Australian Government
Land & Water Australia

fact sheet

# Using market-based instruments to secure water for environmental flows

**Research Project number BDA4 of the Environmental Water Allocation R&D Program**

## Background

Over recent decades the extractive use of water in Australia has dramatically increased, leading to greater agricultural production and, in many instances, to the degradation of riverine ecosystems, loss of productive land and impacts on water quality and biodiversity. In response, Australian governments' are progressing a range of water policy reforms, with recent inter-governmental agreements committing in excess of $1b to enhancing flows and environmental outcomes along the Snowy and Murray Rivers.

While investments in water use efficiency measures may provide some water 'savings' that could be redirected for environmental purposes, recent investigations have indicated that cost-effective savings from these activities are likely to be limited. Improving environmental flows will inevitably mean re-allocating water away from other users, such as irrigation, urban or industrial activities. To this end, governments have committed to investigating the use of market based instruments such as temporary or permanent voluntary 'buybacks' to source water for environmental needs.

While buybacks are common in financial markets and even some natural resource sectors, there is limited experience with their use in the water sector. Importantly, due to differences in the nature of irrigation and environmental water demands, current water right products (such as irrigation entitlements or seasonal allocations) traded on water markets will be poorly suited to many environmental needs.

This project investigated a range of available buyback instruments, including outright voluntary purchase of existing water entitlements and allocations as well as temporary leaseback and options contracts, and identified critical issues in buyback design.

## Objectives

The project reviewed the different quantities and timings of water for irrigation and environmental needs, and:

- assessed the feasibility and cost-effectiveness of the alternative instruments for trading water between irrigation and environmental uses;
- identified key design issues impacting the workability of these instruments; and
- canvassed the acceptability of the different instruments to irrigators.

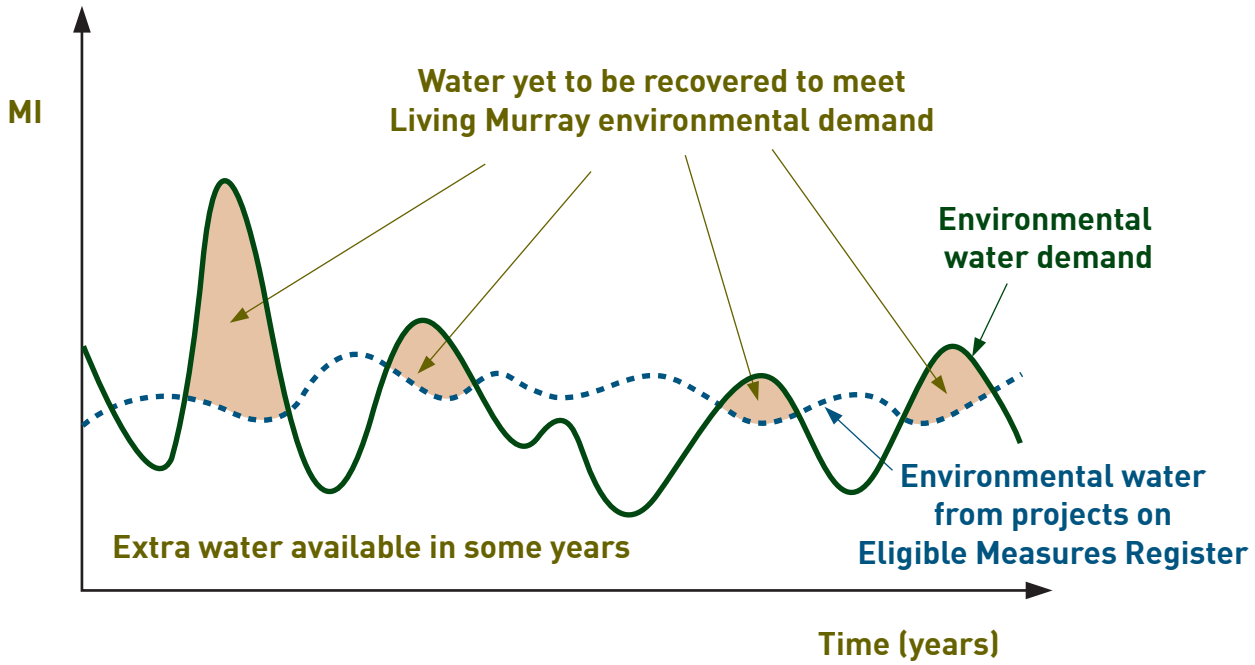
## Approach

We first reviewed experiences with the use of voluntary buyback instruments in natural resource markets in Australia and overseas to understand the pros and cons of different approaches. We then characterised the quantities and timings of irrigation water demand and environmental watering needs in south-eastern Australia. This then allowed us to review the likely merits of alternative buyback instruments. Finally, we consulted with a number of irrigators to canvass their views about the alternative instruments.

