



Restoring our lifeblood

Progress on returning water to the rivers of the
Murray-Darling Basin



**AUSTRALIAN
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Introduction

Two years after the Basin Plan was signed into law this paper explores the ongoing challenges and opportunities in restoring the Murray-Darling Basin to health.

The Murray-Darling Basin is the lifeblood of the nation.

Its 30,000 wetlands support a spectacular array of birds, fish, frogs and other species, many of which are found nowhere else on earth. The basin's ecosystems have evolved to the boom-bust nature of Australia's environment. The ancient red gums that line the banks of its rivers and streams and coolabah trees that fringe the floodplains all rely on our sunburnt nation's infamous droughts and flooding rains. The basin and its ecosystems are the last refuge for a number of Australia's most threatened species and are an important resting place for birds that migrate to Australia from as far away as the Arctic Circle. The basin is not only an ecological wonder, it also sustains and supports millions of Australians.

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Two million people call the Murray-Darling Basin home. Another 1.2 million depend on its waters to survive. The basin contributes significantly to agricultural productivity, providing approximately 40 per cent of Australia's gross agricultural production.

The Murray-Darling Basin is the ancestral domain of some 40 Indigenous nations. Its waterways and wetlands are the source of history, lore and daily succour for some 70,000 Aboriginal people. Caring for the basin and enjoying its fruits is their inherent right – one that is not yet adequately recognised.

A healthy basin is critical to the prosperity of all those who depend on it. The basin's wetlands – 16 of which are internationally recognised as significant – provide up to \$2.1 billion of benefits per annum, through various 'ecosystem services', such as a water filtration, flood mitigation, pollination and more.

The successful implementation of the Basin Plan is critically important to Australia. Combined with the many river health initiatives that pre-date it and have been led by basin communities, businesses and governments, the Basin Plan is essential to redressing the damage done to rivers, wetlands and floodplains through decades of unsustainable water extraction. While the plan itself was compromised during its gestation and delayed in its implementation, it nonetheless represents the most significant rebalancing of water over-allocation in Australian history.

With investment in the basin now exceeding \$13 billion, the Basin Plan is the largest NRM (natural resource management) investment in Australia's history and one of the world's largest river restoration projects. A healthy Murray-Darling will play a critical role in enabling our nation to cope with and adapt to the risks that accompany human-induced climate change.

Failure to implement the Basin Plan properly and restore the balance will have dire consequences – for our environment, our communities and, in the long run, our economy.

So what does a successfully implemented Basin Plan look like?

While the Murray-Darling Basin will never be a pristine ecosystem, the implementation of the Basin Plan must result in vast improvements in the health of the basin's waterways. It must lead to the re-connection of wetlands and floodplains. It must result in an increase in the abundance and distribution of native fish populations, as well as other freshwater species, and provide for larger and more frequent bird breeding events. Overall the Basin Plan must improve the resilience of the many and varied ecosystems that depend on the rivers, both ephemeral and perennial, so inundation cycles more accurately mimic the natural boom-bust nature of the Australian outback.

The Basin Plan must also result in sufficient volumes of water being moved through the system to prevent many of the problems that have plagued the system previously, such as hyper salinity, acid sulphate soils and algal blooms. It must maintain a natural flow to the ocean at the Murray mouth.

Importantly, the plan must also provide for strong and prosperous communities.

Importantly, the plan must also provide for strong and prosperous communities. Water security and quality should be assured for the millions of people, from Queensland to South Australia, who depend on the rivers and aquifers of the basin for their personal use and livelihoods.

Local communities must feel engaged and empowered to contribute to the economic, environmental and social wellbeing of the basin and they must have confidence to know the water that sustains them will be sustainably managed. The heated politics that has typified discussion of water use in the Murray-Darling should be a thing of the past, particularly as industries adjust to more effective and efficient use of water.

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A successful Basin Plan would need to be accompanied by the establishment of Indigenous water rights through cultural flow allocations and must fully integrate Indigenous views into water resource planning.

Lastly, the plan itself and operations of the basin must be viewed globally as a model for managing an environment that crosses borders. If successful it will demonstrate the difference effective national leadership can make in managing natural resources on a large scale and across several jurisdictions. The plan must successfully stitch together and add value to the combined efforts of governments, communities and businesses. This ambitious task can only be achieved with visionary national leadership, considered humility and a system for learning through doing. Adaptive management, using consistent scientific monitoring, rigorous evaluation and courageous decision-making, is essential.



How is it tracking?

ACF has identified a number of emerging issues, threats and opportunities in the quest to return the ecosystems of Murray-Darling Basin to good health. Our 'traffic light' analysis sets out risks, challenges and opportunities in the implementation of the Basin Plan.



Red Light



Red lights represent imminent or serious risks that have the potential to erode the delivery of positive environmental outcomes within the basin.



Amber Light



Amber lights signify emerging issues that have potential to negatively affect the delivery of environmental outcomes under the Basin Plan, but require further evaluation or are too distant to accurately appreciate the impacts.



Green light



Green lights show activities that are on track or already delivering positive outcomes under the Basin Plan.



Opportunities

Lightbulbs highlight opportunities for Government to implement positive further reform within the basin.



Two million people call the Murray-Darling Basin home. Another 1.2 million depend on its water to survive.

Chapter 1

Restoring the balance – recovering water for the environment

Progress to date

A key objective of the Commonwealth Water Act (2007) and the Basin Plan is to address the over extraction and overuse of water resources that have led to the substantial deterioration of the health of the Murray-Darling Basin. To do this the Act and Basin Plan provide for the recovery and use of water for the environment to restore the balance in the basin, rehabilitate many of the degraded wetlands and floodplains and prevent further environmental damage.

The overall targets for the reduction in consumptive use of water is from 13,623 gegalitres (GL) to a 'Sustainable Diversion Limit' (SDL) of 10,873GL per year, measured as a long term average. This translates to a 2,750 GL increase in environmental water entitlements by 2019.

It is important to remember that the decision to recover only 2,750GL came out of a compromise in the final stages of the Basin Plan's development. Based on modelling by the Murray-Darling Basin Authority, this amount of water – on its own – is inadequate to meet many of the ecological health targets within the basin with any certainty.

For this reason, the Commonwealth government has established a 'trust fund' to recover an additional 450GL by 2024. This increase (to a total of 3,200GL) would significantly improve environmental outcomes throughout the system. Further increments above this would continue to reduce the risk of environmental decline.

Figure 1 shows how three wetlands would fare under two different scenarios: returning 2,750GL of water to the system and returning 3,200GL.

This table is summarised from environmental modelling conducted by the MDBA during the development of the Basin Plan.

Figure 1

Ramsar wetland	2,750	3,200
Coorong	Lethal levels of salinity are exceeded during droughts, killing off key species of fish and seagrass.	Lethal salinity is avoided. The extra water is the difference between life and death in the Coorong.
Hattah Lakes	Large areas of river red gum and black box die out due to lack of water.	Greater areas of floodplain are kept healthy, but magnificent old growth red gums are still under threat.
Gunbower Forest	Achieves only two out of five environmental targets. Large areas of red gum forest decline and waterbirds either fail to breed or abandon their young before they are old enough to survive because floodwaters recede too early.	Achieves all five environmental targets. Tens of thousands of waterbirds likely to have successful breeding events. River red gum forest remains healthy.

