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WETLANDS

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NEWSLETTER



World Wetlands Day

*February 2 marks the 44th year since
the signing of the Ramsar Convention on
Wetlands and World Wetlands Day.*

Wetlands Abroad:
Australia, India, and the
Mediterranean

Advancing Green Infrastructure
and the Green Economy

Protecting and Restoring Iconic Wetlands in Australia

From the mangroves and reefs of its coasts, to expansive ephemeral inland floodplains, and a diversity of swamps, marshes, and streams, Australia's wetlands provide significant economic, environmental, and social value. In recent years, a number of innovative measures have been implemented by governments and nongovernment organizations to promote the conservation and wise use of Australian wetlands.

BY MARK BACHMANN AND EBONY HOLLAND

Australia is the driest inhabitable continent on earth.¹ Its rich diversity of rivers, wetlands, and estuaries are among its most important and iconic natural features. Thoughts of the Australian landscape induce images of eucalyptus trees lining billabongs and creeks in the outback, and of multicolored coral reefs teeming with wildlife along seemingly never-ending coastlines. Wetlands are inherently linked to indigenous and European values and culture in Australia.

In recent decades, there has been growing awareness of the substantial economic, environmental, and social benefits that wetlands offer Australian communities. Wetlands supply water, improve water quality, support primary industries and agricultural production, provide flood and storm mitigation, offer climate change mitigation and adaptation opportunities, and provide communities with recreation and tourism. They provide habitat for animals and plants and contain a wide diversity of life, supporting plants, and animals that are found nowhere else. Wetlands also support the spirituality, culture, identity, and economy of indigenous peoples.

Australia's diverse and unique wetlands are the result of variable climatic and geomorphological conditions across the continent. Wetlands are found across Australia in all climatic zones. Rivers and wetlands in northern Australia are influenced by monsoonal rains. The arid interior receives sporadic, heavy rainfall from tropical cyclones, resulting in spectacular ephemeral flooding. The southern parts of Australia receive more uniform rainfall against the backdrop of a temperate climate.² Many species are specifically adapted to take advantage of the highly variable flooding and drying regimes of Australian rivers and wetlands. The cycle may be as short as one year or as long as several decades.

Australian wetlands are essential for maintaining local biodiversity, but also play an important global role in providing habitat for migratory bird species that fly along international routes, linking a network of wetlands at a vast scale. Australia is part of the East Asian-Australasian Flyway, which extends from Arctic Russia and Alaska in the north, to Australia and New Zealand in the south, and incorporates eastern and southeast South Asia. An estimated 50 million migratory waterbirds use this route annually.³ The integrity of Australian wetlands along the Flyway is essential for supporting these species on their long migrations.

AUSTRALIA AND THE RAMSAR CONVENTION

Australia was one of the first signatories to the Convention on Wetlands of International Importance (Ramsar Convention) in 1971, and designated the world's first Wetland of International Importance, Cobourg Penin-

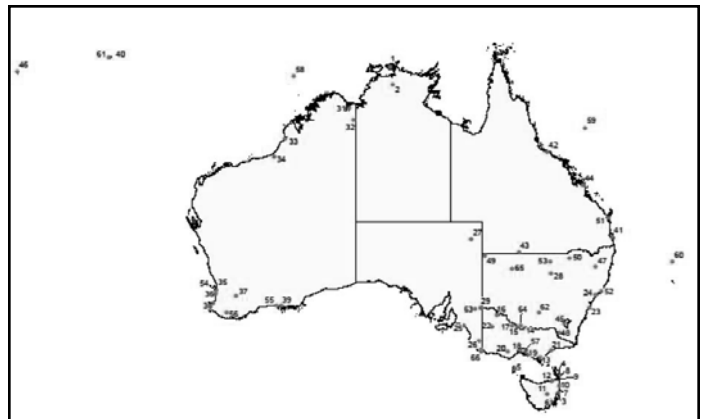


Figure 1: Australia's 65 Ramsar wetlands are located across all states and territories, including external territories. Photo credit: Australian Department of the Environment

sula in the Northern Territory, in 1974. As a contracting party to the Ramsar Convention, Australia is committed to promoting the conservation of wetlands included in the Ramsar List and the wise use of all of the wetlands across the country. Australia now has 65 Ramsar sites that cover more than 8.3 million hectares (ha), forming an impressive estate of diverse wetland types including freshwater and marine and permanent and ephemeral wetlands.

