Murray-Darling Basin Plan Implementation Review 2023

The Productivity Commission's second five-yearly inquiry into the effectiveness of Basin Plan implementation is taking place at a critical junction. The Murray-Darling Basin Authority (MDBA) has provided advice that full implementation of the Basin Plan is not possible by June 2024.[1] With a decade having passed since the Plan began, water resources in the Basin remain over-allocated – and even the flows expected under the Plan have not been achieved.[2] While we are approaching another dry period, Basin states are outlining a new pathway to deliver on outstanding objectives and the MDBA is beginning to focus on the 2026 Review.

This inquiry is tasked with assessing whether the Basin Plan is on track to be implemented on time, and where it is not on track, what needs to change. In this regard, it is worth recognising that the causes of delay and their respective solutions have been well established. Concerning water recovery, for example, the Productivity Commission found in 2010 that straightforward water purchases were more cost-effective than infrastructure projects, recommending that remaining funds in the infrastructure program would be more effectively re-directed, using 'the buyback program as the sole means of easing the transition' to water recovery targets.[3]

Previous reports have also anticipated challenges with present policy settings. For example, the Productivity Commission report found that 'subsidising infrastructure is rarely cost effective in obtaining water for the environment, nor is it likely to be the best way of sustaining irrigation communities' and that 'most of the 'low hanging fruit' has been picked already' indicating programs 'are likely to be less cost effective.' Report findings have undermined seemingly contemporary arguments, noting 'a neutral, independent buyback actually assists (rather than impedes) adjustment processes,' and 'the 'holes' created by a 'Swiss cheese' buyback may open future opportunities.' And recommendations have advanced broad policy guidance, recognising that 'attempting to achieve multiple objectives with one instrument may compromise effectiveness and efficiency,' urging governments to consider establishing a distinct 'program to assist irrigators and related communities adjust to a future with less water, through the most effective means available (not just subsidies for irrigation infrastructure).'

While the reasons for Basin Plan delays are well-established, unfortunately, it appears that policy settings are 'locked in' and opportunities for reform are significantly constrained.[4] This

[1] MDBA, 'Authority response to Minister's request for advice' (2023)
[2] Wentworth Group of Concerned Scientists, 'Assessment of river flows in the Murray-Darling Basin: Observed versus expected flows under the Basin Plan 2012-2019' (2020)
[3] Productivity Commission, 'Market Mechanisms for Recovering Water in the Murray Darling Basin, Final Report' (2020)
[4] G Marshall and J Alexandra, 'Institutional Path Dependence and Environmental Water Recovery in Australia's Murray-Darling Basin,' *Water Alternatives* (2016)

explains both the 'high costs and the slow and contested nature of Australia's water reforms.'

Fundamentally, delays in Basin Plan implementation reflect how Basin governments perceive their vested interests – and how those emergent political objectives have repeatedly influenced the design process, constraining the possibilities for what can be achieved.[5] This was the impetus for the *Water Act 2007* (Cth) – Basin states had failed to deliver on COAG commitments (1994 and 2004) to confront over-allocation and provide environmental flows, forcing the federal government to step-in.[6] The South Australian Royal Commission's assessment of Basin Plan implementation noted the intrinsic weaknesses of this arrangement. The Water Act depends on a combination of sources for its validity, which has unfortunately created ongoing opportunities for 'short-sighted, vested self-interests' to 'drown out' the purposes of the Water Act.[7]

The last five-yearly inquiry found major shortcomings in institutional and governance arrangements. Further interrogation of these arrangements will be critical for establishing the conceptual foundations for subsequent water reform in anticipation of the 2026 Review. But beyond an assessment of the division of responsibilities and provision of necessary powers, it may be useful to interrogate the reasons for the 'lock in' of water policy. This may mean identifying 'who is invested in particular institutional arrangements, exactly how that investment is sustained over time, and perhaps how those who are not invested in the institutions are kept out'.[8]

While this submission is not comprehensive, we have aimed to provide a succinct assessment of the institutional and governance arrangements that have impeded implementation – and where we might find solutions.

Addressing First Nations interests

The Basin is the ancestral domain for over 40 First Nations, but colonisation has left them with few rights over land and water.[9] The overallocation of the Basin, which the Water Act aims to address, is predicated on this ongoing dispossession – further damaging Country, disempowering Traditional Owners in water management and denying their share of wealth made from their land. Until we address this history, any pursuit of reconciliation will remain out of reach.

[5] Environment Victoria, 'Debasing the Basin Plan' (2023). Available at: https://environmentvictoria.org.au/2023/08/03/debasing-the-basin-plan/

[6] John Howard, 'Address to the National Press Club' (25 Jan 2007). Available at: https://parlinfo.aph.gov.au/parlInfo/search/display/display. w3p;query=Id%3A%22media%2Fpressrel%2FK81M6%22

[7] South Australia, Murray-Darling Basin Royal Commission Report (2019) p 117

[8] K Thelen, 'Historical institutionalism in comparative politics,' *Annual Review of Political Science* (1999)

[9] LD Hartwig et al, 'Trends in Aboriginal water ownership in New South Wales, Australia: The continuities between colonial and neoliberal forms of dispossession,' *Land Use Policy* (2020)

Recognising self-determination means returning water to support cultural traditions and community development.[10] We need to make sure First Nations have a say over how rivers and Country are managed.

In its current form, the Water Act fails to address these interests. Traditional Owners have called for involvement in policy and decision-making as well as direct involvement in environmental management.[11] This is more than consultation – and critically, more than existing provisions that water management must 'have regard' to the views of Indigenous people.[12] It means ensuring no decisions directly relation to First Nations rights and interests are taken without their informed consent.