There are two main ways for governments to recover water for the environment in an over-allocated ecosystem such as the Murray-Darling Basin. The simplest, most effective and efficient way is to purchase it from willing sellers. The other, more expensive and uncertain way, is to subsidise projects that reduce water use and loss by industry in exchange for retaining some or all of the volume saved. These may take a number of forms, from on-farm efficiencies to large scale pipeline projects. Generally water savings are achieved through modernising infrastructure that reduces run off, evaporation and seepage.

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As of 30 September 2014 the Commonwealth had achieved approximately 1,907GL of its 2,750GL recovery target, with approximately 1,140GL of that water recovered through buybacks.

In November 2013 the Federal Government announced it would cap buybacks of water at 1,500GL, and potentially push the number as low as 1,300GL, depending on the outcomes of the sustainable diversion adjustment mechanism.

Amber Light: Progress on recovering water for the environment

Water recovery is on track with the Basin Plan’s expectations, but the cap on buybacks creates uncertainty about whether this progress can be maintained.

Subsidising water saving projects

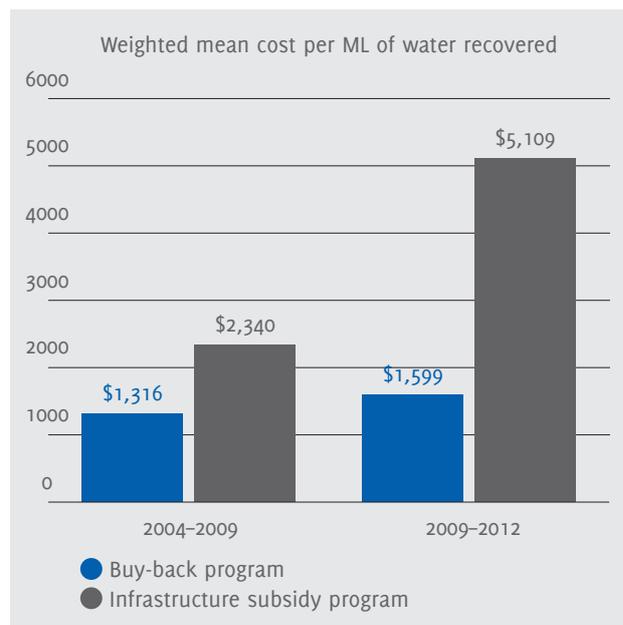
Subsidising water saving projects is often seen as a win-win for irrigators and the environment. Farmers receive funding from government to modernise their irrigation infrastructure or production processes that in turn reduce the amount of water needed for irrigation. Some or all of the water saved is then allocated to the environmental water holder to be used for environmental purposes elsewhere.

It is easy to see why this approach is attractive to decision makers and politicians. However, there are serious pitfalls that arise from putting the vast majority of water recovery funds into subsidising water savings rather than direct purchase.

It is widely accepted that recovering water through subsidising efficiency improvements in irrigation operations is more expensive than going to the market to buy water from willing sellers. Both the Productivity Commission and the Government’s own Commission of Audit have highlighted that the most effective way to recover water for the environment is through direct purchases from willing sellers. While it is known that subsidising efficiency gains is a more expensive way to return water to the environment, recent research suggests the cost of this option is growing.

In 2014 research by Adam Loch from the Centre for Regulation and Market Analysis in the University of South Australia looked at the mean costs of water recovery programs over an eight year period, from 2004 to 2012. Loch’s results show that during the earlier years of the program, recovering water through irrigation efficiency projects (ie infrastructure subsidies) cost nearly twice as much as recovering water through direct water buybacks. But in the later years of the program, recovering water through infrastructure subsidies became substantially more expensive. In fact, the cost was more than three times the equivalent market price for that period at a mean weighted cost of \$5,109 per megalitre of water (see Figure 2, below).

Figure 2 (adapted from Loch et al)



This research highlights a worrying trend. Subsidising infrastructure is significantly more expensive than direct water buybacks and the gap between the two appears to be growing.

As water recovery through infrastructure investment experiences diminishing marginal returns, the cost per megalitre of water recovered increases. This increasing cost diminishes the amount of water that can be returned within a finite budget and highlights the potential limits to returning water by subsidising efficiency gains.

Red Light: Subsidising water saving projects

Recovering water through infrastructure subsidies is an inefficient way to recover water for the environment and eats into limited funds for water recovery. Evidence of diminishing marginal returns suggests Basin Plan SDLs may be impossible to achieve under the Government’s current policies.

The 450GL Water for the Environment trust fund

Subsidising infrastructure, rather than purchasing water, to meet the majority of the water recovery targets under the Basin Plan comes with knock-on effects. In addition to being significantly more expensive than direct buybacks, an increased focus on infrastructure upgrades in recovering the first 2,750GL will have implications for the recovery of an additional 450GL through the \$1.77 billion Water for the Environment Special Account, or trust fund.

When the Basin Plan came into effect the Government set a finite budget to deliver the additional water for the environment, to bridge the 2,750GL gap between present day limits and the new SDLs by 2019. On top of this, \$1.57 billion of the \$1.77 billion Water for the Environment Special Account was set aside to recover a further 450GL by 2024.

Except in limited circumstances, the trust fund can only be spent on recovering water through infrastructure subsidies. This restriction was hardwired into the Basin Plan on the assumption that there was no restriction on how the Commonwealth would recover the first 2,750GL. The Abbott Government has since imposed its cap on buybacks without completing any modelling on the potential economic viability of efficiency projects left within the system and the implications for recovering up to 3,200GL of water for the rivers of the basin.

If the Government stops recovering water through direct market participation and instead delivers the remaining 'bridging the gap' water through infrastructure investment, that will have the effect of reducing the amount of water that can be saved through efficiency measures under the SDL adjustment mechanism – and it will increase their cost.

If the mean cost of \$5,109 per megalitre of water recovered through improved efficiency were to hold across the basin, the government would need approximately \$2.3 billion to acquire the full 450GL under the SDL adjustment mechanism. This equates to an additional \$730 million above the existing budget allocation. This would be certain to jeopardise the 450GL of additional water for the environment and ultimately result in less water recovered for downstream states and the environment.



Red Light: The 450GL Water for the Environment Trust Fund



The cap on buybacks is likely to drive up the cost and reduce the availability of water for the environment under the SDL adjustment mechanism, jeopardising the recovery of the additional 450GL.