The Australian Ramsar estate includes: the iconic Kakadu National Park in the Northern Territory; the river red gum forests of Barmah Forest and the New South Wales Central Murray Forests in the Murray-Darling Basin; the Coorong and Lakes Alexandrina and Albert Wetland at the mouth of the Murray River in South Australia; and the Ashmore Reef Commonwealth Marine Reserve in the northeastern Indian Ocean on the edge of Australia's northwest shelf.

PROTECTING WETLANDS IN AUSTRALIA: REGULATORY AND PLANNING FRAMEWORKS

The Australian government's specific role in wetland management is established by obligations under international conventions, including the Ramsar Convention. Other conventions and agreements such as the Convention on Biological Diversity and Migratory Bird Agreements with Japan, China, and the Republic of Korea are also relevant for wetland management. The Australian government works in partnership with state and territory governments to implement the Ramsar Convention.

Key legislation supporting the conservation and wise use of Australian wetlands are the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), the Water Act 2007 (Water Act), and state- and territory-based land and water planning legislation. The EPBC Act is the Australian government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, and heritage places, defined in the EPBC Act as matters of national environmental significance. It regulates actions that have, will have, or are likely to have a significant impact on matters of national environmental significance, including the ecological character of a Ramsar wetland.⁴ The EPBC Act also establishes a framework for managing Ramsar-listed wetlands through the Australian Ramsar Management Principles.⁵

The principles promote national standards of management, planning, environmental impact assessment, community involvement, and monitoring for all Australian Ramsar wetlands in a way that is consistent with Australia's obligations under the Ramsar Convention.

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The Water Act establishes a range of mechanisms that support the sustainable management of Australian water resources, particularly in the Murray-Darling Basin. The Murray-Darling Basin underpins Australia's most iconic river system and is one of the largest and driest river systems in the world. The Murray-Darling Basin covers an area of over 408,700 square miles, making it over one-third larger than the Colorado River Basin. The Basin extends across several jurisdictions including parts of the



Image 1: Kakadu National Park in the Northern Territory is one of Australia's most iconic landmarks and was designated as a Ramsar site in stages from 1980. Kakadu National Park is also a World Heritage Site for both cultural and natural outstanding universal values. Photo credit: Sarah Stuart-Smith



Image 2: Large numbers of waterbirds, including Pelicans (*Pelecanus conspicillatus*), utilize the Coorong and Lakes Alexandrina and Albert Ramsar Site at the mouth of the Murray River in South Australia. Photo credit: John Baker

states of Queensland, New South Wales, Victoria, South Australia, and all of the Australian Capital Territory (ACT). It plays an important role in supporting biodiversity for a vast array of plants and animals and ecosystems, including many threatened species.

Since European settlement, use of the Basin resources has focused on securing water for domestic and agricultural needs. There was little understanding of the water needs of the natural environment, and as a result, water resources in the Basin were overallocated for human use. The environmental impacts of this overconsumption are exacerbated during periods of drought, accompanied by decreasing river flows and increasing salinity.⁶ The situation became critical during the Millennium Drought of 2000-2010, which devastated southeastern Australia, with regions experiencing record low rainfall. In 2009, total water storage in the Murray-Darling Basin had fallen to 26.1% of capacity.⁷

In 2007, the Water Act was passed, which enabled the establishment of the independent Murray-Darling Basin Authority (Authority) with the functions and powers, including enforcement powers, to ensure that Basin water resources are managed in an integrated and sustainable way. The Authority was tasked with developing a plan for the Basin that provided a coordinated approach to water use across the Basin's four states and the ACT. Following extensive consultation with states, local governments, catchment management authorities, communities, peak

industry groups, and indigenous and environmental groups across the Basin, the Murray-Darling Basin Plan was adopted in November 2012.

