Submission No 115

INQUIRY INTO RATIONALE FOR, AND IMPACTS OF, NEW DAMS AND OTHER WATER INFRASTRUCTURE IN NSW

Name: Professor Jamie Pittock

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Australian National University

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Professor Jamie Pittock
Fenner School of Environment & Society
The Australian National University

The Chair
Portfolio Committee No.7 - Planning and Environment
NSW Parliament House
Macquarie Street
Sydney NSW 2000
By email: portfoliocommittee7@parliament.nsw.gov.au

www.anu.edu.au

Dear Madam,

Submission on the rationale for, and impacts of, new dams and other water infrastructure in NSW

I write to provide a submission into the rationale for, and impacts of, new dams and other water infrastructure in NSW. My submission may be published in full on the website, including my name. I am a professor of environmental science and policy at the Fenner School of Environment and Society at The Australian National University and a member of the Wentworth Group of Concerned Scientists. I have worked on issues of management of rivers, flood plains and water infrastructure since the early 1990s in Australia and internationally. Since 2008 I have published extensive peer-reviewed research on water management in the Murray Darling Basin, flood risk management, water and climate change adaptation, managing the costs, benefits and risks of water infrastructure, and conservation of freshwater ecosystems.

Your Portfolio Committee No.7 - Planning and Environment is inquiring into the rationale for, and impacts of, new dam and mass water storage projects proposed by Water NSW including Wyangala, Mole River and Dungowan Dam projects, the Macquarie River reregulating storage project and the Western Weirs project. In my submission I will focus on the two projects where I have particular expertise, the proposed Wyangala Dam and the Western Weirs projects.

Response to the Committee's terms of reference:

(a) **The need for the projects**, including the historical allocation of water and consideration of other options for ensuring water security in inland regions.

Proposed Wyangala Dam raising.

The proposal is to raise the existing Wyangala Dam wall to increase its storage capacity by 650 GL (54%) in order to supply an extra 21 GL/yr on average to water entitlement holders. WaterNSW justify this on the basis that it will somehow contribute to improved town water supply, flood risk management and improve irrigation water supply. This approach of attributing all manner of purported benefits to justify dam projects, exaggerating the benefits and underestimating the costs, is a well-documented global problem (WCD 2000).

At the time of writing there is no publicly available cost-benefit assessment of this project from WaterNSW, yet the NSW and Federal Governments have earmarked $650 million for its construction.

At the time of writing none of the overarching policy documents for the Lachlan River valley have been approved to enable the community to judge where new storage capacity is justified, to whit:

a) The Lachlan Water Resource Plan under the Murray-Darling Basin Plan has not been approved by the Federal Government;
b) The draft Lachlan Regional Water Strategy setting out a broad range of alternative options for water management in the valley has not been released for public comment; and
c) The NSW Lachlan Water Sharing Plan has not been finalised.

Under these circumstances it would be improper to approve a project that pre-empts the community consultation on water management options.

The Wyangala dam project purports to deliver three main benefits:

a) Reduced flood risk. This is totally unjustified. WaterNSW have provided no evidence that this is needed, that building extra storage is the best of many solutions, or that the harm that this would cause to downstream pastoralists and the environment is worth the cost. The higher dam will capture all but the most extreme floods. The beneficial inundation of the 470,000 ha of downstream floodplains enhances production of fodder, timber and fish. It supports of six wetlands of national significance and numerous migratory water birds that Australia has treaty obligations to conserve (DoE 2009). Even if flooding does cause some localised impacts, global best practice is to move infrastructure out of harms way, or harden it, so as to restore the floodplain (Wenger, Hussey et al. 2013). For example, the inundation of the Newell Highway on the Lachlan floodplain between West Wyalong and Forbes in the 2016 flood may be better addressed by upgrading this key road. For example, there is no information on whether the NSW Government's Lachlan River Gooloogong to Jemalong Gap Floodplain Management Plan (2011) and Lachlan River Jemalong Gap to Condobolin Floodplain Management Plan (2012) have been implemented to manage flood risks.