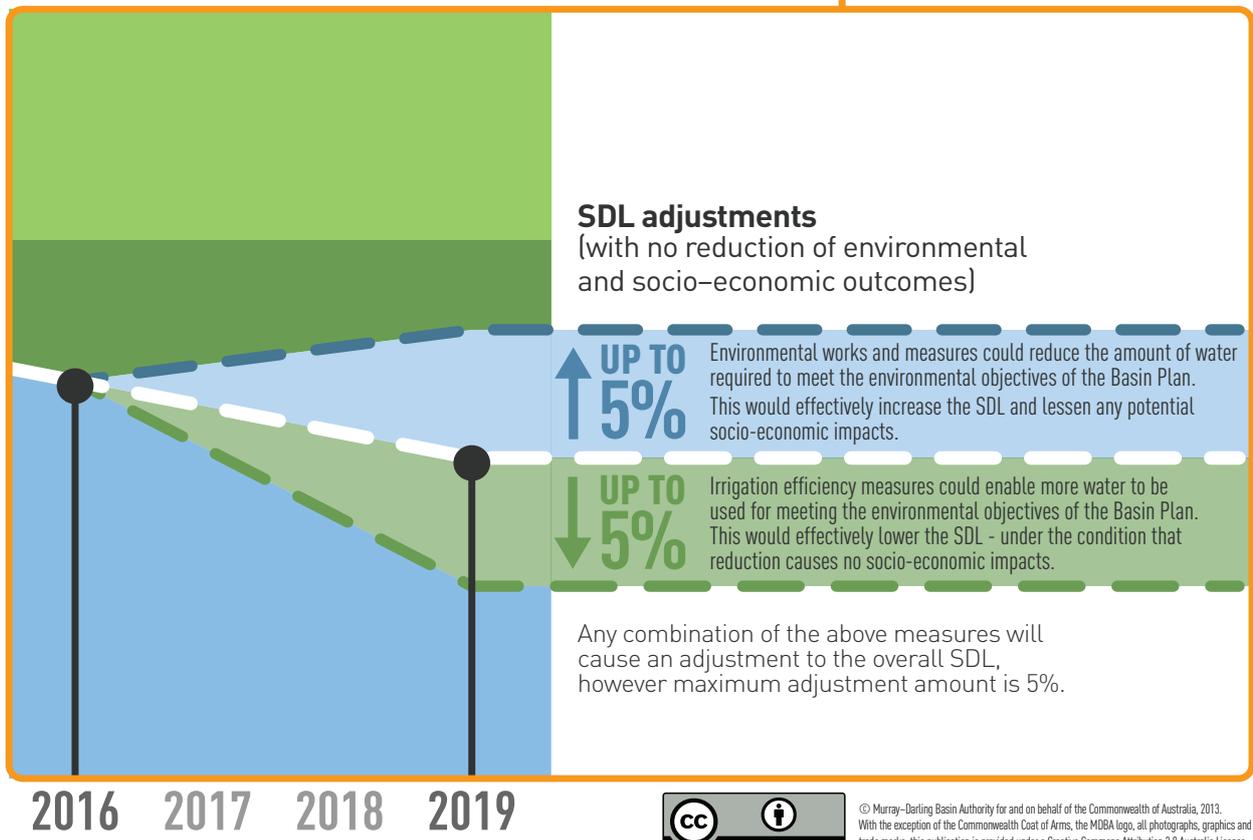
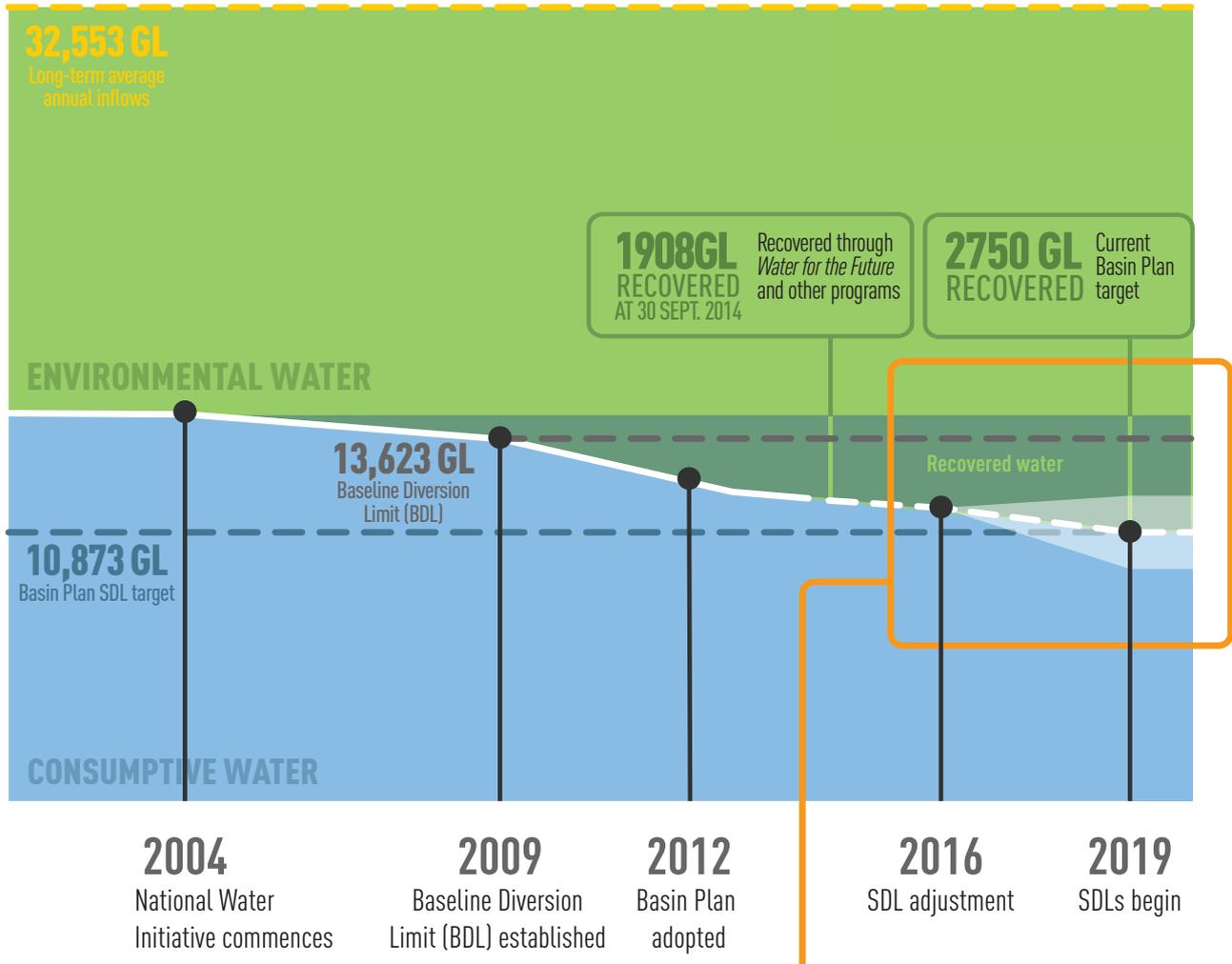
SDL adjustment mechanism

The Sustainable Diversion Limit (SDL) adjustment mechanism was developed as part of the negotiations to finalise the Basin Plan. While the plan itself water allocations to be reduced (as a long term average) by 2,750GL, there is a provision for this number to be adjusted up or down in 2016, using two mechanisms, termed 'efficiency measures' and 'supply measures'.

Supply measures enable governments to replace up to 650GL of environmental water entitlements in the Basin Plan with alternative ways to achieve "equivalent ecological outcomes". There are two ways of doing this. The first is to change river operating rules, such as the when water is pre-emptively spilled from dams that are approaching their full capacity. If these rules take into account issues such as when a downstream wetland needs a natural flush of freshwater, it is possible water that had to be released anyway can serve an environmental purpose – a win-win. The second, however, involves re-engineering the floodplain to create artificial floods with less water. There are many ecological risks associated with this approach, which are examined further in the next chapter.