This standard has not been achieved. Notably, Water Resource Plans have been submitted against the views of Traditional Owner groups and some supply measure projects have progressed without consideration of Traditional Owner views or aspirations – or even genuine consultation.[13] Some Traditional Owners have raised concerns about the Victorian projects that are 'being planned on First Nation's Country without our consent' and 'will entail major and lasting alterations to some of our most sensitive areas of Country'.[14]

As the review works to better recognise First Nations' values in water management and enhance their involvement, it should consider transferring substantive responsibilities and powers to Traditional Owner entities, developing responsive arrangements between Traditional Owner entities and water institutions, integrating cultural water planning proposals into existing instruments and supporting Traditional Owners in design and delivery of water programs.

Projects and policy must be developed with First Nations and informed by Traditional Owner aspirations for Country. Governments should be guided by the United Nations Declaration on the Rights of Indigenous Peoples, ensuring primacy of Traditional Owner views and aspirations for planning and decision-making in relation to the Basin.

Reflecting the best available science

The Water Act begins by recognising that the rivers of the Basin are overallocated and overused.[15] Too much water has been taken from inland rivers for too long, denying them the flows they need to be healthy.

The fundamental tool the Water Act provides to address the problem is a scientifically assessed limit on the water that can be taken from rivers – set at a level that does not

[10] E O'Donnell et al, 'Cultural Water for Cultural Economies,' University of Melbourne (2021)
[11] M Morgan et al, 'Indigenous Rights to Water in the Murray Darling Basin,' Australian Institute of Aboriginal and Torres Strait Islander Studies (2004)
[12] *Basin Plan 2012* (Cth) s8.15(4)(e)
[13] Royal Commission Report (2019) p 325
[14] M Perkins, 'Going against the flow: the plan to engineer Victoria's wetlands', The Age (1 April 2023)
[15] *Water Act 2007* (Cth) s3

compromise the Basin's environmental values. This is an environmentally sustainable level of take (ESLT) reflected in a sustainable diversion limit (SDL) that caps extraction.

This approach recognises that protecting and restoring freshwater ecosystems depends on restoring variable flows – including regular, smaller floods in winter and spring that provide connectivity and diversity in riverine landscapes. In a highly modified system regulated with dams and weirs, restoring connectivity does not entail a complete return to a natural flow regime but instead, an approach that has been referred to as the 'designer flows paradigm.' In simple terms, this means that components of natural flow variability – like flood duration at a certain time of year – are 'assembled' through the strategic use of environmental water.[16]

While the definition of environmental flows was initially based on the requirement for minimum low flows, it now includes several strategies for active management. For example, water that has been set aside for the environment can be used to augment releases from dams to create more-variable 'pulses,' or it may be 'piggy-backed' on top of natural stream flows to mimic larger natural events.[17]

The Water Act reflects this understanding: that when rivers are grossly over-allocated, there is a gap in the volume of water needed to maintain wetlands and rivers. Closing this gap entails simultaneously dialling back extraction from the historic baseline and protecting that water for environmental use. This water reserve can be used toward achieving the passive components of a flow regime, like minimum flows, and more active management strategies, like those above to mimic the timing, duration, and frequency of natural floods. If the water recovery target is insufficient, then these components of a flow regime cannot be delivered.

It is well-established that in determining the Basin-wide environmentally sustainable take, the Murray-Darling Basin Authority 'failed to act on the best available scientific knowledge'.[18] The Guide to the proposed Basin Plan (2010) recommended water recovery in the range of 3000-7600 GL to protect biodiversity.[19] The lower bound represents a 'high-uncertainty target' – the boundary 'beyond which there is a high likelihood that objects and targets will not be achieved'.[20]

The water recovery target was set without incorporating available data for climate impacts and was readily acknowledged as being insufficient to meet the maintain key environmental assets and ecosystem functions that should characterise an environmentally sustainable level of take.[21]

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[16] M Acerman et al, 'Environmental flows for natural, hybrid and novel riverine ecosystems in a changing world,' *Frontiers in Ecology and the Environment* (2014) p 468

[17] Stewardson M and Guarino F, 'Basin-scale environmental water delivery in the Murray-Darling, Australia: A hydrological perspective,' *Freshwater Biology* (2018) p 971

[18] Royal Commission Report p 54

[19] Murray–Darling Basin Authority, 'Guide to the proposed Basin Plan: Technical background' (2010) p 115

[20] Guide to the proposed Basin Plan p 98

[21] WJ Young et al, 'Scientific Review of the Estimation of an Environmentally Sustainable Level of Take for the Murray-Darling Basin,' CSIRO (2011)

Over the past decade of Basin Plan implementation, the water recovery target has become increasingly convoluted and reduced in what has been characterised as a 'step-down effect,' the 'steady reduction in the volume of water to be returned from irrigators to the environment'.[22]

The 'step-down effect' was possible because the process has been subject to undue pressure from Basin states. This may have been due in part to the limited referral of power which brough components of the Water Act into force – while also providing Basin states the option to revoke that referral throughout the development of the nascent Basin Plan.

But as Reconciliation and the 2026 Review begin to assess the suitability of the ESLT and SDL, it is important to recognise that these matters should have been insulated from Ministerial influence regardless. Instead, the determination of the existing water recovery figure was neither transparent nor replicable. Further, it was communicated repeatedly as a deal that had been negotiated by Basin states.[23]

It is critical that the Basin-wide ESLT and SDL are re-determined to meet the requirement of the Water Act, including by incorporating climate projections. But further, it is important to explore the institutional settings that allowed intervention by Basin states. A new determination should be far more rigorous and independent. If the resulting water recovery figure is not acceptable to Basin Ministers, then we can have an informed debate on the criteria by which state and federal governments approach Basin-wide restoration, rather than an unlawful water recovery target determined by political expediency.

