UNSW
Centre for
Ecosystem Science

Submission to the Australian Government on delivery of the Basin Plan

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2nd July 2023

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A. Centre for Ecosystem Science, UNSW Sydney

Professor Kingsford has a long track record of involvement in the management of water resources in the Murray-Darling Basin. He is the Director of the Centre for Ecosystem Science (CES), UNSW Sydney. The research centre he leads supports instruments of government, including strategies that improve effectiveness of conservation of the environment, founded on a strong evidence base. Researchers in CES have established track records in the research and management of Australia's biodiversity, both within and outside protected areas, with a strong focus on freshwater ecosystems and their management (https://www.ecosystem.unsw.edu.au/).

B. Background

The Murray-Darling Basin Plan is a critically important initiative for delivering sustainability to the rivers and ecosystem services of the Murray-Darling Basin. There are a range of aspects relevant to successful delivery of the Murray-Darling Basin Plan which can continue to be improved. Many of these relate to policies and initiatives which have had differing effects on delivery of the Murray-Darling Basin Plan. This submission focuses on focus areas, identified in the request for suggestions to influence successful delivery of the Murray-Darling Basin Plan.

C. Focus areas

There were six focus areas requested through the consultation process.

1. ***Contribute towards the water recovery targets or achieve Basin Plan flow targets more efficiently***

There could be four main opportunities for contributing to water recovery targets and achieving basin plan flow targets more efficiently or ensuring they are not further eroded. These include floodplain harvesting management and regulation; growth in farm dams; definition, interpretation and identification of Sustainable Diversion Limits and; interpretation and approach to efficiency.

i. ***Floodplain harvesting***. It is important to ensure that extractions from floodplain harvesting and development of parts of floodplains are adequately assessed. There needs to be a transparent audit of all floodplain works, in relation to the Murray-Darling Basin Cap 1995, set at 1993/1994 levels of development in all southern states and 1998/99 in Queensland. There remains considerable uncertainty about the amount of water subsequently diverted with infrastructure developments on

floodplains, after governments of the Murray-Darling Basin made the collective decision to cap diversions.

Some assessments have been done that indicated increasing numbers of floodplain storages, indicative of increasing diversions (Australian Academy of Sciences 2019, Brown et al. 2022). This is particularly relevant for the Darling River catchments in New South Wales and Queensland. Further, there is a need to investigate the effects of the Australian Government's investments in efficiency works, as well as private investments in efficiency measures which may capture overland flows. This was highlighted in the ABC Four Corners Report focused on storages developed on the floodplain of the Murrumbidgee River but is more widespread (Rubinsztein-Dunlop 2019). The investment in efficiency developments also probably affects groundwater recharge but may lead to increases in diversions (Wheeler et al. 2020). A rigorous analysis of the infrastructure in place at the time of the Murray-Darling Basin Cap needs to be completed with an assessment of take, and compared with current levels of infrastructure and their take of water. Differences should be incorporated into decisions around access, sustainable diversion limits and licencing to floodwaters, including the environment.

ii. ***Farm dams***. There has been little analysis of the long-term effects of proliferating farm dams in the catchments of the major rivers of the Murray-Darling Basin. These inevitably reduce run-off into the major rivers, affecting supply of water for irrigation and the environment. These were estimated to increase by 8% by 2030, reducing annual runoff by an additional 11% (CSIRO 2008). Analyses for Broadwater Creek, an upstream catchment in the Border Rivers, demonstrated such effects (Schreider et al. 2002). State governments have generally poorly regulated this issue and not assessed the effects. There needs to be an analysis of the growth in farm dams and their effects on flows and impacts on Sustainable Diversion Limits.

iii. **Sustainable Diversion Limits (SDLs)**. One of the major opportunities for achieving basin plan flow targets more efficiently is to review the policy, management and specification of Sustainable Diversion Limits. These were never adequately assessed in relation to environmental sustainability and were largely set to reflect current baseline water use by industry at the time. If these could be reviewed, incorporating potential socioeconomic and environmental impacts, there may be opportunities to improve water recovery at the basin scale. For example, the Macquarie River is considered to be over recovered and yet the ecological condition and data for the Macquarie Marshes, one of the more important Ramsar-listed, internationally important, wetland sites indicates otherwise (Thomas et al. 2011, Kingsford et al. 2017). The SDL for this river system was never based on any environmental sustainability assessment.