Efficiency measures are initiatives to recover an additional 450GL of environmental water through subsidising projects that reduce the amount of water needed for consumptive uses, such as irrigation. Examples include modernising irrigation infrastructure or production processes so less water is required to deliver equivalent production results. The Water for the Environment Special Account contains \$1.57 billion to implement efficiency measures under the SDL adjustment mechanism.

Environmental water recovery progress and SDL adjustments



Over-allocation of groundwater resources under the Basin Plan

The management of groundwater is also a critical element of restoring the basin to good health. These large bodies of underground water have been heavily drawn upon by irrigation users historically, with poor understanding of their hydrology and insufficient regulation of their use. We do know, however, that aquifers provide base flows to many of the rivers in the central and western portion of the basin, and support unique ecosystems such as mound springs and underground cave systems.

There is still a significant amount of scientific uncertainty surrounding the hydrology of the basin's groundwater systems. This includes poor understanding of the connectivity between water bodies, the rates of recharge and drawdown that are appropriate as well as the number and extent of groundwater dependant ecosystems.

It is against this backdrop of scientific uncertainty that the Basin Plan permits a significant growth in groundwater extraction for consumptive use. Average annual extraction of groundwater across the basin was approximately 1795GL in 2012. The Basin Plan set a final annual SDL for groundwater at 3,334GL per year, a substantial increase on existing use and well above the SDL that was proposed in the draft version of the plan. If the mismanagement of surface water in the basin has taught river managers anything, it should be that recovering water from consumptive uses, such as irrigation, is socially difficult and hugely expensive. This will be no different for overexploited groundwater systems within the basin in the future.

The current extraction limits set for groundwater in the Basin Plan do not adopt a sufficiently precautionary approach or account appropriately for the connectivity between water bodies. Worse, it appears the Commonwealth has agreed to further increase SDLs in three key NSW aquifers when it adjusts SDLs in 2016. This presents a risk that increased extraction of groundwater will undermine surface water flows, particularly for downstream ecosystems and users, and adversely impact on groundwater dependant ecosystems across the basin.

The over extraction of groundwater under the Basin Plan presents real and unmitigated risks for all users. These risks are further amplified in the context of increased resource development in the basin, including threats to water resources that arise from the proliferation of coal seam gas and large mining developments.



Red Light: Groundwater SDLs



The groundwater SDLs do not adopt a precautionary approach or adequately account for the interconnectedness of water resources and ecosystems in the basin. This threatens existing water users and groundwater dependent ecosystems, with proposed further increases in NSW likely to worsen the situation.





The freshwater ecosystems of the basin are in a fragile state, with their health rated as very poor in all recent State of the Environment reports and Sustainable Rivers Audits.

Chapter 2

Restoring flows and re-connecting the river to the floodplain

The regulation of rivers and the modification of floodplains has left the freshwater ecosystems of the Murray-Darling Basin highly fragmented. More than a century of modifications has created significant barriers to the natural movement of water throughout the basin, severely confining the distribution of many water-dependent species and threatening some with extinction.

The freshwater ecosystems of the basin are in a fragile state, with their health rated as very poor in all recent State of the Environment reports and Sustainable Rivers Audits.

Hydrological connectivity (making sure rivers are joined up) is a key ecological process that must be restored across the basin if governments are genuine about their stated ambition of returning the basin to health. While it is easy to think of large dams and weirs as the barriers to connectivity in the basin, another major barrier is the modification of the floodplain. Levies, channels and small on-farm storages have a significant cumulative effect, preventing the natural movement of water across the landscape. This modification has reshaped many of the basin's ecosystems.

Overcoming barriers and constraints

Environmental water holders face a number of challenges in delivering environmental outcomes within the basin. These include physical constraints and water delivery rules, which limit the amount of water that can be delivered, as well as tenure constraints and cost barriers that can make the delivery of water unviable.

The Federal Government has allocated \$200 million to address physical and 'rules based' constraints within the system through the Constraints Management Strategy (CMS).

The strategy highlights seven 'priority reaches' for investigation within the basin. It looks at physical structures, such as bridges, roads, outlets and channel capacities. It examines river management practices that may inhibit the delivery of environmental water across floodplains. The final CMS was released in 2013. Final projects to be invested under the CMS will be decided in 2016 and will be implemented incrementally alongside SDL adjustment projects up until 2024.

While the CMS will deal with some constraints within the system, it will not be able to deal with them all.

If we are serious about returning the basin to health, we must address concerns about flooding, because floodplain inundation is critical to ecological resilience. Understandably some local communities and landholders have concerns about the potential impacts flood events may have on private land and assets. Keeping wetlands and floodplains resilient poses significant challenges for policy makers and water managers, given the multiple land uses and tenures within the basin. It is critical the CMS addresses these concerns and prioritises constraints that deliver the largest environmental gains.

If we are serious about returning the basin to health, we must address concerns about flooding, because floodplain inundation is critical to ecological resilience.



Amber Light: Re-connecting rivers and floodplains

Re-connecting the rivers and floodplains of the Basin is critical to restoring ecological health. The Constraints Management Strategy will play an important part in achieving some 'connectivity', but its effectiveness cannot be judged until detailed projects are outlined.

Supply measures – creating new barriers to connectivity

The last minute inclusion in the Basin Plan of the SDL adjustment mechanism creates the potential for further disruptions to natural connectivity if governments choose to pursue risky ‘supply measures’ that re-engineer natural features of the floodplain.

This approach is based on the false premise that artificially delivering small volumes of water to isolated wetlands is just as ecologically beneficial as allowing a river to overflow its banks and reach the same wetland naturally. The inherent problem with this approach is that it achieves only a few of the many ecological benefits that result from periodic overbank floods. Overbank floods reconnect rivers with their floodplains, resulting in many environmental benefits. In contrast, small floods in which the water is delivered via pipes or artificial channels let floodplain vegetation get a drink, but there is virtually no transfer of sediment and nutrients, and fish and other aquatic life don’t get the chance to move to different habitat areas.

Overbank floods reconnect rivers with their floodplains, resulting in many environmental benefits.

Artificially delivering water in this way should be a last resort in circumstances where it has become impossible to protect valuable wetlands any other way, such as when water was pumped into Hattah Lakes to relieve water-stressed red gums during the ‘Millennium drought’. The more water that is delivered through engineering-based supply measures, the harder it will be to create more environmentally-effective overbank floods. This is because engineering-based supply measures replace real water entitlements, thereby reducing the ecological benefits that can ever be delivered by the Basin Plan.

‘Playing god’ on the floodplain can also unleash unintended consequences such as increased blackwater events. These occur when leaf litter and other dead vegetation on the floodplain breaks down rapidly in shallow, slow-moving floodwaters, stripping oxygen from the water and killing fish and other aquatic fauna. It is a natural phenomena that has been exacerbated in recent decades because of a reduction in the natural flooding which cleans up the floodplain floor and flushes this natural litter back into the river. As a result unnaturally high levels of leaf litter can accumulate over time, making a blackwater event more likely and possibly more intense and widespread. Artificial interventions that use small volumes of water to engineer slow moving floods can make this risk even greater.

