CHAPTER SEVENTEEN

A pattern of creeks tessellating the plain;
each does the work of a hundred surveyors,
with its long, looping spirit-level
finds the one, the possible way
through a maze of hills and tilted horizons.

CHAPTER 17

WATER FOR WHOM?

There are three main management options for returning river and flood flows in the Murray-Darling system to a more healthy cycle — increased water use efficiency, smarter flow management and a return of some of the water now allocated to irrigation. All three options offer considerable scope. And all three are open to manipulation through a combination of market forces, regulation and voluntary action.

Australia has arguably the cheapest irrigation water in the world, and in some cases uses it to support low-value agricultural enterprises that the cost of water would make uneconomic in other countries. In the past water from the Murray-Darling Basin was provided free, or nearly so, by State Governments to promote inland development. Much of the estimated $30 billion worth of irrigation infrastructure in the Basin was built and paid for by governments, and in many areas its maintenance and upgrading is still subsidised.

MANAGING WATER

It must be recognised that the current level of exploitation of Murray-Darling waters is too high. Scientists can now say with confidence that many of the ills of the river system are in part caused by over-extraction, and that it is necessary to reduce water use. It takes considerable time for human impacts to work their way through a river system. The problems the Basin is experiencing now were caused by much lower levels of exploitation, perhaps 10 or 20 years ago. The impacts of increases since then are still to be felt, so capping water diversions at existing levels will see the system continue to degrade. Professor Peter Cullen, Director of the Cooperative Research Centre for Freshwater Ecology, has proposed an immediate 20 percent reduction in the water allocated to irrigation throughout the Basin. A gradual reduction in water allocated to human use is probably inevitable, although it may take some years to implement. Irrigators wishing to avoid future problems would be well advised to act now to reduce their water use.

Current moves toward a 'user-pays' philosophy of water management should be encouraged, and significant increases in the price of water should be expected. Novel market mechanisms need to be introduced to make the price of water reflect the environmental costs which accompany its use, as well as the diffuse, but very real, costs to other industries and users, and to future generations. All water diverted from Murray-Darling rivers, including that harvested on floodplains and in catchments, should be included in water allocation and pricing calculations.

As the cost of water rises, dryland and opportunistic farming may start to look more economically attractive, and irrigated farming less so. The rising cost of water will put pressure on lower-value, less-water-efficient practices, such as irrigating pasture. Price and other incentives should promote increased water use efficiency wherever possible, and in many areas there is considerable scope for improving the efficiency of water delivery infrastructure and application systems. An important general principle is that water saved from such measures should be returned to the river system, not reallocated elsewhere.

Water allocation arrangements should be structured so those higher water prices will act as a disincentive to overuse. In principle, users should pay for only the water they use — a principle that should be extended to include water that is stored or released on their behalf, but not used. For example, irrigators who order water, but then do not take it up because of rain after it has been released, (Chapter 12) should still be charged. This is because the damage to rivers from such flows, and from upstream storages held against that season's expected demand, happens whether or not the water is used.

Water being released from Lake Eppalock into the Campaspe River. Scientists are studying the effects of an experimental change in the release regime of Lake Eppalock on the Campaspe River. The project is aimed at providing alternatives for managing flow regimes that both meet environmental needs as well as the demands of agriculture and urban users. Photo: *Karen Markwort CRCFE*

Therefore it is not enough for irrigation areas simply to use less than their allocations — the allocations themselves must be progressively reduced, so water managers know in advance that demand in the coming season will be lower, and can reduce upstream storages and adjust flows accordingly. This is important, to ensure that flow returns to a more natural, seasonal pattern. There is also a danger that in an unchecked market, water may simply be traded from lower-value to higher-value agriculture, with no reduction in use. The major challenge now facing Murray-Darling Basin authorities is to put in place incentives for irrigators to reduce their allocations.

The present practice of allowing some irrigators to extract 'excess' water above their allocations once river flows reach certain levels should cease. The practice reduces flood peaks and diverts much-needed water away from downstream floodplains. The aim should be to ensure that existing allocations are the maximum water allowance for users, not the minimum. One suggestion is that water allocations for the coming season could be linked to the findings of the Southern Oscillation Index (SOI), which is an increasingly sophisticated technique used to predict ENSO droughts (Chapter 7) many months before they happen. Already some graziers are issued with advance advice on stocking rates based on SOI information. Water managers armed with SOI information could advise annual crop growers in advance how much water they will be allocated in the coming season, so they can plan their plantings accordingly. However, growers of perennial crops, such as grapes and citrus, would be unable to decrease acreages to reduce water use in drought years — and demand for water is typically highest in drought years.

Commentators have suggested many different mechanisms that could be introduced to wind back, or to redistribute, water allocations. One suggestion has been to allow water rights to be traded only downstream, never upstream, so that irrigation will eventually cluster toward the lower end of the river system, reducing its negative impacts. One major drawback is that existing water storages are all upstream, so such a move would expose the entire river system to damaging high summer flows as irrigation water is shunted to downstream users.