A clear opportunity for examining the definition of the SDL and water recovery exists

for the Lachlan River. This is currently considered almost fully recovered in relation to environmental water but specification of the sustainable diversion limit, which determines the cap, was similarly never focused around the environmental impacts of river regulation. The ecological health of many floodplain communities in the Lachlan River catchment are in serious decline, making the specified SDLs a poor reference base line for sustainability. Diversions upstream have detrimentally affected downstream ecosystems in the Booligal Creek floodplains and the Great Cumbung Swamp (Armstrong et al. 2009, Murray-Darling Basin Authority 2012b, a).

There is considerable inefficient irrigation infrastructure in the Lachlan River catchment. Governments could invest in improving these efficiencies and potentially providing a dividend of water for irrigation use but also generate savings that would contribute to the overall flow targets for the Murray-Darling Basin. This would deliver real sustainability outcomes for the environmentally important wetlands of the Lachlan River. There may be other catchments where such an approach would also work.

iv. ***Efficiency***. There needs to be an examination of the meaning of 'efficiency' in relation to the management of the rivers in the Murray-Darling Basin. More often than not, efficiency has focused on delivering water downstream. This does not equate with environmental sustainability. It was a fundamental narrative driver for the Menindee Lakes SDLAM project but with little adequate analysis or incorporation of key issues of environmental sustainability (Ford et al. 2023). Worse, there were clear problems in that the Menindee Lakes SDLAM project was further degrading the environments of the Menindee Lakes to provide water for the environment downstream. Management of the rivers of the Murray-Darling Basin need to recognise the incredibly complex nature of these systems compared to our relatively poor knowledge of the importance and behaviour of flow and flooding patterns. It is important to ensure that efficiency is not interpreted simply as an engineering concept, while not acknowledging the importance of water contributing to floodplains and groundwater systems.

2. Secure value for money

Value for money is important for investments in water management in the Murray-Darling Basin. However, it is open to interpretation and misuse in relation to potential impacts on the rivers and the ecosystem services. This also relates to the issue and definition of the word efficiency (see above). There are three areas where securing value for money is important: SDLAM projects and their delivery of water; investment in private infrastructure and; management of constraints projects.

i. **SDLAM (Sustainable Diversion Limit Adjustment Mechanism)**. It is imperative that such projects be reviewed to ensure that their delivery of environmental water is

justified for their cost, as well as clarity in relation to the environmental benefits.

Our analysis of the Menindee Lakes SDLAM project, the largest under consideration by governments in the Murray-Darling Basin, exposed serious cost implications for a project that was not value for money (Ford et al. 2023). It had a poorly developed evidence base and promised to deliver efficiencies which would have inevitably degraded an important environmental asset in the Murray-Darling Basin – the Menindee Lakes. Our analysis of the evidence space used for decision making identified significant problems with governance and interpretation of value for money (Ford et al. 2023).

This project still offers potential in terms of water savings but it needs to be based on a strong evidence base, not only for hydrology but also the dependent ecosystems. Our analysis indicated that that was very poor assessment of environmental benefits both at the local and larger spatial scales, resulting from significant costs for engineering works to reconfigure Menindee Lakes. There is still a need to assess the management of the Menindee Lakes and attempt to develop it as a restoration project with some water savings, rather than a water savings project only. This would secure good value for money. There are lessons in the decision-making which need to be adequately incorporated into such projects meant to deliver value for money. Other large projects equally need to be reviewed in relation to their delivery of environmental water as opposed to potentially providing private benefits at public cost.

ii. ***Private infrastructure – efficiency program***. Considerable government funds have been invested in improving private infrastructure. It is critically important to review whether these projects adequately contribute to the Basin Plan. There are significant uncertainties in quantifying these benefits at considerable costs and they may have actually run counter to the Basin Plan in their effects on the rivers (Wheeler et al. 2020)

iii. ***Constraints projects***. There have been considerable delays in relation to constraints projects, related to costs and feasibility. Many probably still potentially provide good value for money but governments are not delivering. It may be worth considering what other options there may be for implementing these projects. Other models may be required, including contracting a third party organisation to negotiate and deliver these projects. Before this, there would also need to be a thorough analysis of legalities and liabilities of flooding of private property, given that many of these properties are on private land and were always subject to inundation.