Engineered floods can cause havoc for wildlife, triggering breeding or migration of fish and waterbirds that cannot be supported because the full river ecosystem is not experiencing the same event. Fish can be trapped on the floodplain, or killed by water pumps, and larger fish can be disadvantaged by the artificially slow moving waters, although carp may inadvertently get a leg-up.

The appropriateness of these measures has long been questioned by academics and conservationists, and more recently the government’s own scientific advisers have reinforced these concerns. As part of the Basin Plan SDL Adjustment process, the CSIRO developed a detailed methodology for determining ecologically sound supply measures. An independent review of the methodology found the effectiveness of using infrastructure works and measures to deliver ecological outcomes was untested.

It noted no international examples of similar projects to draw on and said the implementation of the methodology came with significant uncertainty and risk. In particular the review found that many ecological processes would be expected to respond better to overbank floods than to supply measure projects.

Unfortunately, basin governments are heavily focussed on developing supply measures that re-engineer the floodplain and have made repeated political promises to irrigators that they will be able to replace 650GL of environmental water with these uncertain measures. It is unlikely governments will be able to meet this expectation without creating perverse ecological consequences.

 **Amber Light: Supply measures**
Governments are creating an expectation that 650GL of environmental water can be delivered through ‘supply measures’ that re-engineer the floodplain. It is highly unlikely this expectation can be met without significant environmental trade-offs and new barriers to connectivity through the construction of weirs and levies.

Cost barriers to environmental water delivery

Basin states and the Commonwealth need to respond to instances where cost barriers are preventing environmental water delivery. These cost barriers are things like state based fees and charges for the delivery of large volumes of environmental water. The governments of the basin must ensure local managers have sufficient resources to deliver environmental water appropriately.

Given the historic public investment in establishing irrigation infrastructure and recovering environmental water entitlements, it would be perverse if the public benefits of this water were unable to be fully realised because of the imposition of high delivery costs.

High operational costs can impede the delivery and use of water already acquired for the environment. There are acute examples of this, such as in the case of the watering of Gunbower Forest in northern Victoria in early 2014, where agreement on reasonable delivery costs was required to make feasible the delivery of large volumes of environmental water.

Cost barriers are an issue when environmental water managers hold and deliver very large volumes of water within an operating framework designed to suit smaller volume irrigation uses. Allocation timing, carryover arrangements and irrigation scheme casual use fees (charged on the amount of water delivered) all pose significant financial barriers to the delivery of large volumes of water for the environment.

Environmental water holders may need to make large deliveries of water only three years in every ten, yet they have to hold perpetual shares, which pushes up the costs and can make environmental watering economically unattractive. One way to address this would be for environmental water managers to trade or hold options for delivery shares. Another would be for the development of different service levels that enable irrigation and environmental demands to be met efficiently. These and other opportunities exist to improve products and services for all users, and to realise 'win-win' solutions from trade and options arrangements. Finding answers to these problems is necessary to avoid undue costs that might otherwise constrain the delivery of environmental water and eat into returns on investments in buyback and infrastructure.



Red Light: Cost barriers to environmental water delivery



Prohibitive costs for the movement and storage of water are limiting the delivery of environmental water within the Basin.



Opportunity

Governments should develop storage and delivery products or services (including service level pricing) that are fair in the distribution and recovery of costs and also ensure the environment and other water users have access to the most appropriate services.

Learning as we go – improving the management of environmental water

Environmental water management is an increasingly critical area of public policy development and implementation. While much progress has been made in recent years, it continues to be a challenging issue for governments and communities, and demands concerted effort from all interested parties to fully realise the outcomes and targets in the Basin Plan.

Water can be legally dedicated to the environment, (that is, designated as ‘environmental water’ that can only be used for environmental purposes) in two main ways. First, it can be protected in the rules that govern how a particular river is managed, such as in the state government Water Resource Plans that will be accredited under the Basin Plan by 2019. This is generally referred to as ‘planned environmental water.’ The second type is called ‘held environmental water’ which is a water entitlement just like that held by an irrigator, only it is owned by an environmental water manager such as the Commonwealth Environmental Water Holder.

There is substantial scope to improve the effectiveness of both classes of environmental water, held and planned, within the Murray-Darling Basin. However, opportunities to improve the use of environmental water are heavily dependent on the water manager’s managers – ultimately politicians and in turn the people who elect them.

Environmental water managers work within this tension: they want to deliver water to demonstrate environmental outcomes, and they want to make sure third parties are not adversely affected by their decisions. ACF recognises that environmental watering is a new area of policy and management. Just as modern irrigation is very different to early efforts, environmental water managers are still in the process of learning and refining their craft.

Environmental watering will become more efficient and effective over time – provided the authorising environment allows for water managers to learn by practice and innovation.

Experience to date shows the authorising environment established by politicians and community sentiment has curtailed the recovery and delivery of environmental water. Politicians have been particularly sensitive about issues around inundation (concerns about floods damaging bridges and other infrastructure) and the impacts of water trade on rural businesses. Building political and community support is therefore critical. Governments need to lead the way by addressing negative perceptions about environmental watering, identifying success stories and encouraging more of it.

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Some approaches have been shown to work. Engage with local communities; be sensitive to the concerns of stakeholders; provide good information; involve locals in decision making; recognise the value of local assets; demonstrate outcomes at a local and regional level; and get key players on board to encourage support for environmental watering.

Efficient and effective water management resonates with people throughout the community; the most effective way to address negative perceptions is to show that good process leads to good outcomes.

There is a strong case for monitoring, measuring, communicating and learning – and for better coordination.



Maximising the environmental benefits of all classes of water

In some cases, environmental water provided for under water resource plans is substantial and in many catchments reflects a volume greater than that of held water, however accountability for the delivery of this water is inadequate. It is likely that actual environmental outcomes from this water are limited and can be improved significantly without detriment to other water users.

It is also important that non-environmental water is managed for multiple benefits as much as possible. Water is moved through the river system for a range of different purposes – for human consumption, to maintain weir levels and for other reasons. This water can be doing good for the river’s ecology all the way to the point that it’s extracted. We need to think about how to maximise the benefits for the environment at every step along the journey.

The transition from existing state plans to accredited Water Resource Plans represents the single biggest opportunity to improve river health in the Basin beyond the achievement of sustainable diversion limits. This transition must enhance the coordination between different classes of water, and strengthen accountability for the delivery of planned environmental water, and pursue all opportunities to achieve environmental outcomes from other classes of water where this can be done without detriment to other water users. ACF urges governments to pursue all opportunities to embed environmental objectives in river operations.

ACF urges governments to pursue all opportunities to embed environmental objectives in river operations.

The National Water Commission has highlighted the risk of leaving the development and accreditation of Water Resource Plans to the last minute, particularly given the slow start by some jurisdictions. It is essential that state governments commence work early on the development of Water Resource Plans and involve all stakeholders in the identification of opportunities to improve environmental outcomes.

Ultimately this process raises important questions about how best to meet the environmental needs of any catchment. Held entitlements may provide flexibility, but ‘planned’ water provides base flows and better mimics natural conditions, particularly in unregulated systems.

