

# River rights

Reliable ways of testing decisions about environmental flows are needed to begin diverting water back from irrigation.

Australia is the world's driest inhabited continent, yet Australians are the highest users of water per capita in the world. Our demand for water is so great, that more than a quarter of our river systems are close to, or have exceeded, sustainable extraction limits.

Nowhere is this more evident than in the Murray-Darling Basin, where more than 80% of the total flow from the combined river systems is diverted for industry and domestic use. Irrigation accounts for 95% of this.

Dams and weirs have dissociated Murray-Darling floodwaters from the floodplains, and altered the magnitude, frequency, seasonality, duration and variation of flows. Algal blooms, native fish losses and explosions in carp populations are increasing.

If nothing is done, closure of the Murray River mouth and the subsequent death of South Australia's Coorong region and its internationally listed wetlands is imminent.

Adelaide's main water supply is predicted to fail World Health Organization standards for every two days in five, within 20 years. The salinisation of our farmlands (through irrigation water) will increase.

These issues were highlighted in the report, *Managing Australia's Inland Waters. Roles for Science and Technology*, presented at the Prime Minister's Science and Engineering Council (PMSEIC) meeting in September 1996.

Strategies to address these issues, such as the water market and a cap on extractions from the Murray-Darling, have been in place for some time, but the Wentworth Group says these reforms have not secured the long-term health of the basin.

'It is obvious that environmental flows need to be increased,' the group says.

'Rivers, like the River Murray, are not working. It is time to begin the process of recovering water from irrigation.'

## Saving the Murray

In 2002, the Murray-Darling Basin Ministerial Council took steps to address the problem of environmental flows in the Murray system. These included the initiation of a community-wide discussion about environmental flows, and an assessment of the costs and benefits to the environment, industries and communities of returning water to the river.

As part of this 'Living Murray Initiative', a computer software tool was chosen to assess the ecological impacts of a range of environmental flow scenarios.

One of the developers of the Murray Flows Assessment Tool (MFAT), CSIRO Land and Water river scientist Dr Bill Young, says the tool will help the Ministerial Council and others to understand the environmental outcomes of any flow allocation decision.

'Much of the debate over water concerns efficiency, so how do we use water more efficiently in order to save more for the environment?' Young asks.

'Achieving greater water savings may cost millions of dollars, through lining channels, installing pipes or improving delivery. So unless we've got some idea of the environmental gains resulting from that expenditure, we won't be able to make informed or effective decisions. That's where MFAT comes in.'

MFAT is being used to assess the environmental returns from three reference flows established by the Ministerial Council: 350 gigalitres a year, 750 GL/yr and 1500 GL/yr.

These are not actual flow options, but are intended to give all sectors of the



The habitat of waterbirds, such as the egret, have been altered by river regulation. A computer modelling tool has been developed to assess the impact of environmental flow allocations on a range of ecosystems and habitats.

community an idea of the costs and benefits involved in transferring various annual volumes of water from current uses, such as irrigation, to the Murray.

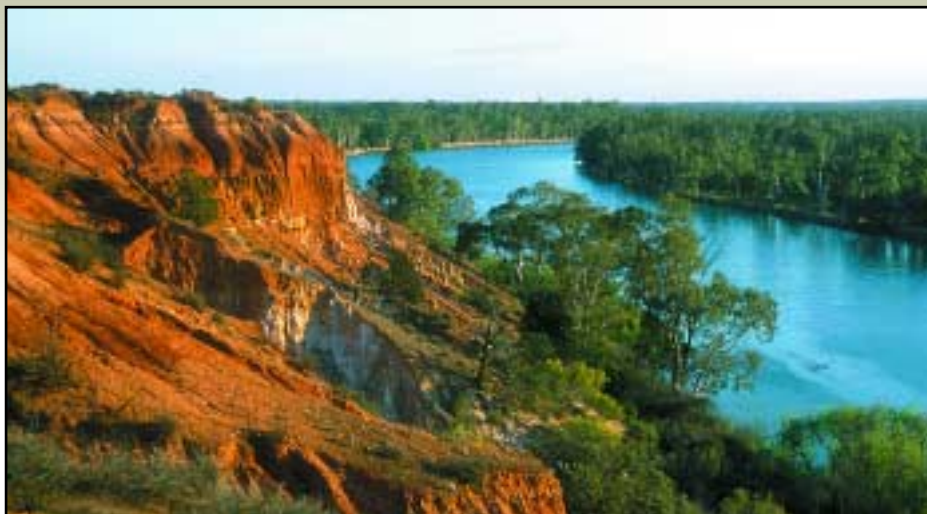
Thirteen scenarios – different spatial and temporal hydrology patterns – have been developed around these flows, to investigate the effects of recovering these quantities of water from different parts of the river system, or releasing water at different times.