3. Provide enduring environmental outcomes

Environmental outcomes delivered with purchased environmental water and improved water management can be affected by a range of factors. There are challenges in relation to ensuring that the gains for the environment persist. There are four areas that need to be addressed to ensure that environmental outcomes endure: basin jurisdictions' policies, management, developments and legislation; climate change impacts; operational management of water; establishment of environmental flow targets and; connectivity and protection of environmental flows between catchments.

i. ***State water policies, management, developments and legislation***. The establishment and introduction of state policies, operational management and legislation which detrimentally affect the objectives and investments of the Murray-Darling Basin Plan need to be monitored and reviewed. These include a range of recent and past policies put forward by state governments, with considerable potential to undermine enduring environmental gains. These include changes to the management of planned environmental water, management and licencing of floodplain harvesting, investment in new storage infrastructure, activation of A class licences on the Darling River and other operational management of rivers.

   For example, the previous NSW government considered a range of detrimental policies to the sustainability of rivers. Some of these initiatives did not eventuate but still remain part of public discussion. Alterations to the use of planned environmental water were of particular concern. Also, the Liberal National NSW Government considered the building of three large dams, including the enlargement of Wyangla Dam, a new dam at Tamworth, the Mole River Dam and also a new re-regulating storage of Gin Gin Weir. All would have considerable impacts on river environments through the storage of water, increasing diversions and eroding gains provided by restoring some flows to the rivers of the Murray-Darling Basin.

   It is also important to ensure that adaptive environmental water is not used as a substitute for planned environmental water in relation to delivery and running of the rivers. There needs to be a close focus on how this is managed both at a policy level and operational level.

ii. ***Climate change effects***. One of the more difficult issues to ensuring enduring environmental outcomes, relates to the impacts of climate change. With potentially drying catchments and reductions in runoff, there will be inevitable environmental outcomes eroded with less quantities of flow in the rivers. It is particularly important to ensure that this reduction does not affect environmental outcomes disproportionately from other users. Current analysis indicates that held environmental water and stored extraction water will be less affected than other sources of water, including unregulated flows and plant environmental water.

iii. ***Operational management of wate***r. A key objective for ensuring enduring environmental outcomes relates to the management of adaptive environmental water. There is a general tendency to manage this water as a lower priority compared to extracted water for irrigation use. This translates into the operational aspects of water management at the individual catchment scale. Ensuring enduring environmental outcomes will require investment in ensuring that operational delivery of environmental flows becomes a priority in terms of timing and quantity that reflects the needs of the environment, rather than historic legacies driving operational water management driven primarily by the needs for extractive use.

iv. ***Linking of environmental objectives to water planning***. To ensure enduring environmental outcomes for the rivers, it will be important to have more explicit linking of water management to environmental flow objectives. Currently, few water resource plans adequately specify environmental outcomes. There is a need for explicit linking of water management in water resource plans to environmental objectives. This would allow more rigorous auditing of the effectiveness of river management and delivery of water for the environment. It will also be important to improved linking and driving of adequate monitoring of environmental objectives and investigating the cause and effect relationships relevant for the management of the river system.

v. ***Establishment of environmental flow targets***. There is the need to establish environmental flow targets which span the full flow and flooding regime, related to linking water resource planning to environmental flows. This will be important in not only knowing whether or not environmental flows are enduring but also understanding what environmental flows cannot currently deliver in relation to the health of our ecosystems. In particular the long-term decline of floodplains needs to be tracked and understood. And as a result, flow targets may not be able to be achieved but at least this will show which parts of river ecosystems benefit from additional flows and which cannot be delivered given current levels of extraction. With this information, it would be possible to assess likely long-term consequences on ecosystems and their dependent organisms.

vi. ***Connectivity and protection of environmental flows between catchments***. A key initiative for ensuring enduring flows will be the protection of environmental flows between river catchments. Currently many environmental flows, which extend beyond a particular tributary river are not protected. For example, environmental flows from the Macquarie River are not protected as environmental flows, when they reach the Darling River. A key initiative would be to put in place policies which protect these flows so that they not only benefit particular catchments but connect throughout the river system and contribute to whole of system protection. It is no longer acceptable for these environmental flows to be extracted. They should not be

subject to extraction. Otherwise the environmental values of these flows are not protected.