A case study at one of the sites being targeted under the Living Murray Initiative – the Gunbower Koondrook-Perricoota Forests – was used to test the practical workability of the different buyback instruments, and gain insights into their likely impact on established water markets. As the purpose of our study was to explore design issues rather than to prescribe specific solutions, we assumed that environmental watering needs at Gunbower could be met via overbank flows rather than the proposed delivery through new channels. Nevertheless, this demand is representative of many sites in south-eastern Australia where overbank flows are used to deliver water to wetlands.

The environmental water demands at sites such as Gunbower can be extremely variable, with occasional peak needs that are many times average volumes interspersed with no water being required in many years. Meeting this highly variable demand becomes even more challenging when you consider that it has to be met in the context of the environmental water demands of other sites along the River Murray. An understanding of the challenge this will pose for environmental managers can be seen in Figure 1 which presents a stylized overview of the supply and demand for environmental water under the Living Murray Initiative; the shaded area represents the water yet to be recovered to meet environmental needs.

**Figure 1: Stylized overview of supply and demand for environmental water under the Living Murray Initiative**



Initial water recovery (from measures on the Living Murray Eligible Measures Register) has provided water that will be available in most years. However, the highly variable and peaky demand for water for sites such as Gunbower means that, in some years, the water already sourced is likely to exceed the environmental demands while in other years it will need to be augmented by large volumes from other sources.

## Key findings

The study has highlighted a range of issues that will need to be considered in the design of water buyback instruments.

### Finding 1

Clearly defining new environmental watering needs in terms of timing, frequency, volume, duration and sensitivity to alternative sequences of watering has a big influence on crafting the most cost-effective buyback instruments. In our case study we found that the cost of meeting 2 or 3 individual waterings over an 85 year period accounted for about half the budget required and would probably arise at times when it was difficult to source water. Thus, significant cost savings can be made by having well defined watering needs and taking opportunities to strategically 'miss' certain waterings.

### Finding 2

Where environmental watering demands are both variable and peaky, purchasing existing irrigation entitlements as the sole instrument to meet these demands will be a blunt and expensive exercise.

### Finding 3

Allowing generous carryover provisions for environmental water can significantly reduce the cost required of meeting environmental demands, but will impose significant impacts on other consumptive users.

### Finding 4

Purchasing seasonal allocations at prevailing 'market' prices may be unworkable in years when large volumes are needed on short notice and often early in irrigation seasons when announced allocations are low. For our case study site alone, this would have meant purchasing up to 9% of available allocations in the NSW Murray and Victorian Goulburn-Murray irrigation regions and in these instances would lead to price increases of about 17%.

### Finding 5

The need to manage the uncertainty in many environmental water demands has prompted interest in derivative type buybacks such as options and leaseback contracts. The design of these contracts will need to take specific account of both the characteristics of the environmental demand and the irrigation regions where the water would come from. Different 'triggers' will be needed for these contracts in different circumstances. In our case study, a 'single trigger' instrument was found to be unworkable – it imposed significant management costs on both irrigators and environmental managers.

### Finding 6

Our analysis demonstrates that no single instrument is likely to be effective in meeting the diversity of environmental watering demands faced under the Living Murray and more broadly across Australia. In many instances a portfolio of instruments will be the most effective approach to balance cost, effectiveness and workability objectives in meeting environmental demands. Astute environmental managers will be able to minimise budget costs by tailoring their purchasing patterns to take advantage of differences in market demand profiles, risk preferences and the potential price effects of their trading activity. Similarly, establishing 'self-funding' portfolios may require trade-offs between cost, workability and risk.

### Finding 7

Irrigators were generally supportive of governments entering water markets to source water for environmental purposes, provided there was transparency in the way they operated and there were accountability mechanisms in place. They indicated a strong preference for environmental managers to trade in seasonal allocations rather than entitlements, because of possible flow-on effects to regional communities. If derivative type instruments were to be used, irrigators indicated a preference for multi-year leaseback arrangements to manage their price risks. If options contracts were to be used, they indicated a preference for crafting triggers around the seasonal allocations market, rather than rainfall or storage levels.

For detailed information on the outcomes of this Land & Water Australia research project, view the final report at: www.rivers.gov.au/research/allocation/publications or contact the principal investigators:

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## Environmental Water Allocation R&D Program

Land & Water Australia commenced the Environmental Water Allocation R&D Program in 2004. The program was initiated to generate the knowledge required to better understand the ecological outcomes likely to arise from environmental water flows and the interactions between surface and groundwater. This knowledge will support the outcomes of the National Water Initiative.

In developing the R&D program, an extensive consultative process was undertaken with water managers and regulators. Through this process the program identified priorities around five research themes:

- Improving, demonstrating and evaluating the benefits of environmental management of stressed rivers.
- Environmental water allocation in poorly understood aquatic ecosystems across Australia.
- Holistic water budgets of complete river systems.
- Economic, social and institutional aspects of environmental water allocation.
- Groundwater dependent ecosystems.

Program collaborators include the Australian Governments' Departments of the Environment and Heritage, and Agriculture, Fisheries and Forestry.

For more information on the Environmental Water Allocation R&D Program visit the Land & Water Australia website at: www.lwa.gov.au or the Rivers website at: www.rivers.gov.au

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