It is important to understand how and where each type of water should be used to address various needs and consider how the joint use of different classes of water might deliver greater environmental benefits. To achieve this requires targeted and strategic deployment of environmental water. Commitments by water managers across jurisdiction to measurable, basin wide targets for all classes of environmental water is a critical first step.



Amber Light: Maximising the environmental benefits from all classes of water

The Draft Basin Wide Environmental Watering Strategy contained promising commitments to measurable targets for environmental watering. While it is too early to assess progress on establishing Water Resource Plans, the National Water Commission has highlighted the risk of leaving this work till the last minute. Water Resource Plans will ultimately determine whether the environmental potential of the Basin Plan is fully realised.



Opportunity

Commonwealth and states should strengthen the accountability for the delivery of planned environmental water and seek to maximise the benefits for all users through better coordination of the delivery of consumptive water with both ‘planned’ and ‘held’ environmental water.

Tenure constraints

One of the most significant barriers to the delivery of environmental water in all jurisdictions is the various tenures that occur across the floodplains. It is also one of the most difficult issues for policy makers and politicians to broach.

Inundation by overbank watering is critical to ecological health, but understandably there are concerns among some local communities and landholders about the impact flooding will have on private land and assets. To ensure informed consideration of potential trade-offs and co-benefits, and agreement between landholders and environmental water managers on an effective and sustainable flooding regime, much better information is needed about the proposed extent, levels and impact of inundation.

Inundation by overbank watering is critical to ecological health

Water managers can use easements and covenants to deliver environmental water across tenures, however it is unclear how useful these tools have been in re-connecting rivers to their floodplains. In some jurisdictions, the cost of installing easements is a significant deterrent.

Governments and water managers must come up with innovative and collaborative policy solutions to encourage floodplain connectivity in the basin. Tax incentives or stewardship payments for resting paddocks during environmental watering conveyancing events could help.

It would be appropriate in some circumstances for governments to seek co-investment from a diverse range of private and local, state and federal sources. This is also an important safeguard against cost-shifting. For example, it would be hard to justify spending CMS funds on the relocation, upgrade or everyday maintenance of private floodplain infrastructure that has been erected illegally or with disregard for the risk of natural flooding.

While historic failures in the planning system justify government investment, it should not be allowed to set a precedent for compensating landholders for the costs of poor business decisions. Such a precedent would quickly exhaust existing funding. In these circumstances, co-investment from alternative revenue streams may be a solution. We need to embark on a long-term journey to change our thinking about flooding.

We need to embark on a long-term journey to change our thinking about flooding

Future policy work must be geared toward restoring hydrological connectivity within landscape and addressing the physical and policy constraints that prevent this. Australians need to change the way we think about flooding. Rather than being solely focussed on suppression it would be much better to aim to minimise harm and maximise multiple benefits. Yes, floodwaters can damage fences and roads, but they also improve paddock health and grazing yield. Preparing roads, levees and flood control measures can reduce the cost and inconvenience of flooding, whether it is caused by controlled environmental releases or unplanned flood events.

Amber Light: Delivering water across different tenures

Restoring connectivity within the basin depends substantially on the ability to occasionally inundate private land. Progress in this area is unclear. Governments and water managers must come up with innovative and collaborative policy solutions to this challenge.

Case study

The benefits of floodplain watering

One of the largest industries in the Murray-Darling Basin is stock grazing. It accounts for approximately 69 per cent of the total land use within the basin, on native and modified pastures.

In 2011 the Australian Floodplain Association brought together landowners and graziers from across the basin. Together they came up with a proposal to provide easements to the environmental water holders to flood their lands. Almost a million acres were signed up and put forward to the government as gifted or voluntary easements. Why? Because the Australian Floodplain Association knows that well managed and watered floodplains are up to 20 times more productive than areas that have been deprived of natural flooding.

The Australian Floodplain Association's easements plans show that a healthy floodplain has many benefits for communities and farmers as well as the environment.

Do we need more dams in the Murray-Darling Basin?

On October 2014 the Federal Government released an agricultural green paper proposing the construction of 23 new dams across Australia, with a number of these to be located within the Murray-Darling Basin. The Federal Government's drive for new dams in the much-dammed Murray-Darling Basin flies in the face of all the evidence about what's required to restore the basin to good health. When you build a dam you fundamentally change the way a river works. Dams are disastrous for river ecology, particularly native fish populations. Dams can also have catastrophic consequences for people and businesses that depend on a free flowing river. While our Federal Government is keen to see more dams in our most perilously dammed and over-allocated river system, in the United States work continues apace to remove dams and river barriers. Reports from the USA show that almost 850 dams have been removed in the past two decades and more than a hundred removed between 2012 and 2013 alone.

The prospect of more dams in the Murray-Darling Basin is particularly alarming and contradicts the principles of the National Water Initiative (NWI) and the objectives of the Commonwealth Water Act. The Murray-Darling Basin already has an unsustainable number of storages, with existing capacities exceeding mean annual water runoff. This means in any average year the basin doesn't get enough rain to fill the dams that already exist. This over extraction of water and excess capacity led to many dams sitting empty during the years of the 'millennium drought'. Dams do not create water, they simply stop it flowing.

Dams do not create water, they simply stop it flowing.

New storages on the Mole, Belubula and Severn rivers would significantly reduce flows downstream. Additional storages and barriers would mean poorer river-floodplain connectivity and ultimately would result in less water getting to the Coorong and Lower Lakes at the Murray mouth in South Australia.

While some argue new dams are essential for drinking water supply, the reality is many of the new dams proposed by the Federal Government would be used for mining, irrigation and other industrial uses. This at the same time the Government has spent more than \$13 billion to recover over-allocated water within the basin!

There is no case for new dams in the Murray-Darling Basin.

Trading environmental water

Environmental water entitlements are an artefact of the consumptive water framework. As such it is inevitable that allocations against these entitlements will not always be available at a time and location that allows maximum environmental benefit.

Countercyclical and inter-valley trade can be efficient management tools that allow water holders to maximise the environmental benefit from a given portfolio, while also benefiting other water users. Selling annual allocations in a valley with less pressing environmental requirements in order to purchase water elsewhere or at a later date enables environmental water holders to address the most urgent environmental needs across the basin at any given time, while also benefitting the users on the other end of the transaction.

The use of trade by environmental water holders should be encouraged where it builds on existing trading frameworks and results in positive environmental outcomes. As trade increases, enhanced transparency measures will be required to maintain stakeholder confidence, in regard to the impact trade by environmental water holders may have on the market and to make sure the trade of entitlements only ever occurs in order to improve environmental outcomes.

Environmental water trade should not be driven by other considerations, such as the need to fund non-flow activities, recover operational costs or increase consumptive water availability. In its review of the Water Act the Commonwealth has come under pressure to do just this, which could result in sustained trade out of the environmental pool. This would mean a reduction in long-term water availability for the environment. Decision makers and governments must guard against perverse incentives to trade away environmental water. ACF urges governments to maintain existing legislative protection for held environmental water and to adequately resource all essential non-flow activities.