4. Minimise socio economic impacts

In assessing and minimising socioeconomic impacts, it is important to appropriately ensure that all potential costs and benefits, relevant socioeconomics are included and assessed. Generally, there is poor measurement of ecosystem services, assessment of inaction, understanding the many causes of socio-economic impacts and estimating the scale of positive and negative impacts. There may need to be a structural adjustment approach needed once clear impacts are identified.

i. ***Ecosystem services.*** These are an essential and often overlooked component of socioeconomics of river systems. These include the delivery of services relevant to humans reliant on the rivers (e.g. water quality, recreational and non-use benefits). This not only includes values related to financial benefit, such as extraction of water for agriculture, but also other aspects of human interactions including non-use benefits, other economic benefits, and cultural and spiritual services provided by the river.

ii. ***Costs of inaction***. There are a range of costs if water recovery does not continue which are not adequately estimated but fundamental to assessing and minimising socioeconomic impacts of changes in river flow regimes. These include impacts such as the effects of the fish kills and related cleanup required, lack of drinking water to towns along the river systems and loss of recreational opportunities for communities living on the river. These are all improved with adequate flows and their management. There is also the deep significance and importance of healthy rivers for communities, particularly First Nations people. There are also costs for those who own or lease land along the rivers of the Murray-Darling Basin, where productivity of that land has decreased with reductions in flow. This is reflected in poor ecological health of flood dependent vegetation such as floodplain, reducing growth of vegetation for livestock.

iii. ***Multiple causes to socio-economic impacts***. There are a range of confounding factors which need to be considered in relation to estimating and minimising socio-economic costs. The effects of flow reductions to irrigation industries need to be separated out from other confounding impacts affecting rural communities around Australia, including changes in demographics and increasing mechanisation and scale of farming. This is reducing employment in many areas with increases in other service industries related to heavy machinery. All need to be included in assessments in relation to minimising costs so that there is a clear picture of the costs and benefits for such initiatives.

iv. ***Estimating scale of socio-economic impact***. It is essential to examine the evidence of socio-economic impacts of previous initiatives in relation to restoration of rivers, particularly through the buyback and improved efficiency in irrigation areas. This requires a rigorous analysis at different spatial scales to adequately assess the impacts of current and future initiatives to restore water to the rivers of the Murray-Darling Basin. Such analyses are increasingly important with projected decreases in run-off to the rivers with climate change. This needs to be communicated to the broader Australian community who need to be reassured that actual socio-economic impacts are estimated and are not driven by interest groups.

v. ***Structural adjustment***. There are opportunities for targeted structural adjustment to assist agricultural industries which are currently affected by restoration of river systems. This needs to apply not only to the producers but also support services and industries. However, this should also ensure that impacts are not treated as a zero-sum game. An irrigation property will move into dryland production, still delivering primary production.

5. Provide other co-benefits (economic, social, environmental, cultural)

There are a range of important co-benefits which come with restoration of the rivers of the Murray-Darling Basin. These have seldom been adequately measured or even more importantly their importance and dependence conveyed to the general public and agricultural industries. It is important to measure and provide the evidence for this range of co-benefits and support the communities that advocate for their importance. There are key areas where river restoration produces co-benefits.

i. ***First Nations benefits***. The health of the rivers is fundamentally important to First Nations people who live and depend on ecosystem services delivered by the rivers. This dependency relates to fundamental human needs such as drinking water, places to recreate and deep cultural and spiritual connections to water.

The drying of the Darling River and poor ecological health of Menindee Lakes were a fundamental concern for Barkandji communities, custodians of the Barka for tens of thousands of years. There are also concerns that lack of water in the river affects physical and mental health of communities. It may be socially disruptive to communities with reductions in opportunities for recreation. There is increasing investment in engaging with First Nations people in relation to the rivers and their restoration. This is to be supported and reinforced through programmes such as indigenous Ranger opportunities. Recent initiatives to include First Nations people in co-design of monitoring programmes also provide considerable co-benefit opportunities.

ii. ***Education and Research***. There are increased opportunities to realise benefits in research and education. There is a need to better communicate current and

increasing understanding of the relationship between river flows and ecosystem health, along the entire river system. Often, there is poor understanding about the scale of effects of diverting water from rivers, both in terms of length of river and also the time dimensions.