The Basin Plan is an adaptive framework that aims to achieve a balance between environmental, economic, and social considerations by limiting water use to environmentally sustainable levels. It achieves this by setting long-term average Sustainable Diversion Limits for both surface water and groundwater resources, which must be reflected in state water resource plans for each surface water and groundwater resource unit by June 2019. The Basin Plan also includes an environmental watering plan to optimize environmental outcomes for the Basin; a water quality and salinity management plan; water trading rules to support the effective operation of the water market; requirements that state water resource plans must meet for accreditation under the Basin Plan; a mechanism to manage critical human water needs; and requirements for monitoring and evaluating the effectiveness

of the implementation of the Basin Plan.⁸

Importantly, the lessons and experience gained in the development and implementation of the Murray-Darling Basin Plan can serve as a model for the management of international cross-jurisdictional water resources in other regions of the world.

In addition to the Basin Plan, all state and territory governments across Australia have enacted comprehensive legislative and policy instruments to protect the environment and conserve natural resources. These frameworks generally apply to all wetlands, both Ramsar-listed and non-Ramsar wetlands, within the respective jurisdictions. State and territory wetland management is broadly addressed in legislation covering environment protection, land use planning, protected areas, water, and vegetation management. Furthermore, many state and territory governments have statutory reporting requirements, such as State of Environment and State of the Parks reporting, which include wetland resources.

As well as promoting the conservation and wise use of wetlands through regulatory and planning frameworks, funding for on-the-ground wetland protection and restoration programs is also provided by all levels of government in Australia. This is an important aspect of wetland management in Australia, as it supports local wetland protection across the country and encourages the implementation of innovative wetland restoration methods across a range of land tenures.

WETLAND RESTORATION CASE STUDIES IN SOUTHERN TEMPERATE AUSTRALIA

By far, the single biggest issue facing the sustainable management of wetlands in Australia is hydrological management, or water regime, which is influenced by a wide range of factors including climate, land use planning, water allocation policy, and physical changes to site drainage or the catchment. In relation to the last point, a long history of modification of wetlands on private land through artificial drainage has resulted in many areas of southern temperate Australia retaining only a fraction of the original wetland extent. This pattern of change also extends into many protected areas where drainage works in wetlands often predate the reservation of land for conservation purposes.

The cost, time frames, and practical difficulties often associated with trying to recreate self-sustaining terrestrial habitats in highly modified landscapes is a potential deterrent to practical restorative on-ground action. However, in contrast, drained wetlands, where site water availability has not been compromised, offer more rapid restoration potential and the possibility of a flexible management approach that is capable of engaging with a wider segment of the rural community.

A number of Australian nongovernment organizations (NGOs) operate in this space and work closely with landholders, the community, and government to advance wetland restoration projects. These organizations are important for fostering local community support for wetland conservation, and promoting a sense of community ownership over restoration activities. One of these organizations, Nature Glenelg Trust (NGT), is working with local government and community partners using funding from state and Australian government programs, to actively address wetland issues in temperate parts of the southern Australian states of South Australia and Victoria.

Case Study 1: Southern Grampians District (Victoria)

A series of wetlands associated with the floodplain of the Wannon River in southwestern Victoria (Walker, Gooseneck, and Brady Swamps) were partly artificially drained in the 1950s for grazing purposes, prior to a portion of these wetlands later being acquired and incorporated into the Grampians National Park (and other peripheral reserves) in the mid-1980s, and now managed by Parks Victoria. However, the balance of the wider wetland and floodplain area remained under private ownership, creating a degree of uncertainty surrounding the future reinstatement of the water regime in the area—an issue that was unresolved for over two decades.