Responding to climate change

Over the past decade of Basin Plan implementation, the Commonwealth Environmental Water Holder (CEWH) portfolio has grown to include 2,889 GL of entitlements with a long-term annual average yield of 2,001 GL.[24] In the last water year, 1,515 GL was allocated against these entitlements. Considering the water requirements for an ecologically effective flood, this reserve is insufficient to maintain ecological condition.[25]

To deliver this water in a way that maximises ecological benefits, the CEWH utilises an adaptive management approach – monitoring results and incorporating that information to inform future decision-making. It is useful to recognise that this is the level at which adaptive management may work effectively, rather than repeatedly contemplating whether addressing over-allocation remains a useful endeavour.

[22] MJ Colloff and J Pittock, 'Mind the gap! Reconciling environmental water requirements with scarcity in the Murray–Darling Basin, Australia,' *Water* (2022)
[23] Environment Victoria, 'Debasing the Basin Plan' (2023)
[24] Commonwealth Environmental Water Holder, 'Environmental Water Holdings' (2023). Available at: https://www.dcceew.gov.au/water/cewo/about/water-holdings#commonwealth-environmental-water-holdings
[25] Y Chen et al, 'A trickle, not a flood: environmental watering in the Murray-Darling Basin, Australia' *Marine and Freshwater Research* (2021)

At the same time, improving climate resilience and adaptation depends on solving interconnected management challenges. The mosaic of vegetation and wetland habitat across the floodplain has been determined by a natural flow regime. And as the character of flow events changes, wetlands begin adapting to a new flow regime.[26] This means that the failure to recover water for the environment and sufficiently relax constraints isn't only a policy failure, it significantly constrains environmental water managers in an already complex institutional setting. And it risks closing the adaptation pathways we are designing for and investing in.

To improve environmental water management in a hotter, drier climate, we need to understand how altered flow regimes and climate change are affecting wetlands across the Basin. In practical terms, this may begin with the update of the Sustainable Yields Project, which is assessing the likely impacts of climate change on the surface water and groundwater of the Basin. Climate change is likely to amplify the disparity in condition between the low-lying reaches and the wider floodplain. This is partially the result of higher rates of evaporation and warmer conditions, but also an effect of the reduced size of regular, natural flow events that water managers use for 'piggy-backing' environmental flows.[27] With this in mind, the Sustainable Yields Project may look to establish the water in the system with a greater focus on connectivity. This means illustrating the ongoing requirements to achieve lateral (overbank), longitudinal (end-of-system flows) and vertical (groundwater interaction) connectivity in a range of climate scenarios.

This exercise would be usefully expanded with an assessment of observed flows in the river system compared to expected flows. There has been a significant disparity between the water expected each year under the Basin Plan and actual river flows at key sites – concerningly, 20% of the water was not received.[28] This shortfall may be attributed to drier weather conditions, higher conveyance requirements because of those conditions or changing use patterns, inadequate rules protecting environmental flows, and improper accounting.

The need for modernised accounting warrants particular investigation within this inquiry. It is not currently possible for decision makers to understand with reasonable certainty how much water is available, how much is being used and where. The inability to validate assumed flow against observed data is further complicated by the likely overestimation of water recovery from water-saving infrastructure projects which some studies have commented 'do not 'save water' per se – they merely have the effect of redistributing water in space and time'.[29] Water accounting may also be undermined by improperly calculated Cap factors, which effectively provide an exchange rate on different water products. Some entitlements may yield less than what they have historically.

[26] V Schweizer et al, 'The Dammed and the Saved: a Conservation Triage Framework for Wetlands under Climate Change in the Murray-Darling Basin, Australia,' *Environmental Management* (2022)
[27] A Horne et al, 'Kaiela (Lower Goulburn River) Environmental Flows Study' (2020)
[28] Wentworth Group of Concerned Scientists, 'Assessment of river flows in the Murray-Darling Basin: Observed versus expected flows under the Basin Plan 2012-2019' (2020)
[29] L Crase et al, 'The fluctuating political appeal of water engineering in Australia,' *Water Alternatives* (2009)

At minimum, an independent audit reviewing the reliability of water recovered 'on paper' should account for these factors as well as observed planned environmental water (PEW) and changes to the baseline diversion limit and sustainable diversion limit, which have not been independently scrutinised.

These projects may support the effective use of environmental water to confer resilience to the wider floodplain with a more-sophisticated assessment of how climate change interacts with flow regimes: what is at risk, what is possible and how we need to respond with water delivery, relaxed constraints or additional water recovery.

Meeting water recovery targets

Water recovery has progressed slowly since the Restoring the Balance program, which began in the late 2000s in anticipation of the Basin Plan. This is largely the result of programmatic pivots and dubious limitations on permissible options for water recovery.

As discussed above, many of the impediments to reliable water recovery are well-established. In addition to the Productivity Commission report cited above, Basin governments have commissioned reports affirming the conclusion that straightforward water purchases have limited socio-economic impacts – 'small if not neutral' – which seem to have been ignored.[30] Similarly, reports have affirmed opportunities to recover the 450 GL for enhanced environmental outcomes with neutral or positive socio-economic impacts – which also seem to have been ignored.[31]

Improving progress on water recovery may depend on a more thorough investigation by the Productivity Commission of the present institutional arrangements – which have trended toward prioritising 'complementary measures' over held environmental water and infrastructure-based approaches over other options. And further, understanding why these preferences have been sustained.