Amber Light: Trading environmental water

The trade in environmental water is a useful tool to move water throughout the basin in response to seasonal inflows. Trading provisions for environmental water must not be changed to allow proceeds to be used for activities other than recovering water.



Community groups such as water trusts and Indigenous organisations have valuable knowledge and capacity that can contribute to environmental watering practice.

Chapter 3

Connecting communities and places

Engaging the community in floodplain management

Community engagement can make or break the operation of environmental water managers.

Environmental watering will only be fully accepted when the community is meaningfully involved in the process of priority setting, decision making, water delivery, monitoring and communication.

Environmental watering will only be fully accepted when the community is meaningfully involved in the process.

Unsuccessful past engagement, such as the infamous Guide to the Basin Plan public meetings of 2010, came close to derailing the introduction of these critical reforms. Current environmental water managers are leading genuine and effective engagement. At the state level, Environmental Water Advisory Groups and local engagement work by Catchment Management Authorities are highlights. Initiatives of the Commonwealth Environmental Water Office, such as Local Engagement Officers and its water delivery partnership with the Nature Foundation of South Australia, provide strong examples at the Commonwealth level.

As such initiatives are built upon, consultative forums must include a dedicated, independent environmental voice. Working with and building on existing social capital is critical. Community groups such as water trusts and Indigenous organisations have valuable knowledge and capacity that can contribute to environmental watering practice.

Communities need to be able to make informed considerations of potential trade-offs and benefits of minor flooding. This means having access to information to evaluate the various types of infrastructure that may be affected, their legal standing and the types of benefits that can be arise through improved floodplain growth and improved grazing yield. It also means having access to maps that clearly show the likely extent of flooding, information about high watermarks from previous floods and data quantifying the costs and benefits of different inundation proposals.

It is important for governments to explain why watering is required at a local level, who it will affect and the necessary agreements that exist between landholders and environmental water managers. In so doing, governments need to be mindful of the value of local knowledge and treat this as an opportunity for two-way communication. Trust can be quickly eroded if governments gloss over the uncertainty of predicting how floodwaters behave; no two floods are ever the same.

 **Green Light: Engaging the community**
Environmental water managers are leading genuine and effective engagement with regional communities across the basin.

Case study

Restoring native fish populations in the Edward-Wakool river system

Community groups in the Edward-Wakool River system, an anabranch of the Murray Darling Basin, are working with government organisations to restore native fish species that have become locally rare or extinct.

A partnership program between the Edward-Wakool Angling Association, the RSL Fishing Club, Murray Local Land Services and NSW DPI Fisheries are focussed on returning the locally extinct Eel-tailed catfish and the threatened Murray-Crayfish to the system. Restocking programs and community based monitoring hope to secure populations of the species and raise awareness of their ecological and social importance. Both are loved by anglers.

Adequate funding and expert advice are essential if these projects are to be implemented effectively, but strong community support and leadership are also critical to their success. These projects are a great example of conservation efforts where communities are working with river managers and water holders to return locally-extinct species to wetlands in the Murray-Darling Basin.

Connecting important environmental areas

Protecting and restoring water dependent ecosystems relies on more than merely delivering a volume of water; land-based activities and management are also critical. Activities on land can affect native vegetation, spread weeds, facilitate erosion and impact on water quality, contributing nutrients, salinity and turbidity to waterways. Even at a very basic level, some watering events have been compromised by land management practices (such as uncontrolled grazing by stock and feral animals, like goats, following growth generated by a watering event).

Integrated catchment management aims to improve the way land, water and related biological resources are used. A critical element of integrated catchment management is evaluating how well protected are our watersheds, wetlands, rivers and floodplains.

Integrated catchment management aims to improve the way land, water and related biological resources are used.

There have been significant improvements in land management within the basin in recent decades. However, momentum has slowed drastically in developing new protected areas and improving the management of lands that contain or buffer important ecological values. This has been exacerbated by the absence of federal programs aimed at strengthening ecological connections and expanding the national reserve system, the abolition of the Biodiversity Fund and significant cuts to the National Landcare Program.

Previous gains in this area have made a substantial difference to floodplain and wetland management, primarily in New South Wales. Between 2008 and 2013, under the National Reserve System program, the Federal and NSW governments in the basin worked together to add 190 kilometres of river frontage to protected areas. This included important reaches of the Lachlan, Barwon and Darling rivers, as well as catchments upstream of Ramsar wetlands, such as the Gwydir.

In November 2014 the NSW government announced the creation of two new protected areas in the basin, with no assistance from the Federal Government. These new protected areas created an important habitat linkage between the Gingham watercourse and Gwydir River in Northern NSW, as well as increasing the size of Doodle Comer Swamp Nature Reserve in Southern NSW.

Despite these recent gains, the progress in expanding protected areas has slowed drastically.

In the absence of programs that create new protected areas, responsibility for managing country sustainably falls to those who can devote limited resources to improving management on private lands.

Farmers, Traditional Owners and environment groups are important stewards and custodians of the land, as demonstrated by the proposed gift of floodplain easements by graziers, positive stewardship activities on many farms and the establishment of protected areas on private and Indigenous owned lands.

Farmers, Traditional Owners and environment groups are important stewards and custodians of the land.

Private protected areas are an important element of the National Reserve System and play a critical role in maintaining key ecological and cultural values within the basin. There are numerous examples of non-government environmental organisations stepping in where governments are unwilling or unable to, but resources within the sector are scarce and can be reliant on favourable policies and programs from all levels of government to facilitate action.

In 2012 Bush Heritage Australia created a new private reserve of 14,400 hectares at Naree Station on the unregulated Paroo river system.

Trust for Nature's protection of Ned's Corner Station is the largest private conservation area in Victoria. It protects important floodplain habitat, including part of the Chowilla Floodplain and Lindsay-Wallpolla Islands Living Murray Site. To maximise environmental outcomes and return on investment in conservation, it is time to revisit approaches to integrated land and water management. Are existing areas under conservation management adequately protected? And are additional protected areas and new connected landscapes provided for in national plans? Failing to do so will put at risk the effectiveness of delivering substantial volumes of water to the environment. Re-connecting rivers to floodplains should be a guiding principle for continual improvement of river operations.

Re-connecting rivers to floodplains should be a guiding principle for continual improvement of river operations.



Red Light: Connecting important areas



The Federal Government has slashed spending on Landcare and the National Reserve System and abolished the Biodiversity Fund.



Opportunity

Governments should commit to more integrated approaches to land and catchment management. This means increasing the national reserve system and funding land management practices that support environmental watering objectives.

Case study

Restoring the connection between the Darling Anabranch and the floodplain

The Darling Anabranch is a naturally ephemeral river that branches off of the Darling River and travels 460 kilometres to the Murray River. For four decades the anabranch was managed as a permanent water storage. This led to the deterioration of water quality and ecology of the anabranch. In 2006 a pipeline was installed to enable more reliable water delivery to domestic and stock users. This allowed for many small dams and weirs to be removed below the Menindee Lakes, and a more natural flow regime to be restored.

In total 14 dams and weirs were removed across the reach (see pic on next page). The system was able to return to an ephemeral wet-dry cycle. The project is currently monitored under a ten-year program funded by the NSW Government and implemented by the Murray-Darling Freshwater Research Centre through the Darling Anabranch Adaptive Management Monitoring Program.

