Rivers and the Murray Darling Basin rangelands

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Keywords: rivers; water reform; Murray Darling Basin

Abstract

A significant proportion of the Murray Darling Basin (MDB) is in the semi arid climatic zone with pastoralism a dominant land-use. Snaking through these rangelands are many thousands of kilometres of "flat, lazy" rivers and creeks, which occasionally spread floodwaters over vast areas. These floods nourish floodplains, woodlands and wetlands, bringing water and with it life to the inland. During the past summer (2009-10), widespread rains resulted in extensive flooding in the Balonne, Nebine, Paroo and Warrego and Barwon Darling systems. Rangeland and riverine management and conservation share many challenges. The Basin's rangelands and rivers share their climate driven, drought-flood, and boom-bust cycles that span temporal scales of decades or generations. They also operate on large spatial scales and share the need for both policies and people, committed to long term, integrated and adaptive NRM informed by long term monitoring and systematic evaluation. This paper briefly profiles the importance of these riverine systems and provides an overview of the policy and planning processes aimed at ensuring their long-term sustainable management.

Introduction

There are over 28,000 wetlands in the Basin, covering some 6.3 million hectares. Approximately 98% are floodplains wetlands (see figure 1) yet only a small area is protected within IUCN conservation reserves (see figure 2). These rivers, floodplains and wetlands have substantial cultural, environmental and economic significance. Some larger wetlands are internationally recognised through treaties such as RAMSAR. The majority of the Basin's

wetlands have been degraded (NLWRA 2002b) and have had water supplies depleted due to irrigation extractions (Kingsford 2009). Most suffer from a lack of guaranteed environmental flows, although recent reforms aim to redress the balance between environmental and extractive use of water (Commonwealth 2009).

Australian governments have collectively committed to providing environmental flows based on the best available science, through the COAG Water Reforms in 1995, and the National Water Initiative in 2004 (COAG 1995 and 2004). More recent reforms giving effect to these commitments include the Water for our Future Program purchase of 3 billion dollars of water entitlements, to be held by Commonwealth Environmental Water Holder (CEWH), and the establishment of the Murray Darling Basin Authority (MDBA), which is developing the Basin Plan.

Provision of water, while vitally important, is not the only factor affecting the health and conservation status of the Basin's riverine and wetland ecosystems. The National Land and Water Audit (NLWRA 2002b) found that they are also degraded due to overgrazing and the impact of weeds and feral animals. Given that the majority of these floodplains wetlands occur on private or leasehold land the roles of the land managers is central to their effective management and conservation.

The ambitious objectives of the Water Act 2007 formalise a new policy era for the basin. The MDBA recognises that to achieve the objectives of the Water Act 2007 (Commonwealth 2009) the principles of subsidiarity and adaptive management must be adopted. The sustainable management, restoration and conservation of the basin's water resources and water dependent ecosystems depend on the willing support of many agencies, communities and individuals operating at multiple scales.