b) Improved town water supply. Every town in NSW deserves access to a reliable supply of potable water. However, town water demand is a tiny portion of consumptive water use in the Lachlan valley. Local water utilities hold just 15.545 ML out of nearly 700 ML in issued surface water entitlements. Building 650 GL of storage is not needed to improve town water security as opposed to better management of existing infrastructure. Further, as climate change makes surface water supply less and less reliable, it is foolish to rely on one water source. A more sensible strategy would be to diversify town water supplies to spread risk and increase reliability. There are many such options in the Lachlan valley, including: a) applying nationally agreed policies to prioritise critical human needs in operating existing water storages; b) developing groundwater and managed aquifer recharge supplies; c) recycling more wastewater; and d) build local, off-river storages dedicated to domestic water supply.

c) Increasing reliability of general security water entitlement take by 21 GL/yr. The reduced reliability of allocations to general security entitlement holders is due to such factors as too many licences being issued, decreased inflows into streams due to climatic variability and change, and limited investment in more efficient water use in the Lachlan valley. There is

no public explanation of why raising Wyangala Dam has been proposed over other options, for example, the ten year old proposal to invest in more efficient water infrastructure in the Jemalong irrigation scheme to reduce transmission losses by 20 GL/yr. Such alternatives have other benefits, for example, increasing the productivity of irrigation farms and employing more local businesses in the implementation of these measures.

Western Weirs Program.

Weirs and other barriers across rivers cause great ecological harm, including by preventing migration of native fish species and by creating weir pools that favour pest species like European carp. There are over 29 weirs along the Barwon- Darling River and the adjoining tributaries. In the late 1990s NSW Fisheries undertook an audit of weirs to assess barriers to fish conservation and recommended improved management. Sadly, apart from the River Murray, there has been no systematic action by NSW governments to implement the NSW Fisheries recommendations. WaterNSW owns a number of weirs but ownership of the other weirs is unclear. The weirs have severe problems which warrants a program to review their performance to clarify ownership, remove redundant and unsafe structures, repair those that are needed, and add environmental mitigation measures, such as fish passages.

Towns in western NSW deserve access to more reliable supplies of potable water. Many weirs were built to pool water to supply these towns with water. The volume and quality of this water is declining with climate change and mismanagement of river flows. There are a number of options for removing the weirs and improving town water supplies. For example, a 2000 study by PKK for WWF scoped out options to improve water supplies for Louth, Tilpa, Yeoval, Pooncarie and Glen Innes (PPK Environment and Infrastructure 2000). The options to improve reliability and quality of domestic water supply while reducing environmental impacts included modifying existing weirs, groundwater and off-river storage.

(b) **The economic rationale and business case of each of the projects**, including funding, projected revenue, and the allocation and pricing of water from the projects.

Proposed Wyangala Dam raising.

No business case has been presented publicly to justify this project. It is hard to see how this $650 million project is value for money. By my calculation, the initial capital cost to supply an additional 21.05 GL/yr of general security water with this proposal is $30,879 / ML. The maximum entitlement price for Lachlan general security water in June 2019 was $1,100 / ML.

The WaterNSW proposal raises many questions for the NSW Government, including:

a) How the National Water Initiative principle that beneficiaries pay for such water supply projects can be implemented since cost recovery would result in exorbitant hikes in water fees for irrigators;
b) Given that the project aims to increase irrigation take, what is the definition of ‘planned environmental water’ in the Lachlan that is meant to be legally protected from extraction under the National Water Initiative and the Basin Plan?
c) In the event that the extra storage results in ‘growth in use’ of entitlement water in the Lachlan (the objective of the project) that exceeds the Sustainable Diversion Limit under the Basin Plan, how many general security water entitlements would the NSW Government need to purchase to compensate?

d) Would planned environmental water or held entitlements wear the additional loss of water to evaporation from the larger surface area of Wyangala reservoir?
e) Given the environmental harm this project would inflict in the reservoir area and downstream on 470,000 hectares of freshwater ecosystems, what price would be required for offsets under the NSW Biodiversity Conservation Act?