The results of the program are promising, highlighting the resilience of ecosystems and their ability to respond positively when dams are removed and a more natural water regime is resumed. Early monitoring highlights an improvement in the movement and populations of native fish species in the system and points to greater diversity of plant and understory species at sites with a more natural wet-dry regime. The restoration work in the Darling Anabranch represents one of the most extensive dam removal projects in Australia. It is an important case study for the removal of in-stream structures to improve ecological condition and connectivity in the Murray-Darling Basin.

Recognising Indigenous rights and access to water

Just as the colonisation of Australia dispossessed Indigenous peoples of their land, it also resulted in the privatisation and consequent degradation of much of its natural resources, including water.

This is of real contemporary cultural and also economic significance. Without addressing the historic misappropriation of Indigenous wealth, Australia cannot hope to achieve reconciliation or an end to the socio-economic disadvantage endured by so many Indigenous people.

When it was established in 2004 the National Water Initiative committed all governments to improve Indigenous engagement in water planning. This included the foundations for the provision of specific Indigenous water rights, but in the basin progress has been limited. The Basin Plan improves the standing of Indigenous people in water management, mandating their involvement in decision making and the consideration of cultural impacts in planning. However, the Water Act left the substantive question of Indigenous water rights unresolved. As a first step, Northern Basin Aboriginal Nations (NBAN) and Murray Lower Darling Rivers Indigenous Nations (MLDRIN) have advocated for cultural flow allocations to be provided for in all Basin Water Resource Plans, a move ACF strongly supports.

Cultural flows

Water entitlements that are legally and beneficially owned by the Indigenous Nations and are of a sufficient and adequate quantity and quality to improve the spiritual, cultural, environmental, social and economic conditions of those Indigenous Nations. This is our inherent right.

– Definition of cultural flows adopted by [the Murray Lower Darling Rivers Indigenous Nations] MLDRIN and NBAN

Cultural flows are of critical importance to the Indigenous communities and Traditional Owners of the Murray-Darling Basin. They represent and acknowledge the deep connection that Indigenous Australians have with their country. While acknowledging Traditional Ownership and rights that are mirrored in the Land Rights movement, they would also provide multiple benefits, improving the wellbeing and economic prosperity of regional Indigenous communities as well as providing for important environmental and cultural outcomes.

While structures exist outside government to advocate for Indigenous rights to water resources, bodies within government that take leadership on this important issue are being abolished, sending mixed messages to the community with regard to meaningful reform in this area.

 **Red Light: Indigenous water rights**
 Despite significant discussion and research, there has been limited progress towards establishing cultural water entitlements within Murray-Darling Basin.




Adaptive management is critical to the effective implementation of the Basin Plan – it creates a learning-by-doing approach in river operations and embeds a cycle of continual improvement.

Chapter 4

Institutional frameworks

Strengthening adaptive management

Adaptive management is critical to the effective implementation of the Basin Plan – it creates a learning-by-doing approach in river operations and embeds a cycle of continual improvement. There are numerous examples of adaptive management within the basin, such as learning the response of native fish to the timing of an environmental watering event, to better inform next season’s work.

Adaptive management may sound easy, but the Murray-Darling Basin is so huge that it can be challenging, especially considering the diversity of people, institutions and jurisdictions involved in managing the basin.

Adaptive management may sound easy, but the Murray-Darling Basin is so huge.

Better coordination, consistency and cooperation on monitoring programs will improve outcomes and return on investment for governments. Long-term funding, institutional resilience and the ability to share and collate data are crucial. Governments must prioritise and promote collaboration and look at new technologies, such as smart phone apps, to deliver and share real-time data.

The Commonwealth should be commended for recent investments in the Long Term Intervention Monitoring Program. This should be built upon, and embedded in, an adaptive management framework. The primary purpose of monitoring must be to enable the achievement of ecological outcomes through informing future management decisions. There is little point in monitoring if is decoupled from management decisions.



Green Light: Long term ecological monitoring



The Commonwealth Environmental Water Holder’s Long Term Intervention Monitoring Program has been funded through to 2019.



Opportunity

Adaptive management

There is scope for better coordination, consistency and cooperation of monitoring programs, and to embed these within adaptive management frameworks.

Eroding the institutional foundations

The success of the Basin Plan depends on the strength and effectiveness of the institutions that administer and monitor its implementation. There are worrying signs that the foundations of these institutions are being eroded, in what appears to be a case of short term opportunism on behalf of governments.

The politicisation of the funding base for the Murray-Darling Basin Authority – the key institution responsible for delivering and driving Basin Plan implementation – is a matter of ongoing concern. Substantial reductions in funding over recent years have created uncertainty around the operation of the Authority.

There is significant work ahead for the Authority, including ensuring the SDL adjustments occur in a robust fashion and that Water Resource Plans, which govern the use of water in each catchment, are effective. Recent indications that funding for the MDBA has stabilised through agreements with Basin States are a positive sign.

In contrast, the proposed closure of the National Water Commission is a bad development. The commission was established to drive the implementation of the National Water Initiative. It has principle roles in assessing the performance of all governments in delivering on commitments with the National Water Initiative, auditing the implementation of the Basin Plan and providing independent expert policy advice on water reforms.

In addition to the proposed abolition of the National Water Commission, the Federal Government has scrapped the only inter-governmental body responsible for environmental matters in Australia, the Standing Council on Environment and Water, effectively removing environment and sustainability matters from the COAG agenda.

There are other worrying signs. The Federal Government has proposed to hand its approval responsibilities under the Environment Protection & Biodiversity Conservation Act for projects that may have impacts on water resources to the states and territories. At the same time the Government has removed from the Water Act critical protections relating to these types of impacts within the basin.

There are other worrying signs. The Federal Government has proposed to hand its approval responsibilities under the Environment Protection & Biodiversity Conservation Act for projects that may have impacts on water resources to the states and territories. At the same time the Government has removed from the Water Act critical protections relating to these types of impacts within the basin.

The Government is also yet to finalise a review of the Water Act, a key piece of legislation that underpins the Basin Plan and national water reform. Through the review process there has been pressure on the Federal Government to remove the environmental focus in the objectives of the Water Act and to allow water to be traded by environmental water holders for non-flow related activities. This means that there will be even less water available for the environment. Such moves would undermine work to date in implementing the Basin Plan and severely weaken any environmental outcomes.

The review of the Water Act presents a unique opportunity to ensure that the basin is returned to good health, for the benefit of all users. This means keeping a focus on restoring water to the rivers, wetlands and floodplains of the basin following a century of neglect and unsustainable use. The review also presents an important opportunity to enshrine Indigenous rights to water, in the form of cultural flows, in legislation. Righting a historic wrong that has lingered in the basin for far too long.

 **Red Light: Institutions to drive water reform**

  The Federal Government is removing and eroding many of the institutions and responsibilities that drive water reform in Australia. This will have lasting negative impacts on the effective management of our water resources, particularly in the Murray-Darling Basin.

 **Opportunity**

Governments should seek to strengthen, not weaken, important public institutions. The Government should maintain the National Water Commission and create a fully independent Commonwealth Environmental Water Holder that is free from ministerial interference.



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