addition we have included the Darling River Water Savings Projects (Maunsell Australia, 2007), which are currently undergoing further scoping and investigation and estimates of the likely costs of the final Trangie Nevertire stock and domestic pipeline project, which is still undergoing scoping and feasibility (Iplex, 2008). We do not know the likelihood of these projects proceeding. However, they have been included here because of what they represent, and that is two systems where water distribution losses are significant.
  - In the case of Lake Menindee and the Darling River system, the evaporation losses are considerable, while changes in the volumes of water stored in the Darling River system would have a significant impact downstream.
  - In respect of Trangie Nevertire, according to Irrigation Australia the supply system includes 244 kilometres unlined irrigation channel, where the distribution losses are estimated to be of the order of 25 per cent of the water supplied(Irrigation Australia, 2005-06).

Box 2 **Projects at feasibility assessment stage**

According to the MDBC:

> During this stage, water recovery projects are assessed to determine their suitability, practicality and potential outcomes. Projects considered feasible progress to the Measure Development stage, and a number will proceed to being included on the eligible measures register.

Current projects at the feasibility stage include the following.

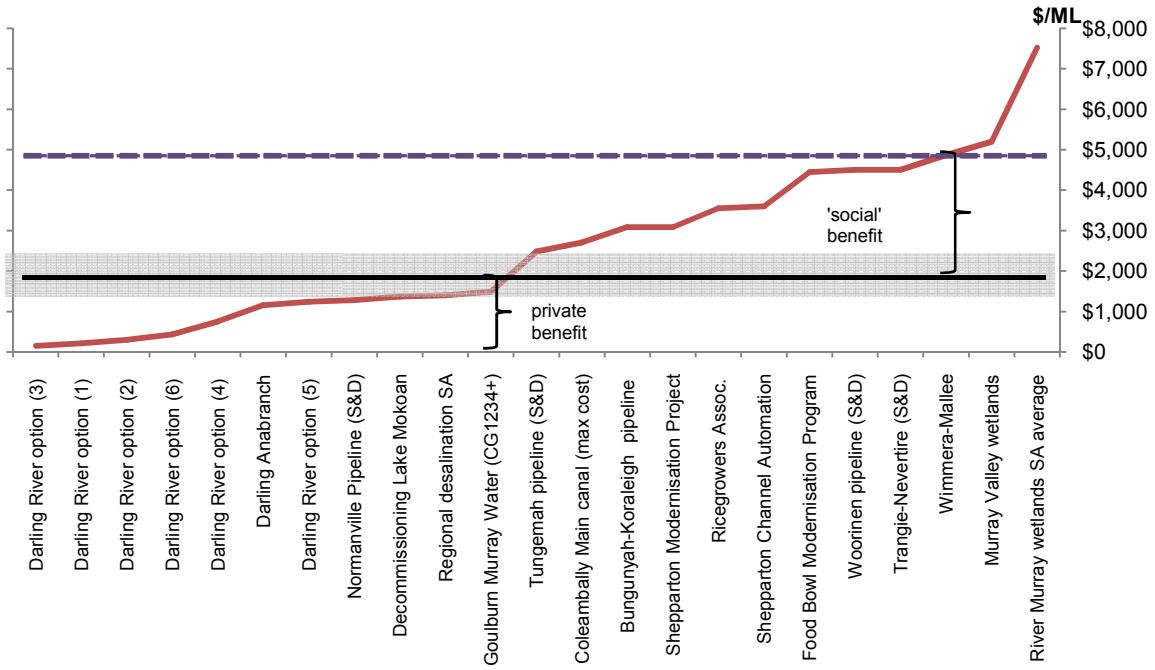
- In NSW
  - the Moira Private Irrigation District off farm channel seepage project (in progress)
  - Murray Valley wetlands rehabilitation (of the 584 wetlands investigated, seven high priority areas are estimated to potentially recover 7GL of water for the environment at a cost ranging from $3,300/ML to 12,200/ML – an average of $5,200/ML)
  - construction of en-route storage, Mulwala Canal (feasibility assessment completed but not yet public)
  - Coleambally Main Canal, seepage and leakage savings (The estimated water recovery is 39GL. The costs the various options for channel lining range from 685/ML to $2,700ML depending on the proportion of the channel to be lined)
  - Coobool irrigation systems savings (feasibility assessment in progress)
  - Lake Moira Stage 3 (feasibility assessment in progress)
  - Murray Valley group licences supply infrastructure, seepage and losses project (early stage of assessment within small districts and group licences for feasible opportunities)
- In Victoria
  - the Shepparton Irrigation Area Channel Automation Project, with the potential to recover 20.6GL for the environment. The unit cost of water recovered is estimated as $3,600/ML
- In South Australia
  - River Murray wetlands (potential savings estimated up to 157GL, at a unit cost ranging from $673/ML to $36,000/ML – an average of $7527/ML
  - Regional desalination option (There is the potential to recover 17GL for the environment, beyond 2009. The South Australian Government is progressing with BHP Billiton to the development of an environmental impact assessment stage and business case. The unit cost is estimated to be $1400/ML).