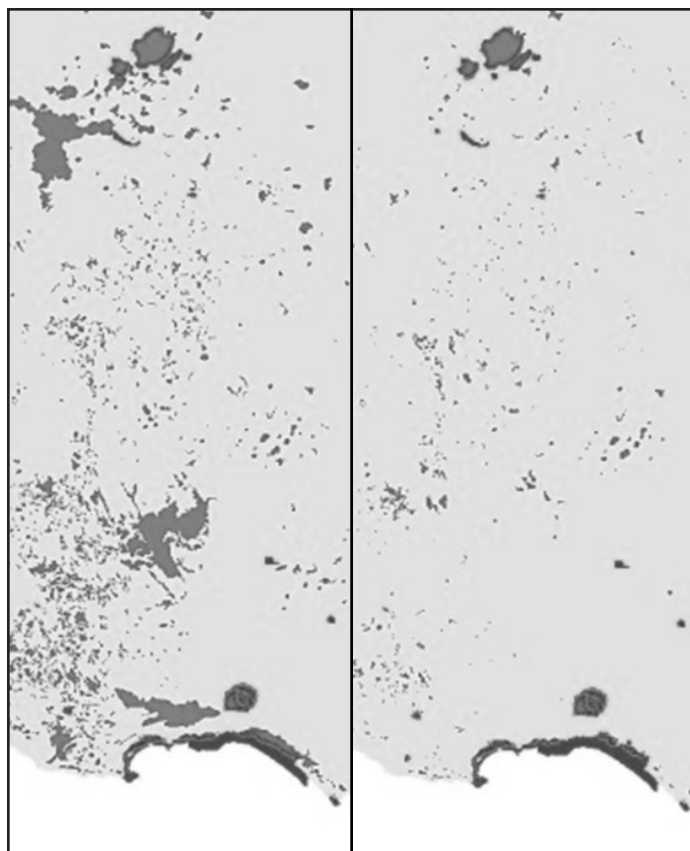


Figure 2: The change in wetland extent caused by drainage activities since European settlement. This is an example district in the general case study area of southwestern Victoria near Warrnambool. The original wetland extent (left) versus the present extent (right). Photo credit: Nature Glenelg Trust

Many years of work, modelling studies, and biological investigations by a range of organizations never quite managed to adequately resolve the best way to design and advance wetland restoration work in this area. To address the impasse, NGT proposed a staged restoration trial process that was agreed to a short time later by landowners, neighbors, government agencies, and local community groups.

The process began in August 2013 with the installation of the first trial sandbag weir structure to regulate the artificial drain at Gooseneck Swamp, and its immediate success in reinstating wetland levels⁹ led to similar trials being initiated at Brady Swamp and Walker Swamp in 2014. To ensure the integrity of the trial structures, the sandbags used for this purpose are made of geotextile fabric, with a minimum field service life of approximately five years.

The success of these trials has been based on their tangible ability to demonstrate, to all parties involved, the wetland outcomes made possible by simple, low-cost,



Image 3: Gooseneck Swamp in September 2013. Photo credit: Mark Bachmann



Image 4: The Walker Swamp restoration trial sandbagging day in August 2014. Photo credit: Mark Bachmann

impermanent methods. The trials were also important for building confidence and collecting real operational (rather than modelled) data for informing the development of more permanent measures to increase the depth and duration of inundation. The trials have led to the approval of permanent works to reinstate the breached natural earthen banks at Gooseneck and Brady Swamps. These works will permanently enable the alternative, original watercourse of the Wannon River to activate when water levels in these wetlands reach their natural sill level.

A vital aspect of the trials has been the level of community participation, not only at the sandbagging “events,” but also the subsequent commitment to ecological monitoring, for helping to evaluate the biological impacts of hydrological reinstatement. For example, the Hamilton Field Naturalists Club has been undertaking monthly bird monitoring counts that are helping NGT to develop a picture of the ecological value of these wetlands and their role in the wider landscape, including the detection of international migratory species.

