

## **Progress on environmental flows in south-eastern Australia in light of climate change**

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The Murray-Darling Basin [MDB] is Australia's major inland river system, covering five different states. Most rivers in the basin are extensively regulated, with high levels of diversions supporting a major irrigation industry and key urban water centres. River regulation has substantially reduced stream flow and altered natural flow regimes, and as a consequence river health is poor and deteriorating across a range of parameters including water quality and habitat value (Murray-Darling Basin Commission (a) 2008). Climate change predictions for the area add significantly to the pressure on resources. In the inland areas of south-eastern Australia, the combination of increased temperatures and decreased precipitation is predicted to result generally in considerable reductions in run-off and stream flow. This is likely to be compounded by the increased frequency and severity of extreme events such as prolonged drought (Jones et al 2002, Hennessy 2003, Preston and Jones 2006, Van Dijk et al 2006, Victorian Dept. Sustainability and Environment 2008:32-58). In this context of extreme resource pressure, protection of the public environmental values of healthy rivers becomes an issue of increasing complexity and urgency. This paper addresses legal and institutional developments to provide for a more ecologically sustainable allocation of water by providing for environmental flows in regulated rivers. Importantly environmental water allocation must now be robust and responsive under potential climate change scenarios.

### **Policy and Legal Context of Environmental Flows**

Traditionally and constitutionally within Australia's federal system of governance, direct management of water resources has been an issue for state (provincial) governments (Fisher 2000: 37). Within the MDB, water-sharing between the states and coordinated catchment management have been achieved through agreements between state and national governments. However in recent years there has been increased involvement of the national government in setting water management objectives and facilitating reform.

A national process of water reform involving state and national governments, and focusing largely on the MDB, began in 1994 (Council of Australian Governments, 1994, 2004). One of the key goals of National Water Policy is achieving legal recognition of environmental water needs, and setting up formal processes to provide for and manage environmental water (Council of Australian Governments, 1994: principle 3; Council of Australian Governments 2004: para 36-7, 40, 78-9, 84-9). These policy commitments have been legislated to varying degrees in each state, so that state water legislation now contains mechanisms to provide for and protect environmental water.

### **Are environmental water mechanisms effective, and robust under climate change?**

Three general mechanisms have been used to provide environmental water in the MDB. The following discussion assesses the effectiveness of these mechanisms, particularly how robust and responsive they are under climate change scenarios.

### **Limits on consumptive use**

A cap on consumptive use effectively means that any water over this limit remains in the system and is available to the environment. From an environmental perspective, the effectiveness of such limits depends on where and how the limit is defined and whether it has any ecological basis.

Current limits in the MDB, implemented through water allocation instruments under state legislation, are based on historic levels of development which represent unsustainable levels of water use. They have no reference to ecological water requirements (Murray Darling Basin Commission (b); Nelson 2005: 110-111).

The water remaining to the environment above such limits is also highly vulnerable to climate change. With limits set so high and based on existing infrastructure and capacity to regulate water, effectively the only water above the limit which enters the system is through flows that cannot be captured, such as dam spills during flood. Under a drier climate regime, such excess flows are increasingly unlikely.

## **Operational Rules – passing flows**

Legal obligations included in water allocation instruments (made under state legislation for individual rivers, or river reaches) require water authorities who operate storages to pass certain levels of flow at certain times and rates. These rules can be used to mimic elements of the natural flow regime which are important ecologically.

However in regulated rivers it is very difficult to deliver many ecologically significant elements of the flow regime without impacting on water available for consumptive use. For example, in the southern part of the Basin, delivering low summer flows (which would have occurred naturally) conflicts with the need to run the rivers high to deliver irrigation water in summer, and alternative options for delivery are generally prohibitively expensive (Sinclair, Knight and Merz, 2006). In the implementation of national water policy, governments have generally prioritised the protection of existing consumptive entitlements to water, over meeting environmental flow recommendations. Consequently, current rules only partially implement scientific recommendations for passing flows, and largely only implement those flows which can be easily met within the regulated river regime for consumption.