Another suggestion is that governments should buy back water rights at market prices to provide environmental flows, perhaps funded by a consumer levy on all goods produced by irrigation. Others have suggested that water licences should be reduced by a fixed amount, say 10 percent, each time they are traded. There are many other proposals, most of which involve some form of compensation for water users as allocations are wound back. The tangle of different State and Federal responsibilities makes concerted action very difficult to achieve, and although the need for action is clear and urgent, it is beyond the scope of this publication to recommend any particular course.

Flow management

Perhaps even more important than reducing overall water extraction from Murray-Darling rivers is the need for more sophisticated management of flows. There are many techniques water managers can use to try and emulate, as closely as possible, natural flows. The techniques vary widely across the Basin, according to the different needs of different river reaches and the different options available, and are already being tried experimentally. Water can be juggled within rivers whose flows are heavily committed to irrigation, mimicking the natural regime to some extent. This is already being done in some rivers to provide limited ecological flows, with water managers creating floods on demand by releasing water from one storage to another further downstream. Floodplain managers can use such flows to inundate floodplains — perhaps holding the flood level up artificially after the peak has passed with regulators to prevent it draining again.

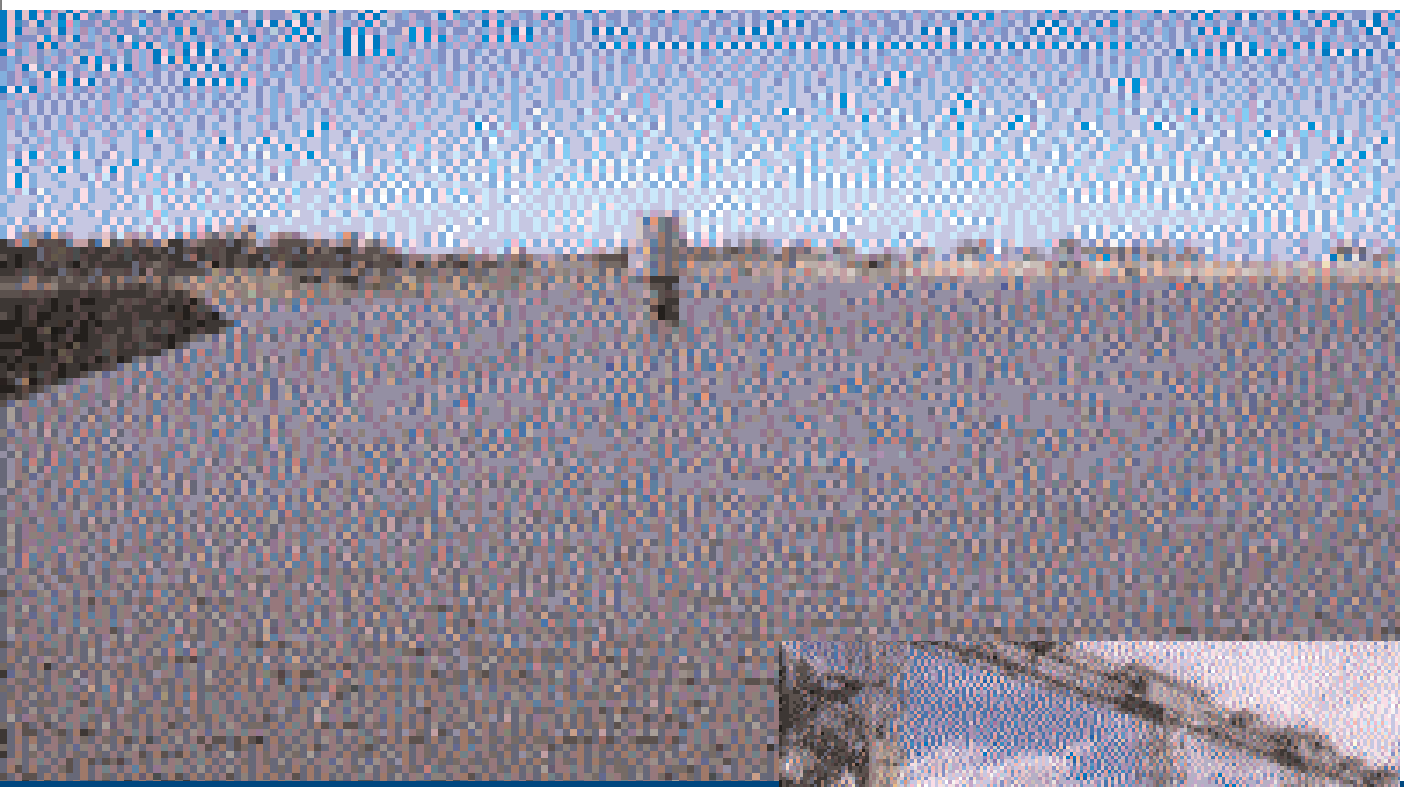
A suggestion from scientists, which is now being tested in Victoria's Campaspe River, is that instead of releasing only an absolute 'minimum flow' when storages are filling, water could be released in some proportion to in-flow from the catchments. For example, water managers might agree to hold only 75 percent of in-flows, returning the river downstream of the storage to a scaled-down version of its natural flow.