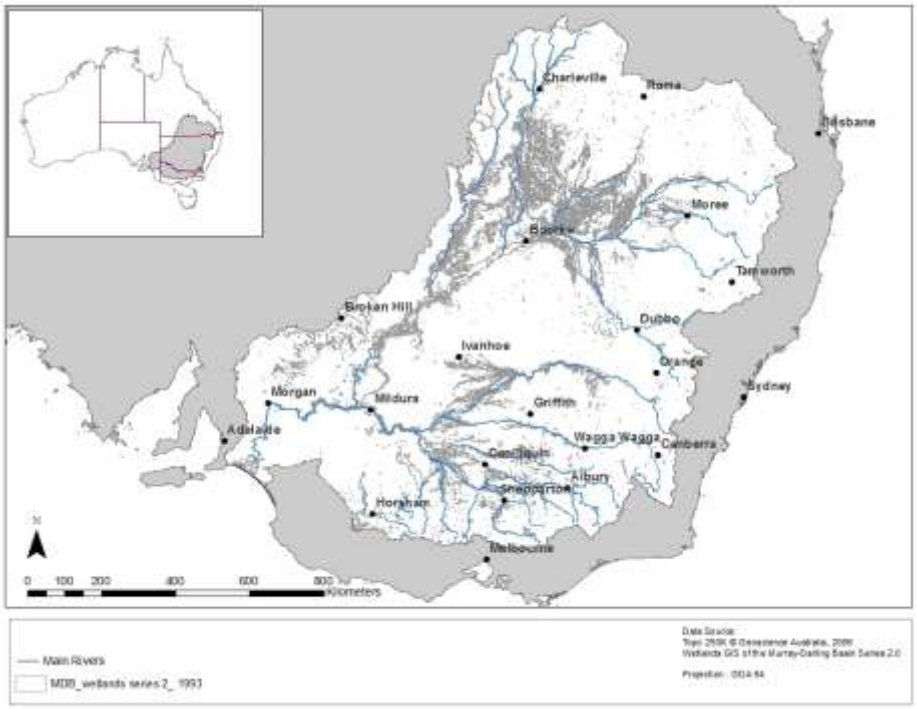

Figure 1. Extent of floodplain wetlands in the MDB.

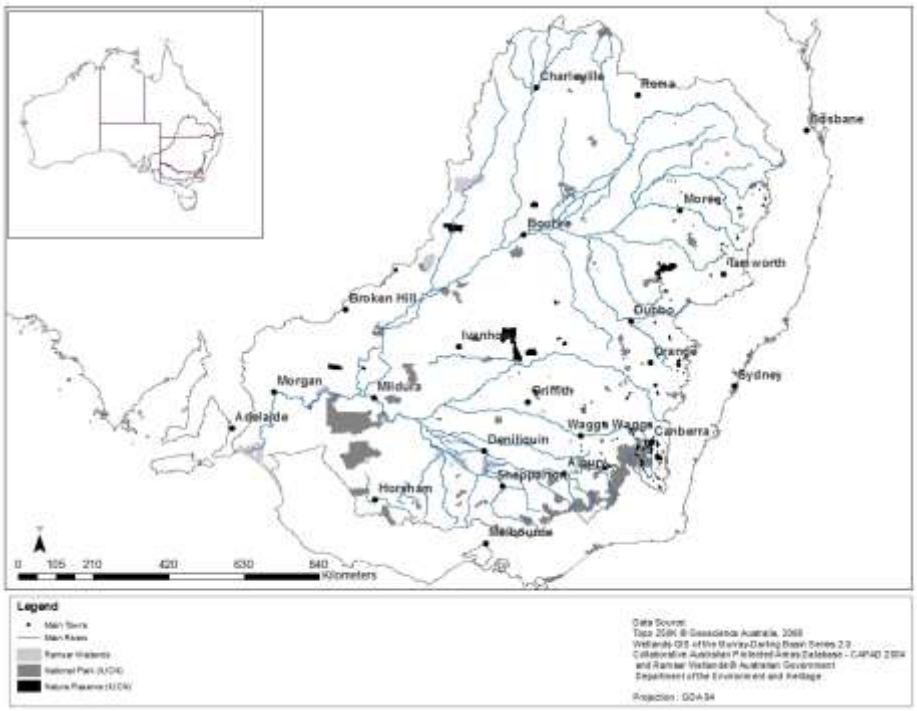

Figure 2. RAMSAR Wetlands and Nature Resources in the MDB.

The Basin's semi arid floodplains and wetlands

The rivers, floodplains and ephemeral wetlands of the semi arid, northern and western Murray-Darling Basin have high cultural and conservation values. They deliver a range of

economic and cultural goods and services. They also provide a range of important sites for fish and waterbird breeding after flood events and act as ecological refugia during drier periods. The health of these ecosystems is dependent on sufficient environmental water (generally floods) and on complementary or sympathetic land management.

Flooding (frequency, duration, timing etc) is the most important natural influence determining floodplain wetland condition. MDB wetlands have proven to be vulnerable to alteration in the size and frequency of flood events, resulting from water resource development (Kingsford 2009). They are also vulnerable to the impacts of over grazing, and to the impacts of feral animals and weeds (NLWRA 2002b).

Floodplain vegetation and land and water management are intimately related demanding integrated approaches to management. Water availability is the key determinant of vegetation throughout much of arid and semi arid Australia. In the majority of MDB, the vegetation of floodplains, wetlands and riparian zones is dependent on water for which, in most valleys, there is intense competition for agricultural production.