The Productivity Commission's 2010 report on Market Mechanisms for Recovering Water assumed the following trend for reform:

> 'large subsidies to irrigators … are simply the price that needs to be paid to achieve reform. That is, the program was needed to convince the states to agree to a truly Basin-wide approach to water planning and to elicit the irrigation sector's support for increasing environmental water allocations. But what the above analysis shows is that unless subsidies are kept to modest levels, the consequences are likely to be detrimental to the community as a whole. Subsidies not only transfer wealth from

[30] G Dwyer et al, 'Economic effects of the Commonwealth water recovery programs in the Murrumbidgee Irrigation Area' (2017)

[31] Ernst and Young, 'Analysis of efficiency measures in the Murray-Darling Basin: Opportunities to recover 450 GL in additional environmental water through efficiency measures by 2024, with neutral or positive socio-economic impacts, Independent Report to the Murray-Darling Basin Ministerial Council' (2018)

> taxpayers to irrigators, they are also likely to lead to wasteful and inefficient investment'.[32]

Acknowledging the bias of Basin governments against further recovery of necessary held environmental water, it may be important to ask whether this strategy of 'purchasing' reform, at increasing expense, has reached an impasse. It may be that more significant or direct subsidies are required. For example, the Commonwealth offered financial incentives – tranche payments which were conditional on implementation of COAG water commitments.[33] But this option may be constrained by the entrenchment of Basin state policy, particularly when infrastructure-based approaches no longer seem to be only 'wasteful and inefficient,' but a strategic barrier to further water recovery. The Royal Commission report commented that this approach is currently 'antipathetic' to the interests of environment and makes achievement of sufficient water recovery 'doubtful'.[34]

On the other hand, it may be suitable to explore options to address the other drivers of this entrenched, ineffective pathway. Studies have commented on factors motivating Basin states and irrigators which may also be understood in terms of the insistence upon maintaining existing production levels, rent-seeking which achieves funds for upgrades of infrastructure for which irrigation infrastructure operators had previously accepted responsibility, or the promise of securing funds and continuing employment within state water agencies.[35] The latter includes the concept of 'hydraulic bureaucracies,' with the same drivers coalescing toward increasing technological control of water.

Below, two components of the present institutional arrangement are discussed: (1) the trend of prioritising increasingly uncertain complementary measures over the straightforward recovery of held environmental water and (2) the limitation of water recovery options to a small set of infrastructure-based options.

Addressing the former may require a process that provides more explicit balance on the different options for water recovery. The latter may require disentangling the different factors which have characterised the perceived socio-economic impact of water recovery – collaborating with Basin communities to interrogate these different drivers of change and develop programs, with broader community buy-in, to address them.

Additional held environmental water (HEW) is needed to meet environmental requirements.

As discussed above, additional held environmental water (HEW) is needed to meet environmental water requirements. However, progress toward its recovery has been

[32] Productivity Commission, 'Market Mechanisms for Recovering Water in the Murray Darling Basin, Final Report' (2020) p 140
[33] BT Heinmiller, 'Multilevel governance and the politics of environmental water recoveries' (2014)
[34] Royal Commission Report p 62
[35] G Marshall and J Alexandra, 'Institutional Path Dependence and Environmental Water Recovery in Australia's Murray-Darling Basin,' *Water Alternatives* (2016)

continually confounded by different approaches toward balancing held environmental water with complementary measures, environmental works and measures, and non-entitlement transfer options.

Basin-wide restoration requires multiple projects working in tandem. Held environmental water is necessary to provide active management, replicating components of a more-natural flow regime. Rules-based (administrative) changes are often critical for providing minimum flows – but they require simultaneous changes to state policy for shepherding water across trading zones and borders, and ensuring it is protected from capricious, unaccountable redirection during times of water shortages. Complementary measures play a critical role enhancing these outcomes.

Held environmental water and complementary measures

Considering held environmental water in the context of complementary measures means first acknowledging that water is a prerequisite for environmental outcomes. Flow variability is the essential driver of ecological condition for flow-dependent flora and fauna in the river and on the floodplain. These flow patterns were disrupted by intense development to support expanding irrigation, with major headwater storages, locks, weirs and other impoundments. This 'river regulation' not only facilitated over-extraction of water, it also changed rivers profoundly by reversing seasonal patterns, depriving wetlands and floodplains of water, and seriously degrading the habitat of native species that depend on freshwater flows for their survival.[36]

This degradation isn't the result of over-extraction alone. Instead, it is the result of the paradigm of 'working rivers' which repurposed rivers to make over-extraction possible, fundamentally altering patterns of flow.

The numerous expressions of river degradation emerge from this system of river operation. *Cold water releases* from storages disrupt fish and invertebrate breeding during spring and summer when water is sent downstream for irrigation. *Sediment* which fills in habitat and limits light for aquatic plants is largely derived from instream bank erosion caused by long-duration summer irrigation flows.[37] *Fish passage* has been limited by weirs, some of which function to maintain hydraulic head for water diversion into canals. Similarly, *poor water quality and blackwater* is the result of the less frequent smaller floods which would have regularly swept manageable amounts of organic matter from the floodplain. Addressing these impacts is fundamentally linked to the objective of the Water Act to address over-allocation, which remains a fundamental driver of river degradation.