Note; All volumetric measures on the register are in long term cap equivalent gigalitres as specified in the Living Murray Business Plan

Data source: MDBC

The Rudd Government's $1 billion contribution to funding stage two of the Food Bowl Modernisation program is a significant addition to the forward commitments to investment in infrastructure. However, it is not included in this Figure 7, as the detail required is currently not available.

Figure 8 **Cost effectiveness of water recovery infrastructure measures**



Note: The dash horizontal line is the observed social marginal valuation of a project and the black horizontal line is its private counterpart. The social marginal valuation incorporates externalities regarding environmental flows and it is therefore above the private marginal valuation

The supply curve in Figure 7 is reproduced in Figure 8 – without the volumes represented by the columns - and compared with the price of water.

As there is uncertainty surrounding the current market price of water, as discussed earlier in this report, a range for the market price is indicated by the shaded horizontal line in Figure 8– from $1,500/ML to $2,500/ML. The solid horizontal line in the figure represents the private marginal valuation of a megalitre of water, i.e. the current market price for water access entitlements, which we assume to be $2,000/ML.[15]

In interpreting Figure 8, every project with a marginal cost below $2,000/ML can be considered as privately financially viable using standard cost benefit techniques. This is essentially saying that every project with a cost below $2,000/ML (which we have assumed is the current market price for water access entitlements) would have a positive net present value when assessed by a private firm.

[15] However there is an additional element in that trading in water access entitlement s involves a certain degree of risk related to the likelihood of rainfall and droughts. Therefore, the actual price is expected to be marginally below this price.

This is shown in Figure 8 as the set of projects to the left of the Tungamah stock and domestic pipeline project where the benefits exceed the private costs of the project. In total these projects – where the private benefits exceed the private costs –could recover a total of 637GL of water for the environment.

This is not to say that these projects are to be left to business to undertake. Rather, it means that whether business, government owned public enterprises were to undertake these projects they could do so because the private benefits exceed the private costs. In fact, with a significant proportion of rural water suppliers being government owned, the history has been that these projects were undertaken by public enterprises and not private ones.

Where the marginal cost of an infrastructure project is higher than the market price of water – projects to the right of the Goulburn Murray Water project – a private firm could not justify such a project as viable on the basis that the project costs exceed the private benefits.[16] However, there are projects to the right of the Goulburn Murray Water project which have been given the go ahead for investment, even though the implied cost per megalitre saved is above the market price.

Government will consider funding such projects when there are additional social and/or environmental benefits, or in economic terms where there are externalities.

By social benefits we mean that there are social, environmental or economic benefits that may not be easily quantified, but that nevertheless would contribute to national welfare. Economists refer to these social benefits as positive externalities and social costs as negative externalities. Governments incorporate externalities into its investment decisions with the aim of increasing national welfare.