Floodplain, wetlands and riparian zones change in response to changes in climate and hydrology, including through water resource development. Climate change is inducing uncertainty regarding the wisdom of relying on historic averages to determine available water resources (SEACI forthcoming). Limited knowledge of historic climate patterns, beyond the last century, makes it hard to determine the size and frequency of severe droughts or of the evolutionary and adaptive responses to long dry periods. Yet there is evidence that for some key wetlands, like the Narran Lakes, the harvesting and use of water is occurring on such as scale as to change hydrological regimes towards a state of extended drought (MDBC SRA 2008).

Australian Governments have made generalised commitments to environmental flows for all Australian rivers in the past (COAG 1995, NWI 2004) but integrated policy and management of the Basin's floodplain wetlands remains a significant challenge.

The Water Act 2007 establishes a new regime for basin scale planning, including arrangements for limiting water extractions (the sustainable diversion limit) and for planning, coordination and provision of environmental water (see below). Some of the key wetlands of the MDB rangelands are likely to be significant beneficiaries.

The Murray Darling Basin (MDB) and the Water Act Reforms

The MDB covers approximately 15 per cent of Australia's total land area. The Basin extends about 1250 kilometres east to west and about 1360 kilometres north to south. Over two million people live in the Basin, and a further million outside rely on its water resources. The MDB produces approximately two-thirds of the value of Australia's irrigated agriculture, and approximately 40 per cent of Australia's total gross value of agricultural production.

The governance arrangements for the Murray-Darling have been the subject of formal negotiations and agreements between relevant Australian governments for over 100 years. The most recent water reforms have followed the Council of Australian Governments agreements of 1994 and 2004 (COAG 1994 & 2004). These reforms were followed by the Water Act (2007) (Commonwealth 2009), which established the Murray Darling Basin Authority, and introduces new powers and functions, including the requirement to prepare a whole of Basin Plan.

The Basin Plan has the purpose of ensuring integrated management of the Basin's water resources. It will establish limits on the amount of water to be extracted (a sustainable diversion limit), develop an environmental watering plan and establish water market trading rules (Commonwealth 2009).

Prior to the Water Act reforms, The Murray-Darling Basin Agreement established a framework of joint management based on consensus decision making between the jurisdictions of Queensland, New South Wales (NSW), South Australia, Victoria, Australian Capital Territory and the Commonwealth. The purpose of the Agreement is 'to promote and coordinate effective planning and management for equitable, efficient and sustainable use of land, water and other environmental resources.' The Water Act 2007 (Commonwealth 2009) incorporates The Murray-Darling Basin Agreement which continues to function,

forming the basis of the current inter-state water sharing rules, joint works and funding arrangements for natural resource management, and the joint management of the River Murray.

In addition to establishing the MDBA, the Water Act (2007) also established the Commonwealth Environmental Water Holder (CEWH) to hold environmental water purchased under the Commonwealth's Water for Our Future Program. The Commonwealth has allocated $3 billion to the purchases of water entitlements to be used as environmental water, of which 1.7 billion has been spent (Commonwealth 2010).

The objectives of Water Act (2007) have direct relevance to the rangelands, specifically referring to the conservation of biodiversity, the protection of riverine ecosystems and their capacity to deliver ecosystem services. The objectives of the Water Act are:

(a): to enable the Commonwealth, in conjunction with the States to manage the Basin in the national interest; and

(b): to give effect to international agreements….

(c): in giving effect to those agreements, to promote the use and management of the basin water resources in a way that optimises economic, social and environmental outcomes;

(d): without limiting paragraph (b) or (c):

i) ensure the return to environmentally sustainable levels of extraction….

ii) to protect, restore and provide for the ecological values and ecosystem services of the Murray-Darling Basin (taking into account, in particular, the impact that the taking of water has on the watercourses, lakes, wetlands, ground water and water dependent ecosystems that are part of the basin water resources and on associated biodiversity);

iii) subject to i) and 1ii) to maximise the net economic returns to the Australian community from the use and management of the basin water resources

(f): to ensure that the management of the basin water resources takes into account the broader management of natural resources in the Murray-Darling Basin.

Monitoring and evaluation of NRM policy and programs

Australia's climate pulses through wetter and drier cycles - drought and flooding rain – with ecosystems that have evolved superb adaptations to the inherent and dramatic climatic variations (Cullen 1998).