The NSW Government has presented no information to demonstrate an economic case for this project in accordance with any relevant national policies.

Western Weirs Program.

Thus far, WaterNSW has only proposed to undertake a $4.3 million scoping study. In the PKK - WWF Australia assessment, the options to improve water supplies for the towns of Louth, Tilpa, and Pooncarie ranged from ~$90,000 to $2.7 million per town in 2000 dollars (PPK Environment and Infrastructure 2000). I would argue that this magnitude of public expenditure is in the public interest in order to: a) provide a safe water supply for people, and b) reduce the environmental impacts of the current weirs.

(c) **The environmental, cultural, social and economic impacts of the projects**, including their impact on any national or state water agreements, or international environmental obligations

Proposed Wyangala Dam raising.

In section 3.3 of the Commonwealth EPBC Act referral for this project, the proponents dismiss their likely impacts on the hydrology of the river system by claiming “Since the existing dam has been operational for a long period of time, the downstream environment is likely to have been significantly modified.” This extraordinarily ignorant assessment demonstrates why this project needs to be exposed to full public scrutiny.

Raising the Wyangala Dam wall will fundamentally change water flows downstream in the Lachlan River and to floodplain wetlands of national and international importance. The higher dam is designed to catch and store high river inflows. High flows down river are beneficial: they sustain the pastoral industry, the nearly half a million hectares of wetland ecosystems and associated values (especially species listed under Part 3 of the Commonwealth EPBC Act). The rare, unmanaged dam spills from the current, lower structure are critical to inundating floodplains to sustain these benefits.

The proposed higher dam will eliminate nearly all unmanaged flows. While in theory an environmental water allocation held in the dam could be released to provide a flow to sustain key environmental values (which the NSW Government does not say it will undertake in this proposal), in practice this will not occur for several reasons:

1. The NSW Government will not release water to provide overbank flows unless flood easements are acquired from all downstream landholders whose properties may be inundated. Overbank flows are essential for sustaining floodplain wetlands and species protected under the EPBC Act. Damage from an unmanaged flow is an act of god. Damage from a managed flow risks compensation claims unless flood easements were acquired. The NSW Government committed to “relaxing constraints” to enable overbank flows under the Murray Darling Basin Plan on the Murray and Murrumbidgee rivers in 2014

(MDBA 2013), but it has not delivered so far. It has not proposed constraints relaxation in the Lachlan in this proposal.

2. This project is intended to "improve water supply yield by 21.05 GL per annum of General Security equivalent" (Section 1.2). Increasing water supply for irrigation means taking this water from the environment and other users (like pastoralists). This project would increase irrigated water take by 12.6% of the current Sustainable Diversion Limit (SDL) for the Lachlan, 166.6 GL LTAAY[1]. The "planned environmental water" that is required to be protected under the National Water Initiative and the Murray-Darling Basin Plan is poorly defined and is likely to include the proposed 21 GL take under this project. Further, under the Basin Plan, if such 'growth in use' were to exceed the SDL then the NSW Government would be required to purchase water entitlements for the environment to compensate.

In addition to any direct impacts at the reservoir site, this project would negatively impact on populations of threatened species and migratory birds, which are matters of national environmental significance under Part 3 of the Commonwealth EPBC Act, by altering water availability and flows downstream of the proposed development. Australia has obligations to conserve migratory species under four international treaties, and to conserve freshwater biodiversity under the Convention on Biological Diversity and Ramsar Convention on Wetlands. The proponents acknowledge the following EPBC Act threatened species are likely to be impacted:

- *Bidyanus bidyanus* (Silver Perch) CE
- *Maccullochella peelii* (Murray Cod) V
- *Macquaria australasica* (Macquarie Perch) E