Land management and complementary measures like pest control and enhanced fish passage are essential tools. But they are *complementary* to environmental flows, not a

[36] Murray-Darling Basin Commission, Report of the River Murray Scientific Panel on Environmental Flows (2000)
[37] I Rutherford et al, 'Human impacts on suspended sediment and turbidity in the River Murray, South Eastern Australia: Multiple lines of evidence' (2020)

substitute. In isolation, they are insufficient to achieve large-scale wetland restoration.[38] Flow-dependent species need enough water for breeding, habitat maintenance and connectivity. In a heavily altered river system, these needs can now only be met through managed environmental flows.[39]

Even considering management to address invasive species, like carp, it is worth recognising a complicated but significant dynamic. Environmental flows allow native fish to remain competitive but appear to cause little impact on the trajectory of the carp population. But critically, the alternative to environmental flows – artificial floodplain inundation (discussed below) – causes significant and maintained carp recruitment compared to the baseline.[40]

It is also critical that the role of farmers and private land management is acknowledged and supported. This is often raised in the context of rice paddies and other paddocks which can provide habitat for endangered species like the Australian bittern. Nevertheless, it is important to recognise the limitations of these private land management approaches: these paddocks have limited species diversity and all decisions about what to grow, how much water to use, which chemicals to apply, when to use water and when to harvest are made by landholders to meet their business needs. Environmental objectives are most often secondary.

Achieving benefits from complementary measures, improving private land management and ultimately integrating these efforts with environmental flow management and flow recovery programs is an ambitious goal for the Basin. Unfortunately, these efforts have been consistently reduced to 'substitutes' for environmental water recovery, which is anathema to their purpose as 'complementary' measures.

Held environmental water and environmental works and measures

A similar dynamic has corrupted the assessment of 'environmental works and measures.' Before the development of the proposed Basin Plan, this was effective shorthand for the infrastructure, provisions and river operations needed to optimise the use of environmental water. The purpose was to deliver this water to certain wetlands which, due to over a century of development on the floodplain, would prove challenging to reach with more natural overbank flow events.

By 2009, however, the concept had been reinterpreted. Rather than merely achieving benefits from the water set aside for the environment, structural works were proposed as a substitute for recovering water in the first place.[41] This proposal became the basis of the Sustainable Diversion Limit Adjustment Mechanism (SDLAM), which is implicitly an

[38] I Cresswell and L Baumgartner L, 'Scoping the development of a method to assess the relative environmental benefits of Complementary Measures,' *CSIRO Land and Water* (2017)
[39] A Ryan et al, 'Flow to nowhere: the disconnect between environmental watering and the conservation of threatened species in the Murray–Darling Basin, Australia,' *Marine and Freshwater Research* (2021)
[40] C Todd et al, 'Does environmental water management promote invasive fish? Modelling the response of common carp (Cyprinus carpio) to natural and managed flows using a stochastic population model' (2023)
[41] Northern Region Sustainable Water Strategy (2009) p 45

offsetting program – where environmental outcomes equivalent to the 2750 GL environmental water recovery target are sought to be achieved with less water. It seems to be the only program of its kind in existence. The approach 'remains untested, lacks on-ground validation and is based on ecological modelling that relies on generalised and hypothetical assumptions'.[42]

The offsetting program includes a range of projects, from infrastructures measures to rules-based measures, constraints measures and even works completed years earlier through the Living Murray initiative – which were included despite the fact they had already been factored into the baseline conditions that water targets were measured against.[43]

Some of these projects may be beneficial – but they may not all be necessary. The projects were developed in anticipation of an 'offset' and modelled in 'packs' without a robust analysis of additionality or alternatives. It is unclear whether individual proposed projects deliver benefits that are additional to the assumed baseline, whether they deliver benefits more effectively than alternatives (for example, additional water recovery and relaxed constraints), and whether they can be delivered with the necessary timing and frequency to locations that provide additional ecological benefits.

The experimental effort to consolidate these projects as 'equivalent' to volumes of held environmental water has deprived the environment of essential flows for over a decade. The 2024 reconciliation, which will calculate the difference between predicted and achieved outcomes through the program has not yet addressed the inadequacies identified in peer-reviewed literature. Critically, environmental outcomes are not being proven with empirical evidence, residual risks like blackwater and carp remain unaccounted for, and neither indirect floodplain impacts or climate change stand to be considered.[44] Nor have they addressed the risk they pose by limiting the modification of watering regimes through adaptive management, potentially 'creating ecological 'museums'' at the expense of the wider floodplain.[45]

Further, many of these projects progressed without consideration of Traditional Owner views or aspirations – or even genuine consultation.[46] Some Traditional Owners have raised concerns about the Victorian projects that are 'being planned on First Nation's Country without our consent' and 'will entail major and lasting alterations to some of our most sensitive areas of Country'.[47]

As we approach the 2024 Reconciliation, it is essential not to view this deadline elastically. River Red Gum forests require floods at least every three years for maintenance. Black Box

[42] K Lyons et al, 'Towards a scientific evaluation of environmental water offsetting in the Murray–Darling Basin, Australia,' *Marine and Freshwater Research* (2023)
[43] Notice by the Victorian Government under Section 43A(4) of the Water Act 2007 (9 July 2012)
[44] K Lyons et al, 'Towards a scientific evaluation of environmental water offsetting in the Murray–Darling Basin, Australia,' *Marine and Freshwater Research* (2023)
[45] M Acerman et al, 'Environmental flows for natural, hybrid and novel riverine ecosystems in a changing world,' *Frontiers in Ecology and the Environment* (2014) p 468
[46] Royal Commission Report (2019) p 325
[47] M Perkins, 'Going against the flow: the plan to engineer Victoria's wetlands', The Age (1 April 2023)

woodlands require flooding every three to seven years for growth and flowering.[48] Floodplain resilience depends on the delivery of held environmental water as soon as possible.

