

Clever planning and management approaches



CSIRO Land and Water scientists Dr Deborah Hope and Dr Bradford Sherman recording data on water quality in the Murrumbidgee River at Maude (near Hay), NSW. Gregory Heath, CSIRO Land and Water.

If there's one thing that is clear about the complex management of environmental flows, it's that improving river health takes time. It can take 10, 50 or even 100 years before environmental responses show up, so the question is, what management strategy do we adopt in the meantime?

Adaptive management is one tool used by scientists and managers when there is some uncertainty as to whether the actions being taken will give the desired result. By monitoring the ongoing impact of environmental flows or other interventions, managers can adapt their responses along the way to improve the results.

'I'm a strong supporter of adaptive management, because it means that you can both do the research and make decisions at the scale that is important to rivers and to people's lives, without having to delay action because we don't have all the answers,' says Peter Gehrke, Research Director for Rivers and Estuaries, at CSIRO Land and Water.

One source of great assistance in managing environmental flows is the recent development of predictive software, such as the Murray Flow Assessment Tool

(MFAT) developed by CSIRO and the Cooperative Research Centre for Freshwater Ecology. The tool has allowed the forecasting of, for example, the effects of different flow volumes on the ecology of river systems, in a management decision support system.

Holistic management approaches

Adaptive management is supported by Hamish Cresswell, Project Leader for CSIRO's Heartlands project, which, by working with local landholders in three case-study catchment areas, aims to improve land use in the Murray-Darling Basin through on-ground works such as tree-planting, protection of remnant vegetation, establishment of perennial pastures and erosion protection.

'We really want to be undertaking substantial, targeted land use change in our catchments, based on good planning with a sound scientific basis. Then we want to be monitoring and making sure the outcomes are consistent with what we thought they might be,' Dr Cresswell says.

'Heartlands is really an integrated catchment management approach. It's about

'To make better decisions about water, we need to build a clear picture of what the full range of benefits is – from the value of water to irrigators, to community lifestyles and to the environment'

trying to think carefully about as many aspects of catchment management as possible at the same time. So, whilst the flow in rivers is one consideration, there are many others.'

Some of these other considerations are the viability of agriculture and forestry; ecological issues such as managing biodiversity, dryland salinity outbreaks, water logging and erosion, control of weeds and pests; as well as how good the landscape looks.

'Integrated management is about getting all the pieces of the jigsaw puzzle together, which is the thing that is often not done as well as it could be,' Dr Cresswell says.

Dr Gehrke agrees. 'It's the same when we come to river management. We need to think of multiple processes and not simply think of environmental flows as being the sole tool in the armoury that's going to improve river health.'

Managing environmental flows today therefore requires the development of a robust scientific framework on which to base decisions, but this framework also necessarily takes into full account the views of local stakeholders and the wider community.

Both environmental and community benefits

The River Murray Program is one of the five major research nodes in the CSIRO-led Water for a Healthy Country National Research Flagship (see Box). The Flagship in turn addresses the 2003 National Water Initiative (NWI), developed under the Council of Australian Governments (COAG) to secure the country's water future, providing much of the science needed to underpin various State/Territory

and regional water resource strategies. Environmental flows assessments are a part of the Murray Program.

One aim of the Flagship is to support improved water and natural resource policy frameworks and ensure that they are robust. More locally, the River Murray Program provides research support that enables governments, industries and communities to increase the overall benefits from water use in the river Murray region and to make them more resilient to future challenges like climate variability and land use change.

Dr Sarah Ryan, leader of the River Murray Program, says 'At the moment, when we change water quality or quantity, it isn't clear how that alters the balance between benefits and disadvantages faced by particular industries, environments and communities across the whole region.'

'To make better decisions about water, we need to build a clear picture of what the full range of benefits is – from the value of water to irrigators, to community lifestyles and to the environment – and how these link to the giant water budget,' says Dr Ryan.

Success through understanding

Understanding water systems can also mean that environmental flows are targeted more effectively.

Dr Gehrke explains that 'we may be able to provide significant environmental benefit with a relatively small volume of water – because as we build our understanding of river systems, there is an increasing capacity to actually deliver direct benefits from a relatively small volume of water. Environmental flows are also about efficient use of water and should not be confused with letting large amounts of water flow to waste downstream in rivers.'

Without both the scientific understanding and acceptance by the community, any attempt to use water to improve river health and redirect this valuable commodity from other uses such as irrigation will be fraught with difficulty.

Dr Gehrke also stresses that overselling the capacity and knowledge of scientists in relation to environmental flows could lead to a misunderstanding of what types of outcomes can be delivered.

'We need to help people understand that there are uncertainties involved in managing river environments,' he says.

Re-planning the future of rivers

There is no question that environmental flows will be a big part of better river

Water for a Healthy Country

Water for a Healthy Country's goal is to achieve a ten-fold increase in the social, economic and environmental benefits from water across Australia by 2025 by developing agricultural and ecological landscapes that deliver increased profits and better environmental outcomes, urban and rural water systems that cope with population growth, climate variability and climate change, and industrial and agricultural systems that profit from innovative conversion of wastes to resources.

The Murray-Murrumbidgee food bowl, is one of four focus regions where research is supporting improved water resources management – including flows planning – to underpin irrigation development and manage the Living Murray ecological icons.

The Research Flagship will make a substantial contribution to improving the value derived from water in the region, and will provide lessons for other river systems as the demands for water continue to grow nationally.



CSIRO Land and Water Research scientist Gillian Napier monitoring life in Murrumbidgee River wetland. Willem van Aken.

The Murray Benefits project will develop a set of water accounts for the region, integrating water flows from catchments into current accounts of river flows, adding groundwater flows where they interact with surface water, and documenting the withdrawals and returns of water to the system. It will then integrate these physical flows of water

with knowledge about water use and the social, economic and ecological returns from these uses. Research outputs will be specifically tailored to the needs of the National Water Initiative, the Murray-Darling Basin Commission, its State partners and catchment management agencies.

Water for a Healthy Country: www.cmis.csiro.au/healthycountry/

management, however, trying to build detailed steps is never an easy task.

'By trying to create management targets and by attempting to see what the river should look like in 50 years, we can build our vision for the future and provide a sound legacy for future generations of Australians,' says Dr Gehrke.

'But, it's worth remembering that if we go back 50 years, to say the early 1950s, the thinking of the day then was to do with taming rivers, damming rivers, and controlling river flow. So the vision that came with river management back then included many of the concepts we're trying to move away from now.'

'The lesson for us today then, is that while we need to let future generations learn from our experience, we also need to

recognise that in 50 years time their vision may differ from ours.'

● Ruth Beran

More information:

The Heartlands project:
<http://www.clw.csiro.au/heartlands/overview/index.html>

Water for a Healthy Country Flagship:
www.cmis.csiro.au/healthycountry/
The River Murray Program:
www.cmis.csiro.au/healthycountry/Murray/index.htm

The National Water Initiative:
www.pmc.gov.au/nwi/index.cfm

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