SUBMISSION BY THE WATER JUSTICE HUB TO THE NATIONAL WATER INITIATIVE INQUIRY 2024

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1. Inquiry Terms of Reference

The Productivity Commission (PC) has been asked to make recommendations:

• on actions that the parties to the National Water Initiative (NWI) might take to better achieve the objectives and outcomes of the NWI

• to support all Australian governments in efforts to progress national water reform in light of current priorities, including water security and the involvement of First Nations communities in water management.

• on how the Australian Government can better utilise the Water Act 2007 (Cth) as a framework for guiding national water reform policy.

2. Overview

We bring to the attention of the PC an initial submission (submission 30, available at https://www.pc.gov.au/inquiries/current/water-reform-2020/submissions#initial) by the Institute of Water Futures dated 21 August 2020 to the PC's Second National Water Reform Inquiry and also a post-draft submission (DR120) dated 17 March, 2021.

Our submission below should be read alongside these two earlier submissions and is a follow up and update. The focus of this current submission is on:

i) water accounting and water auditing and,
ii) climate change and water extractions.

We note that our previous statements in initial submission 30 and post-draft submission (DR120) in relation to other matters and especially to water governance and investments in water infrastructure remain relevant in 2024 and should be consulted as part of the current Inquiry.

3. Water Accounting and Catchment Water Audits

The NWI seeks, one, 23(iv): *complete the return of all currently overallocated or overused systems to environmentally sustainable levels of extraction* and, two, 23(vi): *clarity around the assignment of risk arising from future changes in the availability of water for the consumptive pool*. These objectives cannot be achieved without first delivering 23(vii): *water accounting which is able to meet the information needs of different water systems in respect to planning, monitoring, trading, environmental management and on-farm management*.

Water accounting specified in the NWI in 23(vii) requires robust measurement of water flows (inflows, outflows, return flows, ET) and critically important data and information to deliver effective and good water governance. We detail below what is required to ensure such data and information to achieve the objectives and outcomes of the NWI.

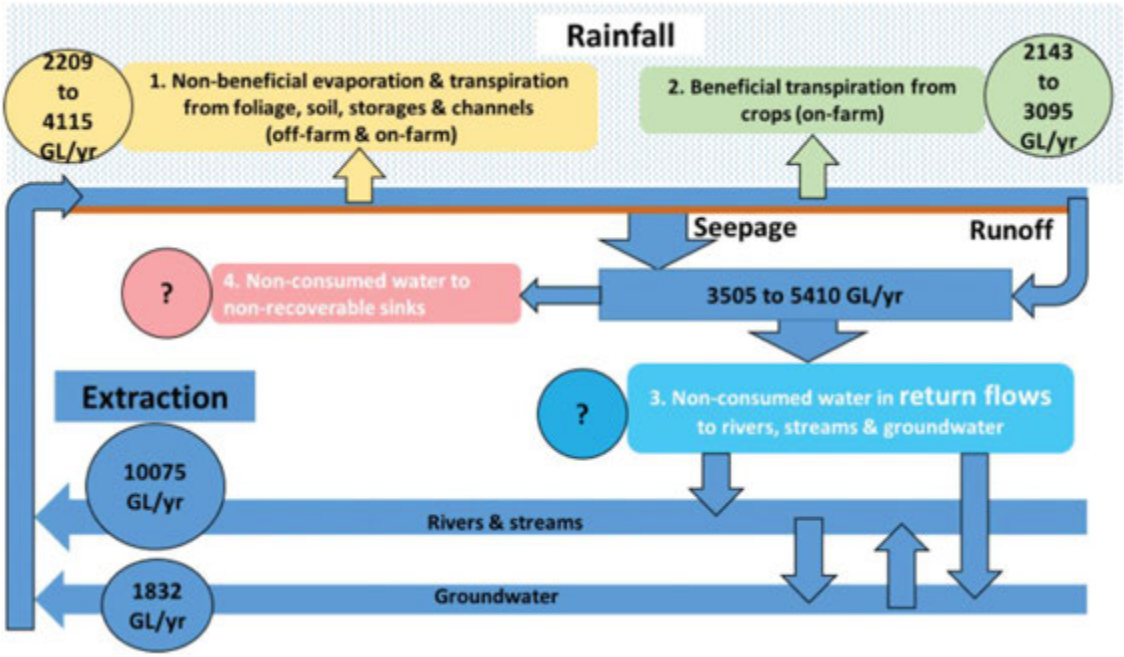
3.1. You cannot effectively manage what you cannot measure. While there is water accounting data available in reference to the Murray-Darling Basin (MDB) this is 'patchy' and in some locations, particularly in the Northern MDB, is subject to large uncertainties. Importantly, data on 'who, what, how and when' of water use (and return flows) is not publicly available at an individual water diverter level.