That there may be substantial benefits in addressing these externalities – to the environment, region, the community and industry – is demonstrated in the case of the Wimmera Mallee water supply system (see Box 3). The first pipeline project was proposed for this region in the 1890s. In 2007 the first stages of the current ten year project were completed, and will, over time, alter the sustainability of this region.

[16] Note this assumes the market price is currently $2,000/ML.

Box 3 **Wimmera Mallee water supply system**

The objective of the project is to provide a sustainable water supply system that will meet the needs of the Wimmera Mallee region – its people, towns and industry - for the next 100 years.

The annual turnover from cropping in the region is $369.75M – 50% of major cereal farm properties in Victoria.

The open channel system that currently services the region is unsustainable. At present, 85 per cent of water in the system is wasted through seepage and evaporation. A total of 120GL of water are released from storages in the Grampians each year, but only 17GL of water are ultimately used by customers on farms and in towns. There is the potential to recover all of this 103GL for water for the environment.

The $501 million project involves the construction of almost 9,000 kilometres of reticulated pipeline to replace over 16,000 kilometres of existing, highly inefficient open channels.

Water will be sourced from the Grampians, with a small supply provided from the River Murray.

- Trunk mains will supply storages, servicing urban centres, and distribution mains servicing rural customers.
- Open farm channels and dams will be replaced by pipelines, tanks and troughs.

The project will supply stock and domestic water to approximately 6,000 rural customers and 36 towns across a region that covers 10% of the total land area of Victoria, from the Grampians to the Murray River.

Data source: (GWM Water, 2008)

The social value of a number of the current projects is revealed in Figure 8, taking, for example, the Food Bowl Modernisation program and the Wimmera Mallee infrastructure project. The funding of these projects in the two districts – the Goulburn Murray and the Wimmera Mallee – suggest that these water recoveries, through these strategies and inclusive of their wider regional and other ramifications, is in excess of about $4,500/ML of Cap Equivalent.

These analyses, while clearly only crude and indicative, do suggest that the economics of some of these infrastructure projects − and in particular assessment of 'competitiveness of the projects – should be done with caution, and that this might well justify, on the basis of additional benefits, some projects with relatively high nominal costs. In total, these projects could together contribute 175GL of water for the environment.

It should be noted in Figure 7 and Figure 8 that two potential projects exceed this implied upper bound price, suggesting that these projects at a market price of water in the region of $2,000/ML, would need to be associated with significantly higher positive externalities for investment to be justified. In fact as the quantity of water supplied from off-farm water efficiency infrastructure

projects increases the price elasticity of supply appears to increase sharply after a certain point. This suggests higher prices for water in the longer term if competing demands grow significantly.

A Background on national water reforms

National policy on water commenced with the 1994 Council of Australian Governments (COAG) meeting on water reform, which established that the better management of Australia's water resources as a national issue.

2004 National Water Initiative

On 25 June 2004, following a decade of water reforms, COAG agreed to a National Water Initiative (NWI) covering a further range of areas related to national water management (COAG, June 2004c).

It was the first such intergovernmental agreement which recognised the need to

> increase the productivity and efficiency of Australia's water use, the need to service rural and urban communities, and to ensure the health of river and groundwater systems by establishing clear pathways to return all systems to environmentally sustainable levels of extraction' (COAG, June 2004c, p. 1).

2004 Living Murray First Step

In addition to this agreement new funding was provided for the *Living Murray* program – a program established in 2002 in response to evidence showing the declining health of the River Murray system. An intergovernmental agreement was signed by New South Wales, Victoria, South Australia, the Australian Capital Territory and the Commonwealth Government on 25 June 2004 – which as the *Living Murray First Step* committed $500 million over five years to recover 500GL through water recovery measures identified in a *Living Murray Business Plan* (COAG, June 2004a).

2006 Supplementary funding

Further, in 2006 the Commonwealth Government and signatory governments entered into a supplementary agreement, the *Supplementary Intergovernmental Agreement on Addressing Water Over-allocation and Achieving Environmental Objectives in the Murray-Darling Basin* which took the funding for the *Living Murray* up to $700 million (COAG, 2006).

