

Managing Australia's Scarce Water Resources for the Environment

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AUSTRALIA has 12 major drainage basins, but most water use and extraction comes from the Murray-Darling Basin, despite not having Australia's more populous cities. About 66% of surface water use in Australia is extracted from the rivers of the Murray-Darling Basin (NLWRA 2001). The ecological impacts are widespread and insurmountable: key ecosystems are in various stages of collapse. Many of these are conservation reserves and wetlands recognized for their international importance under the Ramsar Convention. Populations of native fish species are considered to be only at 10% of pre European levels with 46% of the 35 fish species now listed as threatened at state level (MDBC 2004). Waterbird populations are also declining significantly, sometimes up to 80% over a period of about 25 years (Kingsford and Thomas 2004; Nebel *et al.* 2008). Many communities of floodplain vegetation are also in decline. The River Murray no longer breaks through the sand barriers to naturally flow out to sea, with flow now only maintained by a dredge (costing ~\$100,000 per week) to ensure that sand does not completely block the Murray mouth. The lower lakes are below sea level for the first time in more than 7,000 years and marine incursions into this freshwater ecosystem have allowed colonies of marine worms *Ficopomatus enigmaticus* to build their calcareous colonies on the backs of freshwater turtles and crabs weighing them down.

The causes for ecological collapse of the Murray-Darling Basin aquatic ecosystems are reasonably well established in the community and government, although not accepted by all. Regulation by dams, over extraction of water and building of levee banks are the major causes. Three key challenges emerge: manage-

ment of environmental flows, transparent auditing and management of floodplain development and making sure proposed developments of northern Australia does not make the same mistakes.

Governments are now embarked on major rehabilitation, with most of the \$12.9 billion to be spent on the rivers of the Murray-Darling Basin, including \$3.1 billion for the purchase of environmental water and \$5.8 billion for improving water efficiency and providing water for rivers. Inevitably this will mean that increasing amounts of water caught in dams will be environmental water, owned by governments. It has to be managed with rules for its release. Transparent management underpinned by good science will be essential as there will be considerable scrutiny on whether the rehabilitation of our rivers at considerable expense has achieved any success. There will be no shortage of critics demanding to know how many ibis have been hatched or river red gums grown. There is currently little indication that governments are devoting much time or energy into understanding the consequences of becoming the environmental water holder, as they will be known under new legislation. There will need to be good monitoring, modelling and hopefully the odd experiment. Resources to do all of this do not seem to exist. All of this policy initiative to rehabilitate the rivers primarily revolves around the main channel of the river and the storage of water in large dams up in the catchment. This is all part of the regulated river supply with licences to a quantum of water. Governments are buying back these licences for the environment.

The second major challenge is the forgotten part of the river — the floodplain. For many years the policy

and management of rivers, primarily driven by water agencies, has focused on the main storage and control of rivers for the delivery of irrigation water. Governments have almost universally ignored the key part of the river that provides habitat for most of the biodiversity — the floodplain and its associated wetlands. Belatedly, there is recognition that this needs to be addressed, but it is particularly difficult to do so because of the lack of policy for levees and channels on the floodplain. For example, on the Macquarie River floodplain, there are more than 2,000 km of earthworks that potentially interrupt river flows (Steinfeld and Kingsford 2008). Under legislation, there was little need to licence many of these works and so most are probably legal and designed primarily to move water around an irrigation farm. However, some may actually be capable of intercepting environmental flows that come down the river. As governments buy back water for the environment, ensuring that these flows reach their destination is critical as the volumes build up. The regulation of floodplains also varies among the states of the Murray-Darling Basin, but is primarily relevant to the northern states (New South Wales, Queensland) because of the large floodplains. New South Wales only issued a draft policy in July 2008 to regulate (licence) all earthworks and not allow for any new ones without appropriate environmental assessment. In Queensland, overland flows are regulated under Water Resource Plans and Resource Operations Plans relevant to a catchment. Moratorium dates exist past which no structures are allowed to be built, but any structures that were started or existing before these dates are allowable. This involves assessment by the water agency of the take of water of the structure and provision

of an overland flow licence. The Paroo River, the most western river in the Murray-Darling Basin, is supposedly protected by an interstate agreement (Paroo River Agreement) between New South Wales and Queensland, signed by the Premiers in 2003. Under the Queensland water resource planning, there is 50 ML of water allocation available from unregulated water harvesting (CSIRO 2007) and up to 100 ML of unallocated water can be extracted annually from the Paroo catchment for town water supply, ecotourism or something similar. And yet, the Queensland Government recently approved of 10,338 ML of overland flow extraction from the river, based on assessment that a previous irrigation development was established. There is no record of this development in any of the water resource planning. It appears that the Queensland Government has licensed the storage of this volume of water on the basis that there was a levee across the floodplain in place in the 1960s and some assessment that water was extracted. There is now a newly established irrigation enterprise, potentially increasing the diversion of this volume of water from a river that two State governments agreed to protect from further water development. Further, the Queensland Government's water agency now articulates a policy position where any levee bank across a floodplain can be defined as a storage because it holds back a volume of water. If there is demonstration of extraction, then approval can be given for an overland flow allocation. As with many such developments, there are no measures of the take of water which is assumed to be the maximum held in volume, but storages can be potentially emptied and filled.