The water that is being diverted in the MDB is a public resource and, as such, the onus should be on diverters to make available a transparent and accessible water plans in relation to the water they divert, for what purpose. Individual diverter water plans, at the end of the irrigation season should be completed as part of a statutory declaration. This requires comprehensive water-balanced based water accounting and water audits, as outlined in Grafton and Williams (2019).

Remote-sensing data on ET could then be used to identify 'outliers' in relation to the stated water diversions. Such a process of measurement, monitoring and reconciliation would identify water theft, levels of water diversions and consumption at a field scale and provide invaluable information to all about how much water is being diverted and consumed, by whom, where and when. The fact that remote sensing date is already being used by the Natural Resource Access Regulator (NRAR) of New South Wales for compliance purposes means that such information could be made accessible for all.

3.2 A comprehensive water audit for key catchment is needed across Australia. A comprehensive, robust, rigorous, and transparent water accounting framework is a fundamental requirement for the effective implementation of the NWI and, in particular, 23(iv) and 23(vi). Such a framework underpins information on the trade-offs needed to reset the balance between the environmental health of rivers and groundwater systems and the consumptive use of water in a catchment. Such water accounting must be built on quantitative hydrological analysis and modelling tools that can describe all the water flows under irrigation, at scales from catchment to whole-of-Basin. These tools must be able to show that mass is conserved (that water in the system is consistent with the Law of Conservation of Mass).

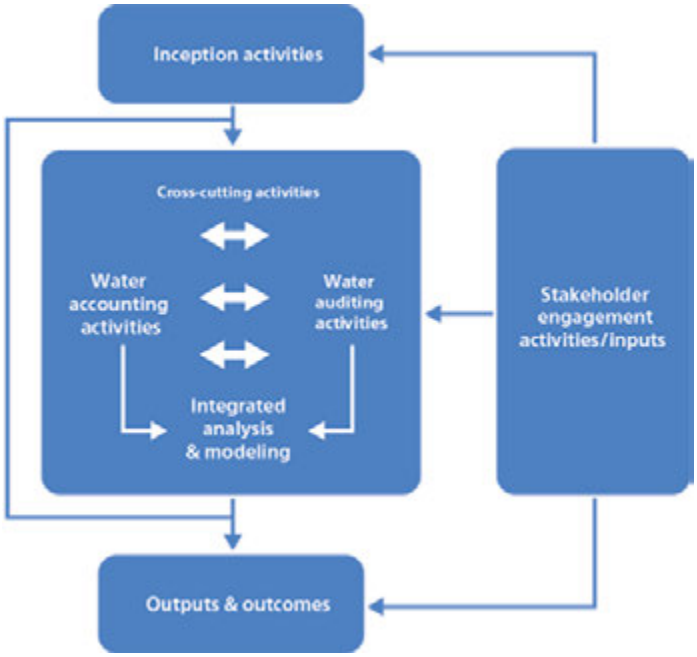
Hydrological measurements, coupled with various modelling tools can describe reliably the flows of water in an irrigated landscape. They are essential to inform water management and water sharing arrangements at a catchment scale in Water Sharing Plans, including estimates of water security and supply, sustainable diversion limits and environmental water recovery targets. Copied below, from Fig. 3 in Williams et al. (2022), we highlight 'closing the water balance' gaps for the MDB and the critical need for a robust water audit.



We restate, as per the 2020 submission, the Murray-Darling Basin Authority (MDBA) and State agencies currently either do not know or do not make publicly available: (1) the volumes of water in private storages; (2) the volume of water diverted through floodplain harvesting; and (3) the downstream flow effects of increases in irrigation efficiency.

Uncertainty over private water storage, floodplain harvesting and return flows undermines the perceived integrity of holders of water entitlements, increases the likelihood of errors in decision-making, and diminishes trust in decision-making by water governance agencies, especially by the owners of water entitlements. In our view, large unmitigated risks will remain for all water users without transparent and audited water accounts that include measurements or reliable estimates of recoverable return flows (see Williams and Grafton, 2019), floodplain harvesting (see Brown et al., 2022) and the effects of climate change on flows (see Grafton et al., 2022).