In addition to the *Living Murray*, state and federal governments either in collaboration or on a stand-alone basis have funded additional water recovery measures for the environment. These include:

Water for Rivers

- The *Water for Rivers* program (established by the Commonwealth Government and the governments of Victoria and NSW) to acquire water efficiency savings to enable additional dedicated environmental flows of 212GL for the Snowy River and 70GL for the River Murray by the end of June 2012 (Water for Rivers).

Australian Government Water Fund

- The *Australian Government Water Fund* is a $2 billion program to invest in water infrastructure, improved water management, and better practices in the stewardship of Australia's scarce water resources. The Fund will

support practical on-ground water projects that will improve Australia's water efficiency and environmental outcomes (National Water Commission).

Food Bowl Modernisation Program

- The $1 billion *Food Bowl Modernisation Program* in Victoria which will recover an estimated 225 billion litres of the 800GL of Victoria's lost water by 2012. The water savings will be shared equally between irrigators, the environment and Melbourne (Victorian Government, 2004).
- The Commonwealth Government's $50 million purchasing plan for the environment, in financial year 2007-08 (ABC Online, 2008).

April 2008 Water for the Future

In April 2008, Senator Penny Wong outlined the Rudd Government's strategy to secure the long term water supply of Australia— *Water for the Future*. The policy has four key priorities:

- addressing over-allocation
- using water wisely
- securing water supplies
- supporting healthy rivers.

Breakdown of $12.9 billion

To achieve these goals the Rudd Government has committed $12.9 billion investment. These funds will be allocated as follows.

Over-allocation will be addressed in the Murray-Darling Basin with a new Basin Plan, which is to make provisions to secure the needs of communities relying on the basin for drinking water. The actual methods by which this plan will be undertaken are yet to be determined.

Minister Wong noted that another fundamental priority is to ***use water wisely***. *Water for the Future* includes a $250 million commitment to the National Greywater and Rainwater Initiative, which provides direct incentives to households to use alternative water sources.

Moreover, the Minister has committed $5.8 billion to improving the efficiency and productivity of water use and management in the agricultural sector. Of this $5.8 billion, $1 billion will go towards funding stage two of the Food Bowl Modernisation project and $450 million will go towards developing national water accounts through the "Improving Water Information Program' administered by the Bureau of Meteorology.

Modernisation planning

Overall, this suggests that there is approximately $4 billion that may go towards other infrastructure projects. In this context the Rudd Government has provided $4.6 million to irrigation water providers to develop modernisation plans. There are as yet no details on the separate application and assessment process that will be applied for funding infrastructure works.

The Rudd Government aims to ***secure future water supplies*** by spending $1 billion in the "Urban Water and Desalination program' aimed at supplying water to urban areas through desalination, recycled water and stormwater harvesting.

Finally, the Rudd Government aims to ***promote healthy rivers*** by purchasing water from willing sellers in order to return it to the environment. Under *Water for the Future*, the government will spend $3 billion over the next ten years with this aim.

Budget 2008-09
Budget Paper No. 2

In the 2008-09 Budget the Rudd Government announced funding of $435 million, notionally brought forward from the 2011-12 funding allocation for *Water for the Future*.

Expenses ($m) **Water recovery for the environment measures**

	2007-08	2008-09	2009-10	2010-11	2011-12
Taking early action	96.2	110.0	193.8	-	-400
Water efficiency, Western Australia	35	-	-	-	-35

Data source: Budget Paper No.2, Department of the Environment, Water Heritage and the Arts

According to Budget Paper No.2, the bring forward of the $435 million is as follows. By June 2008 the Government will

- spend $96.2 million in water saving infrastructure and buybacks
  - including the $50 million already committed for buybacks and $4.6 million for modernisation planning across 14 irrigation districts, both announced in February 2008
- $35 million as its initial contribution for the cost of the Harvey Water Piping project, with a further $14 million to be contributed in the budget financial year.

In the budget financial year, the Government has committed a further $110 million, and in the first year of the forward estimates has committed a further $193.8 million.

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