It is important to improve the level of knowledge of communities about the temporal and spatial scale of impacts of water resource development. For example, many major changes to rivers have only occurred downstream of large dams with the most significant effects on the floodplains, at the end of rivers. This spatial scale of impact is generally poorly understood in the broad public. Further, shifting baselines are also contributing to this lack of understanding. It is important that all communities broadly understand how ecosystems are affected by river regulation and extraction. Improving the narrative of these effects is important, while also demonstrating the positive effects of river restoration with environmental flows. Monitoring of environmental changes is still relatively poorly resourced and is contributing to poor understanding of changes.

iii. **Tourism**. There are also a range of tourism benefits. Full Menindee Lakes are already a major attraction for visitors going out to the Darling River but with benefits not only locally but also through to major centres such as Broken Hill. This co-benefit is seldom measured or included in decision making around river restoration. There are also bird watching opportunities at Menindee Lakes. The health of Kinchega National Park, which includes much of the lake system is fundamentally dependent on river health. There are also inextricable links between the health of fish populations in both the Darling River and the River Murray, which depend on breeding and recruitment in different parts of the river system.

There are other major wetland systems in the Murray-Darling Basin which provide significant co-benefits, including the Macquarie Marshes, Gayini wetlands, the Great Cumbung Swamp and Booligal wetlands and the Lower Lakes and the Coorong. Opportunities for improved tourism are often poorly realised, particularly in relation to deepening understanding of the importance and value of river flows.

6. Be supported and implemented effectively by basin state and territory governments

Implementation of the Murray-Darling Basin plan and restoration of the Basin's rivers is inevitably dependent on the policies, management and legislation of basin states and territory governments.

i. ***Improved integration of State environmental agencies in decision-making related to water***. Most water policy and management is governed by jurisdictional water agencies, with relatively few mechanisms for engagement by state environment agencies. Usually, Water Ministers are involved in the Murray-Darling Basin governance, often without Environment Ministers. There are concurrence

requirements for water plans in NSW but this has seldom resulted in major changes to improve basin outcomes in this state. It is important to reform water management in basin state and territory governments at all levels. This could be done with increased involvement of environment agencies (responsible for biodiversity, including native fish). At state levels, improved integration of water policy and management is essential and could be done by forming Whole of Government technical task groups. This was done to good effect in NSW in the 1990s with much improved sustainable water management, under the governance of Water CEOs. This was subsequently abandoned.

ii. ***Federal oversight and compliance***. There is a need for improved oversight by the Commonwealth government of the implementation of the basin plan by states and the territory. There is considerable variation both between states and also within states in relation to the level of implementation of the objectives of the basin plan. Some of these issues are identified in this submission.

The current processes primarily revolve around approvals of state and territory water resource plans. Previous arrangements under the Murray-Darling Basin Commission were supported by the Australian government through some key mechanisms which are absent under the current arrangements. This is leading to individual interpretations by state governments of their responsibilities under the basin plan, often undermining the Basin Plan, with limited repercussions.

In the past, the Commonwealth government provided resourcing to the states through grants which supported programmes in a range of different areas. There was also independent reporting of implementation of water policies and management, with advice provided to the Australian government about the relevant efforts of the jurisdictions. Further, the National Competition Council was able to advise on levels of delivery of programs by the states, offering a compliance mechanism. If states and territory did not meet their obligations, then there was a mechanism where the Australian Government through the National Competition Council could restrict funding to those states not complying.

This mechanism is absent under current implementation of the Basin Plan and has led to poor implementation by some states. There is a need to investigate how the Commonwealth government might better ensure implementation of the Basin Plan by restricting grants to the states if they are not meeting their obligations as previously occurred. Unless a mechanism such as this is provided, there will be ongoing challenges for the support and implementation of the basin plan. In summary, there is a need for independent auditing mechanisms in relation to policies, extraction of flows, and management of rivers across jurisdictions. This should then be supported by mechanisms which restrict funding to states or the territory where compliance is not occurring. A national body could oversight such a process.

iii. ***Standardisation of language and procedures***. There is a need for improved standardisation. Considerable progress has been made in relation to ensuring that water resource plans are similar but the jargon variation across different jurisdictions makes coherent Basin wide policy difficult.

Given that the rivers of the Murray-Darling Basin do not respect state boundaries, it is important to keep progressing standardisation across the jurisdictions. This will inevitably require negotiations in relation to state legislation and how it specifies different types of water but this should continue to be a key objective. It could be included as one of the important initiatives under a future National Water Initiative.

There is also a need to continue to strive for standardising monitoring so that reporting can be achieved at different spatial scales, across the Basin. Further, there is a need to improve standardisation of operations across river systems, recognising there will always be some necessity to tailor operations. For example, there will be variable amounts of environmental flow and releases may be restricted by operating rules. Even within states there is considerable variation in high level operational procedures and decisions with significant user and environmental consequences, particularly under climate change (Steinfeld et al. 2020).

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