In other documents, NSW Government acknowledges to importance of the biodiversity supported by the Lachlan River, stating that: "parts of the regulated Lachlan River have very high instream values ... The Lachlan catchment supports a significant spread of threatened fish species or endangered populations ... Eel-tailed catfish and Murray cod were widespread in the regulated river sites ... Fish biodiversity was highest in the lower reaches of the Lachlan River between Lake Cargelligo and Hillston."[2]

The NSW Government further reports" "Native and threatened fish species including the eel-tailed catfish, silver perch, Macquarie perch, golden perch, big-headed gudgeon, olive perchlet, southern pygmy perch, Murray cod, and western carp gudgeon … Habitat for threatened frog species such as Sloane's froglet, Booroolong frog, yellow-spotted tree frog, southern bell frog and stuttering frog … Habitat for threatened bird species including magpie goose, Australasian bittern, brolga, black-necked stork, Australian painted snipe, black-tailed godwit, blue-billed duck, eastern osprey, freckled duck and curlew sandpiper … Habitat for threatened plant species including spike rush, dense cord rush, Austral pillwort, Klaphake's sedge, winged peppercress and Menindee nightshade."[3]

The NSW Government claims in their referral that they do not consider the impact on migratory species to be significant. This is an outrageous omission given the extensive migratory waterbird use of the floodplain, as summarised in the table below. Their habitat would be degraded as the higher proposed dam would prevent peak water flows needed to fully inundate these wetlands.

[1] https://www.mdba.gov.au/basin-plan-roll-out/sustainable-diversion-limits/current-diversion-limits-basin
[2] https://www.industry.nsw.gov.au/__data/assets/pdf_file/0007/145393/Lachlan.pdf
[3] https://www.industry.nsw.gov.au/__data/assets/pdf_file/0007/145393/Lachlan.pdf

The Lachlan supports important ecological values including over 470,000 hectares of wetlands of which 95% are floodplain wetlands and 5% are lakes.[4] Of these, the Directory of Important Wetlands in Australia lists five important wetland complexes covering 54,240 hectares.

Table. Directory of Important Wetlands in Australia site in the Lachlan valley.

DIWA #	**Important wetland**	**Area (ha)**	**Bird species listed under JAMBA and / or CAMBA** (migratory species under Part 3 of the EPBC Act).
NSW040	Lake Cowal / Wilbertroy Wetlands	20,500	Great Egret (*Ardea alba*), Cattle Egret (*Ardeola ibis*), Lesser Golden Plover (*Pluvialis dominica*), Greenshank (*Tringa nebularia*), Japanese Snipe (*Gallinago hardwickii*), Bar-tailed Godwit (*Limosa lapponica*), Red-necked Stint (*Calidris ruficollis*), Sharp-tailed Sandpiper (*Calidris acuminata*), Caspian Tern (*Sterna caspia*), White-bellied Sea-eagle (*Haliaeetus leucogaster*), and the Glossy Ibis (*Plegadis falcinellus*)
NSW048	Lake Brewster	6,140	Great Egret (*Ardea alba*), Glossy Ibis (*Plegadis falcinellus*), White-bellied Sea-eagle (*Haliaeetus leucogaster*), Common Greenshank (*Tringa nebularia*), and the Marsh Sandpiper (*Tringa stagnatilis*)
NSW043	Booligal Wetlands	5,000	Glossy Ibis (*Plegadis falcinellus*), Great Egret (*Ardea alba*), Sharp-tailed Sandpiper (*Calidris acuminata*)
NSW045	Lachlan Swamp	16,000	Great Egret (*Ardea alba*), and the White-bellied Sea-eagle (*Haliaeetus leucogaster*)
NSW047	Great Cumbung Swamp	6,600	Great Egret (*Ardea alba*), Glossy Ibis (*Plegadis falcinellus*), White-bellied Sea-eagle (*Haliaeetus leucogaster*), Sharp-tailed Sandpiper (*Calidris acuminata*), Latham's Snipe (*Gallinago hardwickii*), and the Common Greenshank (*Tringa nebularia*)
Total		54,240	

The Commonwealth Environmental Water Holder says that the Great Cumbung Swamp at the end of the Lachlan River is "one of the largest stands of river red gums in New South Wales and is one of the most important waterbird-breeding areas in eastern Australia."[5]
This dam raising proposal threatens nationally significant wetland ecosystems and national policy commitments under the National Water Initiative and Murray Darling Basin Plan.