To deliver outcomes for the floodplain, experimental offsetting programs should be urgently constricted and phased out. This would include immediately removing incomplete projects while improving models accounting for residual risk, climate change and Basin-wide effects. Where possible, empirical data should be used to demonstrate environmental outcomes. The updated framework should be reviewed by an independent expert panel. After 2024, the results should be regularly monitored, and offset volumes confirmed or re-calculated.[49]

Until a significant body of peer-reviewed research has developed, the Ecological Elements Scoring Method – and the experimental notion of ecological equivalence – should not be used to attribute volumetric progress to infrastructure or rule changes.

These projects should be assessed on their merits: their ability to deliver necessary flows that cannot be realised through reasonable alternatives, aligned with the rights and interests of Traditional Owners. No project should progress where it threatens cultural heritage or wellbeing – or has violated principles of free, prior and informed consent.

Cost-effective, reliable water recovery is needed to meet environmental requirements.

Water recovery progress has also been hampered by the perception of socio-economic impacts through different recovery pathways. The policy of voluntary water purchases had successfully recovered environmental water from 2008.

But this was also a period of significant changes in land ownership and water financialisaton. The Water Act 'was introduced at a time that Australian farmers were losing competitiveness due to a soaring Australian dollar resulting from the mining boom' and when 'the Basin was in drought, which brough community stress'.[50] The coalescence of these factors have led economists to conclude that 'buybacks have become a scapegoat for adversity within the Basin.'

[48] J Roberts and F Marston, 'Water regime for wetland and floodplain plants: a source book for the Murray-Darling Basin,' National Water Commission (2011)
[49] K Lyons et al, 'Towards a scientific evaluation of environmental water offsetting in the Murray–Darling Basin, Australia,' *Marine and Freshwater Research* (2023)
[50] G Wittiwer, 'Modelling variants of the Murray-Darling Basin Plan in the context of adverse conditions in the Basin,' Centre of Policy Studies, Victoria University (2020) p 62. Commissioned by the Panel for the Independent Assessment of Social and Economic Conditions in the Murray-Darling Basin.

In 2015, the *Water Amendment Bill* limited water buybacks from irrigators to 1500 GL. This was followed by the federal water minister reneging on the delivery of the 450 GL and,[51] several years later, the further limitation of water recovery to off-farm efficiency measures.[52]

Infrastructure-based solutions had been contemplated since the Water Act was signed into law. Options included on-farm water efficiency infrastructure as well as targeted, strategic rationalisation through irrigation authorities. This might entail contracting channel networks by closing down parts of the distribution system while modernising the 'backbone,' or abandoning some assets altogether.

But the risks of this approach were identified just as early. It is well-documented that if investments do not meet basic cost-benefit criteria for water saving, they delay the adjustment irrigation areas will inevitably face. In other words, they can lead to 'gold plating' assets that may subsequently become stranded while perpetuating a dependence on increasing external support – imposing substantial costs elsewhere.[53] In effect, infrastructure investment may create an imperative to sustain the viability of those assets while perhaps neglecting more difficult, structural reforms.

Further, before the Basin Plan was signed into law, economists described water-saving infrastructure approaches as an egregious subsidy to irrigators at a huge loss to Australians because it was 'such an expensive way to solve a problem'.[54] Experts also confirmed there was no evidence of significant water savings[55] and discounted claims that such projects would ensure food security as an 'absolute furphy'.[56]

Nevertheless, efficiency projects have been consistently prioritised to the detriment of alternatives for water recovery. And subsequent projects have exhibited consistent flaws. Efficiency projects are very slow to implement, with some off-farm projects taking more than 14 years to complete.[57] Claimed savings from the programs have not been confirmed by adequate site-level streamflow measurements. While the projects are at least 2.5 times more expensive than water purchases,[58] if the volume of water returned to the environment is as low as some studies suggest, they could be 25 times more expensive.[59]

Studies considering the claimed flow-on benefits of these programs reveal those advantages are speculative. Efficiency projects are relatively fruitless in terms of job

[51] AAP, 'Sack Barnaby Joyce for ditching plan to return water to Murray River, says SA Minister.' The Guardian (18 November 2016)
[52] K Pitt, 'Putting Communities at the Heart of the Basin Plan. Media Release, Minister for Resources, Water and Northern Australia,' (3 March 2021)
[53] Productivity Commission, 'Market Mechanisms for Recovering Water in the Murray-Darling Basin, Final Report' (2010)
[54] Melissa Fyfe, 'Brumby's water plan savaged', The Sydney Morning Herald (28 March 2010). Available at: https://www.smh.com.au/environment/sustainability/brumb ys-water-plan-savaged-20100327-r4dh.html.
[55] Ibid
[56] Ibid
[57] Department of Climate Change, Energy, the Environment and Water, 'First Review of the Water for the Environment Special Account' (2020)
[58] RQ Grafton and SA Wheeler, 'Economics of Water Recovery in the Murray-Darling Basin, Australia,' *Annual Review of Resource* Economics (2018)
[59] J Williams and RQ Grafton, 'Missing in action: Possible effects of water recovery on stream and river flows in the Murray–Darling Basin, Australia,' *Australasian Journal of Water* Resources (2019)

creation, with modelling revealing that 'each dollar spent on human services creates four times as many jobs within the Basin as infrastructure upgrades spending'.[60] These projects also push up the price of water as beneficiaries have higher returns per megalitre and consequently more buying power. The step-up in demand is estimated to have increased water use across participating farms by 23%, increasing prices more than a program focused on purchases would have.[61]