Since European settlement, one of the primary ways of adapting to Australia's highly variable climate has been the construction of large water storages (dams, reservoirs, weirs) and the associated infrastructure to regulate rivers and provide water supplies to irrigation and urban areas. In the MDB there are large dams on the majority of the rivers, excluding the semi arid Paroo and Warrego rivers in the North West.

With its intensive, high value and reliable production, irrigated agriculture is responsible for approximately half of the farm gate profit of Australia's agriculture (NLWRA 2002a). While agricultural businesses remain the dominant users of land and water resources in Australia, agriculture's significance to Australia's economy has declined significantly in the latter half of the 20th century (Keating and Harle 2004).

The environmental consequences of extracting large volumes of water are well understood to have contributed to the degradation of the MDB (Cork 2006; Kingsford 2009). Other degradation trends, such as salinity, loss of bio-diversity and declining water quality, are well established, with substantial economic costs (Industry Commission 1998). Australia's widespread land and water degradation, with its severe and long term ecological consequences have been documented in successive State of the Environment Reports (SoE 1996, 2001&2006) and other comprehensive audits such as the Sustainable Rivers Audit and the National land and water Audit (NLWRA 2001&2002b, MDBC 2008).

The degradation of the environment is unacceptable to Australians and their Governments (Cullen 1997) and in 1996, the Prime Ministers Science and Engineering Council warned on water that "a continuation of past policies … will severely and adversely affect every aspect of contemporary life" (PMSEC 1996).

Ongoing policy and institutional reforms, and significant funding programs are aimed at changing the way land and water resources are managed. Yet the water and natural resource policy challenges facing Australia have been nominated as "wicked problems": those with characteristics of being systemic, persistent and resistant to simple solutions (Australian Public Service Commission 2007).

Given the scale, complexity, and multiple stakeholders involved, it is highly desirable that independent monitoring and evaluation, such as state of the environment reporting (SoE), is used to track progress and ensure greater accountability (National Land and Water Audit - NLWRA 2006). Similarly, the NWC has been chartered with responsibility for reporting on agreed water reforms' progress on a biannual basis (NWC 2009) and the Water Act 2007 mandates a monitoring and evaluation plan to be a component of the Basin Plan.

To date, the successes of Australia's environmental and natural resource management policies have been difficult to quantify with reliability (Cork et al 2006) emphasising the need for independent and scientifically credible research and monitoring. This needs to focus on assessing the pressures on, and condition of the environment and the overall effectiveness of responses (policies, program etc). The NLWRA and the Sustainable Rivers Audit provide precedents of large scale, scientific assessments (NLWRA 2002, SoE 2006, MDBC 2008).

Future evaluations of the effectiveness of responses to environmental challenges will need to be capable of attributing the impacts and effectiveness of specific natural resource initiatives, like the Basin Plan, in order to ensure greater accountability of the agencies responsible for their implementation (NLWRA 2006). Furthermore, these kinds of assessment should also attempt to be broad and integrated, assessing the NRM and environmental policies in a holistic way, to determine their impacts in the context of long-term trends, and to guide future planning and policy development.

Conclusions

In the 21 century, a renewed respect for nature and pressing global sustainability issues are driving massive change in nearly every aspect of society. Sustainable resource management, conservation of biodiversity and restoration of degraded landscapes remains a global challenge. Meeting sustainability imperatives demands that we continue to find new ways to be innovative in the management of natural resources (Weaver et al 2000). There are no simplistic prescriptions because sustainability policy invariably involves dealing with "wicked

problems": those that require diligence in how solutions are conceived, and executed, (APSC 2007).

The rivers, creeks and wetlands of the rangelands of the Basin have significant values, recognised internationally and in Australia. While recent reforms include establishing the MDBA, the preparation of the proposed Basin Plan and the establishment of the Commonwealth Environmental Water Holder (CEWH) aim to ensure that the environmental water needs of these aquatic systems are met, integrated management remains a challenge that involves States, local communities, industries and individual land managers.

The Basin Plan will usher in a new era in water resource management. As outlined above, long-term commitments to adaptive management of natural resources require commitments to systematic monitoring and evaluation.

The MDBA is committed to the principles of subsidiarity and adaptive management and to systemic monitoring and evaluation. It will continue to work in with other agencies to manage the Basin, based on the recognition that the sustainable management of the natural resources remains a collective effort.

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