One way of easing the problem of high summer flow, when rivers are naturally low, may be to release water in large pulses that mimic summer rain events instead of as continuous high flows. Flood-mitigation 'pre-releases' of water from storages (Chapter 12) should generally be avoided, and instead floodplain users should be encouraged to accept the inevitability of regular floods, and to plan accordingly. Conversely, water releases from storages can be used to increase the height of small floods in some river sections, to inundate floodplain areas that would otherwise be above the high water mark.

Manipulating flow can also be used to address other economic and environmental problems. For example, it is now well-established that modern cyanobacterial (blue-green algal) blooms are often triggered by stalled stream flow, when a layer of warm water forms on top of a waterbody (Chapter 12). In conditions of low flow the warm upper layer, where conditions are ideal for cyanobacteria, does not mix with the cooler lower layer. Releases from storages can be managed to break up this temperature stratification and help prevent cyanobacterial blooms. (59)

Individual Murray-Darling rivers are so different from each other, both by their nature and because of their different regulatory structures, that a unique regime needs to be worked out for each one. Rivers whose waters are not fully committed to irrigation may already carry enough water, and have enough slack in their storages, to make a large difference to floodplain health by rescheduling their water releases. However, in many rivers the only solution will be to divert some regulated flow to the environment. Unused or under-used weirs and other regulatory structures, in river channels or in floodplain waters, should be considered for removal.

The Campaspe River. Recent surveys have shown that European carp and redfin perch, both introduced species, dominate the adult fish fauna in this highly regulated river. Photo: *Karen Markwort, CRCFE*



Lake Eppalock on the Campaspe River. Many of the Murray-Darling Basin's rivers are affected by coldwater 'pollution' through irrigation releases from the bottom of storages. Photo: ***Karen Markwort, CRCFE***

Right: Maude Weir Photo: ***David Eastburn, MDBC***

In general, a fundamental rethink is needed in the way water is allocated in the Basin. The goal should be that only water surplus to the needs of river systems is allocated to human use, instead of allocating to rivers only water that is surplus to human needs. It is clearly in the interests of the environment to move toward such a sustainable regime, but it is also in the long-term interests of its human tenants (Chapter 2).

Wetting and drying floodplains

Just as it has taken many small actions to degrade floodplains, it will take many small actions to restore them to health. If water managers are going to release environmental flows, rivers must be made ready to make the best of them. Landcare and Rivercare groups, local governments and other community-based organisations will need support to manage their sections of floodplain, guided by overall management plans for each river. The phrase 'river management planning' needs to become as well known in the Murray-Darling Basin as are the phrases 'total catchment management' and 'property management planning'.

The first step, which is already happening in many places, is to identify those areas of floodplain which will benefit most, and which will contribute most to the health of the river, if natural flooding cycles are reinstated. Historical records of pre-regulation flow cycles are often sketchy, but they can be used to help reconstruct more natural flow patterns. Many Murray-Darling Basin wetlands have been mapped and classified by different agencies and studies (60), and this information may help guide planning. Obviously, decisions also need to be made about which areas should not be flooded or dried out. Towns and some high-value perennial crops should be protected from flooding, for example, although those that are flood-prone are mostly already protected by levees. In some areas decisions to inundate or to dry floodplains may be contentious.

The second step is to look at what can be done. Even now, large areas of floodplain need only increased flow to flood. But other areas may be too high to be reached by smaller ecological flows, or may be prevented from flooding by the myriad of small regulatory structures which have been built to control off-river flow. Similarly many permanently inundated floodplains are never able to dry out,

as they should do seasonally, because year-round river flows are too high. In such cases small regulators and other structures can be used successfully to return floodplains to their natural wetting and drying cycle. Screens can also be used, if desired, to exclude large carp. This is already being done experimentally in some areas.

For example, some floodplain lakes and lagoons in South Australia's Chowilla district, now being managed as part of the Bookmark Biosphere Reserve, are deliberately manipulated in this way. Similarly the New South Wales Murray Wetlands Working Group is using levees and regulators to deliberately dry floodplain lakes which have been permanently connected to the river by high summer flows, including Moira Lake and Croppers Lagoon. Some floodplain wetlands are now so isolated from their parent rivers that it may be necessary to pump water from the rivers to inundate them, in the right season, if floods cannot be delivered any other way. All artificial flow restrictions that are not used, are under-used or whose economic benefits are minor should be considered for removal, or for conversion to environmental purposes.


Photo: *David Eastburn, MDBC*

'Cold water pollution', caused by water releases from the bottom of storages, is affecting the distribution and numbers of native fish and aquatic invertebrates.