Securing water for the environment: investing in the future Australian style

FIONA J. DYER
Institute for Applied Ecology, University of Canberra, ACT, 2601 Australia
fiona.dyer@canberra.edu.au

INTRODUCTION

Water security is generally agreed as the availability of water of sufficient quantity and quality to ensure human and ecosystem needs combined with an acceptable level of risk to humans, ecosystems and economies (Global Water Partnership 2000, Grey and Sadoff 2007, Cook and Bakker 2012). In spite of the explicit recognition of ecosystem needs within the agreed definitions and considerable discussion among academics about ways in which water security is measured holistically (Falkenmark *et al.* 2007, Lautze and Manthrithilake 2012, Nichols and Dyer 2013), in practise for most developed countries the focus of water security measures has been the provision of water to meet human and economic needs.

Australia has a long history of investing in water security for human and economic needs. With an extremely variable climate there has been a focus on 'drought proofing' to ensure supply for agricultural purposes and communities and 'flood protection' to prevent loss to life and property. In recent decades there has been a growing recognition of the need to provide water for the environment, in part because of a broader understanding of the benefits to society of healthy functioning ecosystems (Baron *et al*. 2002)

Water managers in Australia have long been faced with the challenges of balancing the water requirements of people, environments and economies. In recent years, Australia has coped with a 10-year period of significant water shortage (known as the Millennium drought) followed by major flooding events which caused serious economic loss. Currently, the approach of water managers to providing water for the environment involves three main areas of focus:

1. Capping the consumptive use of water.
2. The purchase of regulated water entitlements for the environment.
3. The construction of infrastructure to facilitate watering of major environmental assets.

CAPPING USE

Following an audit of water use in the Murray-Darling Basin that showed an ongoing increase in diversions from rivers and a widespread decline in river health (Murray-Darling Basin Ministerial Council 1995), a cap of diversions from the Basin's rivers was introduced. This was defined in terms of the volume of water that would have been diverted under 1993/4 levels of development. Central to the implementation of the cap is the concept of cumulative impacts with diversions assessed on a catchment basis. At a similar time, State governments began to cap water use across the various river basins within their states, This not only protected water for the environment, it also clearly defined the security of supply for existing consumptive users and ensured that new users could not adversely affect existing license holders. However, compliance with the capping of water use was voluntary and consequently of varying success.

Subsequent water reform culminated in the passing of the *Water Act 2007* and the formation of the Murray-Darling Basin Authority (MDBA) with responsibility to establish a new cap on diversions (the environmentally Sustainable Diversion Limits, SDLs). The Water Act also confers compliance powers to enforce the new cap. The development of water sharing plans is central to the implementation of the SDLs, clearly defining the rights and access to water of all stakeholders.

PURCHASE OF WATER FOR THE ENVIRONMENT

The Millennium drought (2000–2010) and associated widespread ecosystem decline saw Australian governments recognise the need to secure water for the environment as well as for consumptive users. To address this, they have obtained regulated water entitlements that can be used specifically for environmental benefit. The water entitlements have been obtained through water savings from efficiency programmes, typically in irrigation supply systems, and through voluntary sale from existing entitlement holders.

The 'environmental water' is held by Government Environmental Water Holders (EWH) who allocate the water for ecological outcomes, aiming to have any return water flow downstream to contribute to further ecological outcomes. The EWH is responsible for all charges associated with the entitlements and must measure and report their diversions from the system to a level consistent with other consumptive users of water.

INFRASTRUCTURE

To maximise the effectiveness of the limited environmental water available, the Murray-Darling Basin Authority, through the Living Murray programme, has invested in a series of works to allow the protection of six landscape-scale flood-plain ecosystems (watering areas of 1000–16 000 ha). These works allow the environmental managers to more closely replicate the natural frequency, extent and duration of flooding at these iconic sites, using less water than would have been required without the assistance of infrastructure.

The works typically use existing infrastructure to provide the driving head to deliver water to the flood plain and then control the duration on the flood plain by means of downstream regulators and natural sills. For example, the Hattah Lakes site in Victoria includes a large pump station (capable of delivering up to 1000×10^6 L/d) to ensure that the necessary frequency of inundation, in particular of higher elevation areas of the flood plain, can be met.

The development of such infrastructure is an attractive option for ensuring landscape-scale assets are provided with the watering required replicating the natural watering regime with the minimum amount of water. In attempts to balance competing needs, infrastructure options are being considered more widely across southeastern Australia with additional works being considered under the Murray-Darling Basin Plan.

FUTURE DEVELOPMENTS

The management of water for the environment is subject to ongoing change and policy development. Current investigations are directed at enabling limited environmental water to deliver multiple benefits as it flows through the river system. Another area of ongoing discussion is environmental water accounting and how environmental water can be delivered in association with irrigation deliveries and unregulated flows to provide much greater ecological outcomes.

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