Western Weirs Program.

A well-considered program to remove or repair over 29 weirs along the Barwon- Darling River and the adjoining tributaries in conjunction with enhanced town water supply systems could have positive environmental, cultural, social and economic benefits.

(d) **The impacts of climate change on inland waterways**, including future projections, and the role of dams and other mass water storage projects in ensuring security of water supply for social, economic and environmental outcomes.

[4] https://www.environment.gov.au/water/cewo/publications/environmental-water-delivery-lachlan-river
[5] https://www.mdba.gov.au/discover-basin/catchments/lachlan

Proposed Wyangala Dam raising.

It is doubtful that the higher dam will regularly fill. Wyangala currently has a capacity of 1,220 GL and the proposal is to increase this by 650 GL or 53% Consider the WaterNSW real time website data on Wyangala Dam storage (below).[6] In the past 20 years the dam has only been full and spilled twice. In a drying climate, where will the inflows come from to justify a 53% increase in storage capacity at a cost of $650 million? The proponents provide no hydrological modelling, nor analysis of climate change impacts, that justify this excessive infrastructure proposal.

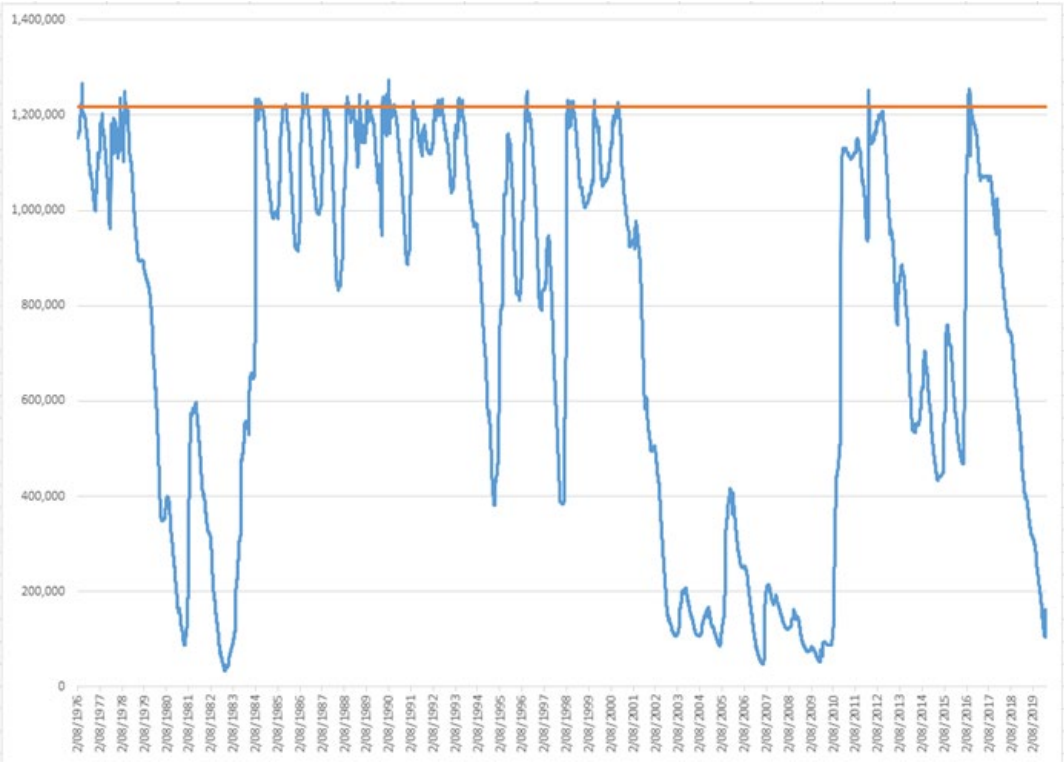

Figure. Wyangala Dam water storage 1976-2019. Source: WaterNSW

The proponents acknowledge their lack of hydrological assessment in the scoping report (pg. 28) provided under the Commonwealth EPBC Act referral in stating: “Water balance modelling will be conducted to confirm yield and security of supply and will consider any requirements of the water sharing plans and SDLs (such as cumulative impacts associated with water extraction/allocation), which have been developed in accordance with the MDBP [Murray Darling Basin Plan].” A responsible proponent would have undertaken this work already.