It is worth reiterating that these consequences had been anticipated in 2010, with the Productivity Commission recognising that infrastructure upgrades are generally not cost-effective, pointing to the projects financed under the Living Murray initiative which had cost nearly 40% more than market-based measures. The report also acknowledged that most of the 'low hanging fruit' had already been picked, meaning future projects would be even less cost-effective.[62]

Basin governments appear to be locked-into an ineffective pathway despite abundant evidence and direct advice. Returning to cost-effective, evidence-based water recovery may require addressing the perceived impacts and the disparate drivers that forced the selection of this path. This includes those mentioned above: insistence maintaining production levels, rent-seeking and advantages for state water agencies, irrigation infrastructure operators and engineering consultants.[63]

Addressing the real concerns with water purchases may also require untangling the various instances of false attribution. For example, rural and regional communities are experiencing challenges that are strongly influenced by climate change and drought in combination with decreased commodity prices.[64] Specific industries, like dairy, might suffer from trade sanctions while seasonal conditions like prolonged droughts contribute to rising water prices. Research shows that these factors play a significant role in farm exits.[65]

These factors may also apply to the 'Swiss cheese' effect, which has been used to describe both the flow-on impacts in the community from farm exit as well as the flow-on impacts to other customers on the channel system. These claims would seem to be undermined by evidence that many farmers participating in voluntary water purchases sold only a portion of their water, generating cash-flow to pay off long-term debts and invest in their business. Moreover, economists have pointed out that water buybacks have positive impacts on community spending and that government-commissioned reports claiming a simplistic relationship between water use and farm production don't hold true.[66]

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[60] 4 G Wittiwer, 'Modelling variants of the Murray-Darling Basin Plan in the context of adverse conditions in the Basin,' Centre of Policy Studies, Victoria University (2020) p 62. Commissioned by the Panel for the Independent Assessment of Social and Economic Conditions in the Murray-Darling Basin.

[61] L Whittle et al, 'Economic effects of water recovery in the Murray–Darling Basin,' *ABARES Insights Report* (2020)

[62] Productivity Commission, 'Market Mechanisms for Recovering Water in the Murray-Darling Basin, Final Report' (2010) p xxxiv

[63] G Marshall and J Alexandra, 'Institutional Path Dependence and Environmental Water Recovery in Australia's Murray-Darling Basin,' *Water Alternatives* (2016)

[64] SA Wheeler, 'Debunking Murray-Darling Basin water trade myths,' *Agricultural and Resource Economics* (2022)

[65] SA Wheeler et al, 'Modelling the climate, water and socio-economic drivers of farmer exit in the Murray Darling Basin,' *Climate Change* (2019)

[66] SA Wheeler et al, 'Submission to the Murray-Darling Basin's Royal Commission' (2018)

At the same time, other factors may be influencing the 'Swiss cheese' effect. For example, farmland value has grown significantly in the last decade.[67] Practices by investment groups taking advantage of appreciating land values may intersect with the trade and termination of delivery rights. Other factors could include the rapid expansion of horticulture in the lower Murray, with changing patterns of use driving local change. Compounding the inherent problems with efficiency measures discussed above, these factors may also drive lower utilisation of channel systems and increased evaporation – further undermining the claimed efficiency savings.

These changing market conditions also fuel speculation about what is possible to achieve with water purchases. For example, the number of entitlement trades is increasing but the average parcel size is decreasing.[68] This has been used to point to the diminishing appetite for trade, and the limited possibility of water purchases. Nevertheless, it has also been acknowledged that larger parcels are typically only available when land and production assets are offered for sale.[69] This should draw attention to the role of off-market water exchange. It may also highlight how farms are restructuring now, at a pace that is not ideal for rural communities – but water rights are flowing to large agribusinesses and institutional investors rather than correcting systemic over-allocation.

While it remains critical to identify opportunities for water recovery that maximise public benefits, economists have concluded that separate policies would be more efficient and equitable to provide water for the environment and support jobs and incomes in the Basin.[70]

These confounding variables do not necessarily need to be untangled within this inquiry. But it will be critical work for governments to investigate these processes distinctly. While straightforward water purchases remain the most effective and efficient means of acquiring water, government should pair buybacks with thoughtful spending on regional development projects to help ease adjustment pressure.[71]

Further, it may be worth considering the role of other options toward meeting water requirements and developing a more reliable and secure portfolio, like compensated reduction of extraction access licenses or across-the-board pro-rata purchase, evenly shared across industries.

The same broad assumptions may also be tested regarding structural adjustment. It is critical to assist transition and contribute to the ongoing resilience of communities in collaboration with those communities – without assuming the desired pathways of

[67] Rural Bank 2023. 'Australian farmland values.' See Goulburn Valley p.31. Available at https://www.ruralbank.com.au/siteassets/_documents/publicati ons/flv/afv-2023.pdf
[68] Aither, 'Australian Water Markets Report: 2021-22 Review and 2022-23 Outlook' (2022)
[69] Duxton Water Ltd, 'Explanatory statement to notice of general meeting' (8 Sep 2017)
[70] G Wittiwer, 'Modelling variants of the Murray-Darling Basin Plan in the context of adverse conditions in the Basin,' Centre of Policy Studies, Victoria University (2020) p 62. Commissioned by the Panel for the Independent Assessment of Social and Economic Conditions in the Murray-Darling Basin.
[71] L Whittle et al, 'Analysis of Economic effects of water recovery in the Murray-Darling Basin,' Australian Bureau of Agricultural and Resource Economics and Science (2020)

economic diversification and community development.