Passing flows have been generally established by fixed rules. However given the uncertainties associated with climate change, there is an increasing requirement for management flexibility to allow environmental water managers to alter flows according to antecedent circumstances. For example, in a certain year, provisions for a winter flush, may actually be best delivered in autumn to enhance a natural rain event.

Theoretically, passing flow rules provide very secure environmental water: water authorities are obliged to provide these base flows in the system before any water for consumptive use is delivered. However, these flows (like any water entitlements in the system) are subject to a broad legislative power, vested in the minister, to temporarily qualify rights in times of water shortage, in order to meet critical human needs (eg, Water Act 1989 Vic, s 33AAA).

These powers have been exercised extensively in the MDB in the last few years in response to the lowest inflows on record and very low storage levels (Victorian Dept. Sustainability and Environment 2008:42). Environmental passing flows have been reduced to very low levels, or stopped in some river reaches. Therefore, as well as being far from adequate in terms of environmental outcomes, under climate change scenarios and current management patterns they are likely to be further reduced through qualification.

## **Volumetric Environmental Entitlements**

State water legislation also creates the capacity to have water allocated, held in storage and released for environmental purposes. For example, water may be released to fill significant wetlands.

These entitlements are generally held by the state Minister for Environment, with associated management arrangements such as committees of stakeholders and experts. They have similar legal status and characteristics to other entitlements in the system. For example:

- rate of allocation: if consumptive users are allocated 50% of their entitlement in a year, the environment will also receive 50% of its entitlement;
- level of security: an entitlement may be high or general security according to how often the water is likely to be available. Security is an important consideration given increasing water scarcity under climate change, which further decreases the reliability of low security water; and
- flexible management options, such as a right to carry over unused water in storage at the end of the year for later use. This provides environmental managers with the ability to accumulate sufficient volumes to orchestrate a timely environmental release.

Volumetric entitlements hold considerable potential for active adaptive management in response to climate conditions. However, to date the volumes set aside for the environment in this way are relatively minor. Additionally the environment has only very limited high security water entitlements (Victorian Dept. Sustainability and Environment 2008:57).

## **Key elements of a governance model for ecologically sustainable water allocation and management**

In summary, current provision for environmental water is far below scientific recommendations for healthy river systems, and generally highly vulnerable to climate change. Identified below are key areas for reform, towards a governance model for ecologically sustainable water allocation and management.

### **Ecologically sustainable allocation**

The MDB needs limits which achieve an ecologically sustainable balance between environment and consumptive entitlements and which are responsive to changing climate conditions. Recent climatic experience in the southern MDB system is suggesting that a significant reduction in entitlements and reconfiguration of the system is warranted (Young, 2008:30).

Currently, the national reform process is taking tentative steps in this direction with proposed new sustainable diversion limits (*Water Act 2007* [Cth]: Part 2). However, tools relied upon for implementing these are arguably neither comprehensive nor rapid enough under the circumstances. Given the considerable reform impetus and funding currently on the table, an accelerated and targeted adjustment / buyback program to implement limits set through an administrative re-allocation process would be appropriate.

### **Environmental Entitlements of appropriate nature and security**

Increasing the volumes set aside for the environment as high security entitlements with flexible management arrangements should be a key focus of ongoing reforms. Passing flow rules are also important, and are a good way to achieve some flow-variability. However, flexibility to renegotiate rules according to climatic conditions should be increased.

It is also important to develop safeguards for the treatment of environmental water under critical water shortages. While political realities will undoubtedly see critical human needs prioritised in times of water shortage, the long term implications of sacrificing already stressed rivers to do this must be considered. Powerful disincentives to encourage water authorities to avoid qualification of basic environmental water provisions, and provisions for environmental recovery following qualification must be developed. Legal safeguards which ensure basic levels of river health are not compromised need investigation.

### **Competent, well-resourced, independent environmental water managers**

Adaptive management models for environmental water are slowly evolving. However across the MDB more work is needed on the institutional and legal frameworks for sustainable water management. A more active and independent role for environmental water managers is critical under climate change scenarios.

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## **Legislation**

*Water Act 2007* [Cth]

*Water Management Act 2000* [NSW]

*Water Act 1989* [Vic]