Further, many water users in the Lachlan valley depend on groundwater resources. These are recharged by peak flow events that a higher dam wall will prevent. The Murray-Darling Basin Authority says: “Groundwater in the catchment exists in alluvial deposits that extend along the Lachlan River from Cowra to Condobolin, as well as along tributaries of the Lachlan. However, the main resource of good quality (fresh) groundwater is in alluvial aquifers that spread across the western part of the catchment from Lake Cargelligo to beyond Hillston — an area of around 3,300 km². There is streamflow leakage into alluvial groundwater within the catchment.”[7] The

[6] https://realtimedata.waternsw.com.au/
[7] https://www.mdba.gov.au/discover-basin/catchments/lachlan

proponents have undertaken no analysis of the likely impact of the dam wall raising on groundwater recharge.

Western Weirs Program

The drying up of the Darling River in recent years due to drought and mismanagement highlights the risks to water supply for western towns with climate change. The Western Weirs Program is an opportunity to secure more reliable and higher quality water for towns by diversifying water sources through including modifying existing weirs, managed groundwater resources and off-river storage.

(e) **Water infrastructure technologies that may promote enhanced environmental outcomes**.

Proposed Wyangala Dam raising

There are plausible alternatives that the governments should consider.

1. **Managing existing infrastructure better**. This is a very expensive project in terms of money, impacts on the environment and on other water users, like pastoralists. Managing the current Wyangala Dam and other infrastructure better may improve outcomes, e.g. increase reliability of town water supplies.

2. **Moderise irrigation infrastructure** to increase efficiency of water use. The irrigation schemes in the Lachlan valley have not had the opportunity to benefit from the Federal Government's Sustainable Rural Water Use and Infrastructure Program to upgrade their infrastructure. Clearly, the Federal Government in allocating $3.1 billion to this program considers infrastructure upgrades are a viable means of improving water security. Efficiency would only need to be increased by 13% of the SDL to obviate any benefits from raising the dam wall. A proposal ten years ago to modernize the Jemalong irrigation scheme was reported has having the potential to save 20 GL/yr. Such work would help reduce salinity problems in the Lachlan valley. Further, investment in infrastructure upgrades are likely to generate more jobs in local towns along the valley than the dam wall raising. The risk of reducing return flows to the river from leaky irrigation infrastructure would need to be managed with this option.

3. **Managed aquifer recharge**. Security of water supplies for towns in can be greatly improved through a range of measures that include managed aquifer recharge, better use of groundwater and greater wastewater recycling. Again, this is a cost effective alternative that offers greater socio-economic benefits for local communities.

4. **Manage flood risks**. Where infrastructure downstream of Wyangala Dam is at risk from the very infrequent flood events in the valley the governments could fund its relocation, raising or strengthening. Such measures to 'give the river room' to flood safely is a standard approach to managing flood risks in China, Europe and the United States (Wenger, Hussey et al. 2013). The NSW could start by funding implementation of its existing floodplain management plans for the Lachlan valley.

Western Weirs Program.

As discussed above, there are a number of options to improve reliability and quality of domestic water supply while reducing environmental impacts, including modifying existing weirs, groundwater and off-river storage. The environmental performance of the current weirs may be improved by removal, lowering existing structure and installing fishways.

Thank you for considering my submission. I would welcome an opportunity to elaborate on any of these points for members at any committee hearing.

Yours sincerely,

Professor Jamie Pittock

References:

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