MFAT is then used by 10 regional evaluation groups (state agency scientists or consultants) to determine the ecological effects of these hydrological changes.

'Each regional group uses MFAT to model different aspects of the ecology at about 10 locations along their zone of the river,' Young says.

MFAT contains five models that look at the effects of each scenario on native fish habitat, floodplain vegetation, wetland vegetation, waterbird habitat, and behaviour of algal blooms in weir pools.

The models give users the flexibility to weight aspects of the ecology differently,



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according to their beliefs, but their supporting 'evidence' must be documented.

The modelling results from each regional group are then fed back to a scientific reference panel, which integrates the results and makes decisions about rehabilitation that could be sensibly achieved.

'The panel looks at the relative merits of the different scenarios between zones,' Young says. 'Some scenarios may be better in some river zones than others, and tradeoffs may be necessary.'

'For example, the panel must decide if all parts of a river could receive environmental benefits, or if areas need to be sacrificed to protect areas such as RAMSAR wetlands or Murray cod habitat.'

Environmental flow decisions based on MFAT results have not yet been made and, until consistent water reforms are in place, such decisions may be some time off.

But Young says the Murray Darling Basin Commission is keen to use MFAT to adapt and refine flow management as more information about river health arises.

While the tool has been specifically developed for the Murray system, the concepts embodied in the models could be adapted to other Australian rivers.

## The Wentworth view

The Wentworth Group says the rapid adoption of a new robust framework for water rights is needed to underpin future

environmental flow reforms. The group is encouraging the Council of Australian Governments to commit to converting existing water licence systems to one system. This should provide additional environmental flows to stressed rivers through the provision of transitional assistance payments, probably in the order of \$100 million.

Once interests in water have been defined, obligations specified, and the volumes of water required for environmental flows determined, the Wentworth Group advocates a mixed approach to recovering water for the environment. The approach includes:

- reducing part of everyone's allocation without compensation;
- providing compensation or purchasing some water on the open market; and
- improving infrastructure to reduce evaporation from supply systems.

## Integrated monitoring of environmental flows

A MAJOR study in New South Wales – the Integrated Monitoring of Environmental Flows program – aims to understand the flow responses of river and wetland ecosystems along the Gwydir, Hunter, Lachlan, Macquarie, Murrumbidgee, Namoi, and Barwon-Darling rivers. The study, run by the NSW Department of Land and Water Conservation, is evaluating the environmental performance of flow rules for these seven rivers. This is proving a difficult task given the absence of a stable flow period before the environmental flow rules were applied.

### More about the program

Chessman B and Jones H (2001) *Integrated Monitoring of Environmental Flows: design report*. NSW Department of Land and Water Conservation. [www.dlwc.nsw.gov.au/care/water/imef/index.html](http://www.dlwc.nsw.gov.au/care/water/imef/index.html)

To achieve this, the group suggests that transitional assistance payments could be made in over-allocated areas. At the same time, farmers who are beneficiaries of subsidised public water could be required to demonstrate increased water use efficiency.

'Increasing the efficiency of water use through lining or piping of channels could reduce up to 25% of water transmission losses,' the group says.

'An audit of evaporation losses in supply and distribution systems would identify opportunities associated with this option.'

To prevent the few undamaged rivers left in Australia from going the way of the Murray-Darling, the Wentworth Group also advocates a proposal for the establishment of a Heritage River system.

'A system of designation in perpetuity, such as we have developed for National Parks and Nature Reserves, is an essential step to long-term protection of these systems,' the group says.

'Under such designation, existing users would maintain existing levels of extraction of water and catchment development.'

### More about environmental flows

Prime Minister's Science and Engineering Council Report. *Managing Australia's Inland Waters. Roles for Science and Technology*. September 1996. [www.dist.gov.au/science/pmsec/14meet/inwater/Living Murray Initiative: www.mdbc.gov.au/TLM/thelivingmurray.html](http://www.dist.gov.au/science/pmsec/14meet/inwater/Living Murray Initiative: www.mdbc.gov.au/TLM/thelivingmurray.html)