Improving governance and institutional arrangements

The governance and institutional arrangements for the Basin Plan pose several significant risks, but in particular, to implementing the constraints relaxation program.

Relaxing constraints on river flow is essential. Without these projects, 'achieving so-called enhanced environmental outcomes will either not happen, or will result in limited outcomes'.[72] These projects are also essential to realise the greatest benefit of water that has already been recovered. The failure of state governments to implement them means that only 7% of the wetland area in targeted river valleys is receiving effective environmental flows.[73] They also provide notable benefits, including forward planning for infrastructure to protect communities from larger floods as well as more sophisticated early warning systems.

Unfortunately, changes to proposals on tributaries like the Goulburn, as well as the slow rate of progress indicates 'the appetite for ambitious constraints relaxation projects by state governments appears to be relatively low'.[74] While a range of instruments and options are available, governments have proposed that easement sales allowing water to flow over the lowermost floodplain remain voluntary.[75] This allows individual landholders to block the delivery of the program.

A panel of independent experts should be appointed to find a workable pathway. This might include considering a wider range of options available to landholders as well as mechanisms for managing unexpected outcomes. Critically, it should consider a deadline for agreements after which compulsory acquisition of easements may be undertaken. Until this pathway is considered, state departments continue to hold disproportionate and unaccountable control of Basin Plan implementation.

It is worth recognising how slow implementation of the constraints program has been utilised as a control valve for the speed of Basin Plan implementation for some time. For example, there has been consistent speculation on the value of recovering additional environmental water while the constraints program remains incomplete.

There is no question that it remains valuable to continue progress on the recovery of held environmental water while the constraints program progresses.

[72] Royal Commission Report (2019) p 60
[73] Y Chen et al, 'A trickle, not a flood: environmental watering in the Murray-Darling Basin, Australia,' *Marine and Freshwater Research* (2021)
[74] G Kahan et al, 'Using an ecosystems approach to re-frame the management of flow constraints in a major regulated river basin,' *Australian Journal of Water Resources* (2020)
[75] J Pittock et al, 'Evidence-Based Conservation of the Northern Victorian floodplains,' *CSIRO* (2022)

First, because even in-channel flows can deliver outcomes maintaining bank vegetation and contribute to flushing salt from the river system, maintaining salinity levels in the Coorong.

Second, because the slow progress with water recovery and accounting discrepancies discussed above mean there is not sufficient held environmental water to warrant discussion of diminishing marginal outcomes. The SDLAM projects and increased SDL reflecting the Northern Basin Review have diminished the targets for held environmental water. Accounting discrepancies related to efficiency measures bring hundreds of gigalitres into question.[76] SDL compliance is limited in the absence of accredited Water Resource Plans – while SDLs may be assessed, they are not enforceable.[77] Audits of have identified discrepancies in water account volumes.[78] Opaque modelling and arbitrary changes to Cap factors and shifting SDLs continue to distort actual water recovery.[79] And there is a 20% disparity between the river flows expected each year and actual river flows.[80] The portfolio is already skewed toward less reliable entitlements and likely to underdeliver in a hotter, drier climate.

Third, because the constraints and enhanced environmental water delivery (EEWD) programs continue to evolve. In Victoria, feasibility studies are being undertaken, project scope is being refined, and prototypes for implementation are in development. For several years, the Victorian government has also been updating modelling, incorporating observations from recent flooding, to improve understanding of how private property will be impacted. As these programs develop – and if a wider range of options are presented to landholders, and liability is clarified or distributed to manage unexpected outcomes – there is reason to believe that they will become more-iterative programs. For example, a trial-based process may be adopted to advance relaxed constraints, recognising seasonal conditions, the short-term requirements of ecosystems, and a range of available water products. The flexibility to pursue this option would be dramatically limited without a sufficient reserve of held environmental water – as reliance on allocation trading would significantly limit delivery timing and increase the burden of planning on water managers.

Fourth, because the prices of all major entitlement in the southern Basin continues to rise, attaching a notable cost to delay. This may continue until the major driver – uncovered permanent horticulture demand in the lower Murray – is thoughtfully addressed.[81]

In combination, the delivery of the constraints management program and a growing reserve of held environmental water provides the most effective pathway toward the Basin Plan's objective of establishing a sustainable and long-term adaptive management framework for Basin water resources. We will know the Basin Plan is working when we can guarantee connectivity between rivers and floodplains, linking all the tributaries, inundating wetlands

[76] J Williams and RQ Grafton, 'Missing in action: Possible effects of water recovery on stream and river flows in the Murray–Darling Basin, Australia,' *Australasian Journal of Water* Resources (2019)
[77] Senate Estimates, Hansard (26 May 2023). Available at: https://www.aph.gov.au/Parliamentary_Business/Hansard/Hansard_Display?bid=committees/estimate/26906/&sid=0002
[78] Inspector-General of Water Compliance (2023), 'Audit of Accounting for Interstate Trade in the Northern Basin'
[79] Slattery and Johnson, 'Water recovery and 'over recovery' in the Macquarie valley' (2021)
[80] Wentworth Group of Concerned Scientists, 'Assessment of river flows in the Murray-Darling Basin: Observed versus expected flows under the Basin Plan 2012-2019' (2020)
[81] Aither, 'Australian Water Markets Report: 2021-22 Review and 2022-23 Outlook' (2022)

and returning nutrients, seeds and young animals to the main river – until flowing out through the Murray Mouth to nourish marine ecosystems.

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