Case Study 2: The Discovery Bay Coast (South Australia and Victoria)

Corresponding with an Important Bird Area (IBA) identified by national bird advocacy organization BirdLife Australia,¹⁰ the Discovery Bay coast includes Australia’s 65th and most recent Ramsar site, Piccaninnie Ponds Karst Wetlands in South Australia, as well as a possible future Ramsar site, the Glenelg River estuary and Long Swamp, in adjacent Victoria. Both Piccaninnie Ponds and Long Swamp originally discharged into the ocean via the Glenelg River estuary, but a combination of drainage activities and fragmented land tenure led to an interruption of these historic flowpaths in the early 1900s, including subsequent hydrological (and hence habitat) change within the wetland areas that remained.

The restoration story of the Piccaninnie Ponds Karst Wetlands dates back to 2006, when the artificial outlet from the main artesian springs to the sea in the existing Conservation Park was first regulated. This was achieved through the construction of a substantial concrete weir structure and fishway, increasing water levels in the surrounding wetland and reversing the drying trend of the past several decades, whilst maintaining oceanic connectivity for diadromous species of fish. Around the same time, an adjacent 230 ha property, Pick Swamp, was purchased by the South Australian government to be restored and permanently reserved. Initial experimental restoration works commenced with the backfilling of drains in 2007. Later in 2009, more formal infrastructure including a concrete weir, spillway, and earthen levee bank were constructed with grant funding contributed by the Australian government to achieve property-wide reinstatement of hydrology.

Nearby in Long Swamp, the local community had expressed concern for over a decade about the impact that two artificial outlets to the ocean were having on wetland condition, with a background drying trend reflected by significant vegetation shifts (encroachment) occurring in the swamp. In 2012, NGT became active in Long Swamp, working closely with Parks Victoria, the Nelson Coast Care Group, and the Glenelg Hopkins Catchment Management Authority, initially to undertake a scientific review of the aquatic ecological values that might be impacted by the ecological shifts anecdotally observed to be underway. This early work identified that one of the outlets to the sea had naturally closed, with a dune forming in front of the former outlet several years ago during the last major widespread drought in Australia. There are some interesting changes now taking place as a result of recovering water levels in that part of Long Swamp, including the recreation of an area of aquatic habitat immediately upstream of the



Image 5: The results of restoration works: the transformation and ongoing natural recovery of Pick Swamp, now a part of the Piccaninnie Ponds Karst Wetlands Ramsar site, from May 2007 (top), July 2007 (middle), and June 2012 (bottom). Photo credits: Steve Clarke (top/middle); Mark Bachmann (bottom)

former outlet that is now home to a diverse native freshwater fish community, including two nationally threatened fish species, the Yarra pygmy perch (*Nannoperca obscura*) and dwarf galaxias (*Galaxiella pusilla*).¹¹ Another staged restoration trial is now being implemented, in partnership with the local community, at the second outlet to further improve the aquatic habitat values of Long Swamp.

THE BENEFIT OF A FLEXIBLE APPROACH TO RESTORATION

The case studies provided here illustrate just a few of the measures available and reasons for adopting a flexible and variable approach to wetland restoration; treating this as an applied scientific endeavour. Long-undisturbed

areas under existing conservation tenure, where a wide range of stakeholders exist, typically require a more cautious approach; with the restoration trial methodology described here proving to be successful in enabling practical action to proceed with low risk, while permitting adjustment during operation if required.

Investing in community-based practical action to reverse the trend of wetland loss through restoration, at the same time as providing the legislative framework to protect and conserve existing high-value wetlands and the water resources that underpin them, is a vital dual-role currently played by state and federal governments in Australia. ■

For more information on Australia's iconic wetlands and 65 Ramsar sites, please visit: www.environment.gov.au/wetlands; or for a closer look at some wetland restoration case studies, including the examples provided, see: www.natureglenelg.org.au.

ENDNOTES

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