3.3. Water Accounting and Water Audits are best practice and widely practised globally. Water accounting and audits are widely practised and are necessary requirement of good water governance (see Food and Agricultural Organization, FAO, at Water accounting & auditing guidelines (fao.org)). A figure explaining the approach is provided below, copied from Batchelor et al. (2016, p. 20)



The FAO has developed this process in three river basins (Okavango, Awash, Helmand), and developing Water Audit in other river basins (Nile, Niger, Jordan/Litani) within that FAO's Remote Sensing for Water Productivity programme.

In sum, a comprehensive set of Australian water accounts, a regular, transparent Water Audit that deploys 'cutting edge' technology alongside effective community consultations is essential to delivering credibility and public trust in NWI implementation.

4. Climate Change and Water security

It almost three decades since the then Prime Minister of Australia stated in relation to the MDB and climate that: "The CSIRO estimates that by 2020, average annual flows could decline by about 15 per cent due to climate change, recovery from bushfire, farm dam and plantation expansion and increasing use of groundwater. All parties must recognise that the old way of managing the Murray-Darling Basin has reached its use-by date. The tyranny of incrementalism and the lowest common denominator must end." (Transcript of the Prime Minister, the Hon John Howard MP Address to the National Press Club, Great Hall, Parliament House, 25 January 2007).

Yet the 2012 Basin Plan did not have sustainable diversion limits (SDLs) account for climate change. Neither do many water sharing plans in Australia. Further, the current NWI mentions Climate Change only twice including: First, 82(iii)(c), where it states water resource accounts must give consideration of land use change, **climate change** and other externalities as elements of the water balance. The second mention of climate change in the NWI is in Schedule E 1(iii) where it states consideration be given to the risks that could affect the size of the water resource and the allocation of water for consumptive use under the plan, in particular the impact of natural events such as climate change and land use change, or limitations to the state of knowledge underpinning estimates of the resource.

In our view, climate change must be given a high-level priority in a revised NWI that would be given effect through water resource planning, accounting, and water audits at the state and territory level but facilitated at the federal level for consistency and information sharing. How climate change is considered and responded to in Australian water planning should be 'fit for purposes, people and place'. Reformed water planning and auditing should include both baselines (with climate change) and triggers (where actions are taken in response to the state of the world). It should also consider cultural, social, environmental and economic values and, at a minimum, environmental outcomes, water extractions and types of water use, current and projected flows, water storage levels, and groundwater-surface interactions.

Of critical importance in water planning is to attribute or partition impacts of climate change from water extractions and water consumption on stream flows and groundwater levels. Without a decomposition of which factors are driving changes in surface water flows or groundwater, the management actions required will less than effective or may even be counterproductive. For example, if all stream flow declines are attributable to climate change, 'business as usual' or some incremental change in water sharing plans may be considered adequate by some water planners. If, however, much of the decline in stream flows is the result of increased water extractions, a much more fundamental change in catchment planning and water reallocation is required.

A decomposition analysis, using the Budyko Method, of stream flows by Grafton et al. (2022) on the Lower Darling (hereafter the Barka) River found that only about one third half of the recent reduced streamflow over the period 1981-2020 for the Barka- Barka River is due to a meteorological drying trend. Grafton et al. (2022) attribute the unexplained streamflow decline along the Barka (measured at Wilcannia) to an increase in water extractions upstream of the

Barka River. A four-step process developed by Grafton et al. (2022) provides an adaptive response to changes in meteorological trends and stream flows which involves a reduction in water extractions, as required, to achieved agreed-to environmental outcomes.

A follow up analysis by Chu et al. (2023) for all seven catchments in the Northern MDB over the period 1981-2020 found that in the five catchments (Condamine Balonne, Border Rivers, Gwydir, Namoi Pell, Macquarie Castlereagh) with water extractions for irrigation long-term meteorological trends only explain half streamflow decline in irrigation catchments. In the two catchments (Paroo and Warrego) without (or very little) water extractions for irrigation, long-term meteorological trends fully explain the reduction in stream flows. Chu et al. (2023) attributes the unexplained decline in streamflow in the five irrigation-catchments to increased water extractions between 1981-2000 and 2000-2020 which is consistent with the findings of Brown et al. (2022) of increased water extractions and flood plain capture, as summarized in Williams et al. (2022).

In sum, delivery of key objectives of NWI cannot be achieved without: i) composition analyses of meteorological trends and other factors (e.g. water diversions) of changes in stream flows and groundwater levels and ii) timely water plans that actively respond to changes in the 'state of the world' (e.g. water quality, stream flow).

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