The final big challenge is to avoid making the mistakes of decision-makers on the rivers of the Murray-Darling Basin. Paradoxically, this is even more difficult to tackle. Water brings wealth to rural Australia in the form of irrigation production that can be exported (e.g., rice, wine, stone fruit, cotton, almonds). There is a long list of agricultural products that demand the damming of rivers and/or diversion of water for irrigation. The common refrain from many, although not all, in the agricultural

community is that with a world population climbing towards seven billion, there are many more mouths to be fed and bodies to be clothed. Australia should be developing the north of the continent to meet this growing demand, potentially the "food bowl of Asia". Inevitably, we end up exporting the water from our rivers. Without curtailing the development imperative for northern Australia, another river will follow the degradation path. Even a cursory examination of Australia's water history will show that river development has had many powerful advocates outside and within governments.

Since early federation, Australia has adopted a course of river development, primarily concentrated in the Murray-Darling Basin. The genesis of the Murray-Darling Basin Commission was an agreement to co-operatively manage the rivers of the Murray-Darling among the states of New South Wales, Queensland, South Australia and Victoria and the Commonwealth Government. Initially management was all about ensuring navigable rivers so that produce could be barged down to where the River Murray flows out to sea. This was once considered to be where Australia would export its produce, particularly wool. The rivers were cleared of "snags": the logs and branches that had fallen into the river. On the River Murray, 24,000 snags were removed over a decade between Lake Hume and Yarrawonga to ensure uninterrupted navigation of the river (MDBMC 1987).

Soon after early agreement on the management of the Murray-Darling Basin rivers by the States, irrigation began at Mildura with the Chaffey brothers. Riparian rights to water were removed as governments established water management agencies that took over the allocation and management of rivers. The Water Conservation and Irrigation Commission of NSW was one of the more powerful arms of the New South Wales Government, primarily focused on developing rivers through the building of dams and allocation of water for irrigation. Often the dams were built with few customers for the water (Kingsford 1999). As recent as

the early 1990s, the government water agency in NSW was the proponent, assessor and builder when Pindari Dam, the last major dam construction in the Murray-Darling Basin was enlarged eight times. Its own Environment Impact Statement (EIS) hardly countenanced downstream impacts of the dam (only 8%) of the EIS and yet this is the most serious and long lasting impact. Most of the large dams in the Murray-Darling Basin were built in the 1950s and 1960s (Kingsford 1995; Goss 2003).

Status of water resource development and plans for future dam construction in New South Wales were detailed in 1971 by the water agency in a book entitled the Water Resources of New South Wales (WCIC 1971). It identified the major dams and opportunities for irrigation. Copeton Dam on the Gwydir River was under construction and enlargement of Pindari Dam on the Border Rivers by eight times was not yet considered. Already there was concern within the agency that opportunities for building dams to capture flows were becoming limited. The preface of the book even suggests that because some of the more western rivers are unregulated then opportunities to capture the water were limited because the land was so flat but a potential solution existed. "It has been suggested that this problem can be partly solved by the use of nuclear explosives to create giant storage basins in level areas where no conventional storage structures are possible." The culture of the water agency has sometimes remained strongly pro-development. The southern States of the Murray-Darling Basin were eventually forced to acknowledge that rapidity of ecological degradation and introduced a cap on development. In response, Queensland primarily driven by their water agency articulated the point that they still needed to develop their rivers. One of the most developed rivers was the Condamine-Balonne whose off river storage capacity has risen to 1,500,000 ML, a development that largely occurred throughout the 1990s.

Habitat loss caused by the effects of agriculture through clearing of land and diversion of water remain the most serious global issues for

conservation of biodiversity, despite even the most serious climate change predictions. At the 2020 summit to chart Australia's future, delegates considered the agricultural options in a section on "Incentives for Sustainability" where the emphasis was on "the potential of north and north-west Australia with particular reference to agriculture". Recommendations were for future soil and hydrological surveys, informing "production opportunities". A northern taskforce set up by the previous Federal government is investigating the possibilities of more agriculture in northern Australia. Agricultural development for crops in Australia and around the world often takes two steps: first clear the land and then, if the crop needs water, divert it from the nearest river or groundwater system and irrigate. Both have wrought large scale destruction of ecosystems and biodiversity. So, tropical river sustainability must surely evaporate when agricultural development progresses in the north. And any ambitions of improving our ecosystems by 2020, as articulated by those to the summit interested in environmental sustainability, will be just a mirage.

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