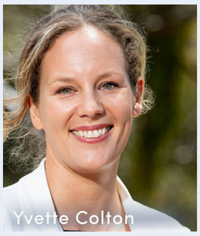
Authors



THE FUTURE OF BANKING?

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Water banking in aquifers is an internationally proven, low-cost solution that could improve drought resilience across Australia.

Introduction

Despite recent flooding cycles associated with la nina, southern Australia continues to experience a widespread drying trend and droughts have greatly affected agriculture, communities, and the environment of the Murray Darling Basin. In future, climate change presents increasing prospects of extremes of abundance and dry while we face the parallel challenge of increased demand for water.

Aither working in collaboration with the CSIRO has identified opportunities for water banking to be better utilised by the water industry and irrigation sector to improve drought resilience and enhance long-term water security.[1] The CSIRO has identified capacity equivalent to Dartmouth Dam for potential water banking through Managed Aquifer Recharge (MAR) in the MDB[2] and costs of water banking through MAR have been demonstrated to be favourable when compared to other infrastructure options such as desalination plants and new dams.[3] Drawing from international and Australian experience, the paper identifies policy and other characteristics as being favourable to support water banking in Australia together with four potential implementation frameworks for water banking schemes.[4]

What is water banking?

Water banking is the purposeful recharge of water to aquifers for subsequent recovery and use, with a focus on enhancing long-term water security. It can enhance water security for a variety of end users, including augmenting water supply to towns, and improving reliability of supply to agriculture, industry and for the environment during drought. Water banking can be achieved through MAR of surface or alternative water sources, conjunctive use, or groundwater carryover when other surface or alternative water sources are substituted for groundwater use. Water banking has an emphasis on inter-year long term storage opportunities and defined rights to recover deposited volumes for later use, supported by appropriate policy, accounting and risk management settings.

[1] D.W. Page, D. Gonzalez, T. Clune, Y. Colton & G.D. Bonnett (2022) Water banking in aquifers as a tool for drought resilience in the Murray Darling Basin, Australasian Journal of Water Resources, DOI: 10.1080/13241583.2022.2144115

[2] In the Murray Darling Basin it is estimated that around 4,000 GL of aquifer storage potential near major rivers could be utilized for water banking, which equates to 16% of the total accessible surface water storage; Gonzalez D, Dillon P, Page D and Vanderzalm J (2020) The Potential for Water Banking in Australia's Murray–Darling Basin to Increase Drought Resilience. Water 12(10), 2936

[3] Vanderzalm, J., D. Page, P. Dillon, D. Gonzalez, and C. Petheram. 2022. "Assessing the Costs of Managed Aquifer Recharge Options to Support Agricultural Development." Agricultural Water Management 263: 107437. doi:10.1016/j.agwat.2021.107437. [Crossref], [Google Scholar]

[4] D.W. Page, D. Gonzalez, T. Clune, Y. Colton & G.D. Bonnett (2022) Water banking in aquifers as a tool for drought resilience in the Murray Darling Basin, Australasian Journal of Water Resources, DOI: 10.1080/13241583.2022.2144115

What are the opportunities of water banking?

Water banking may operate at different scales and support achievement of different objectives. Key potential opportunities of water banking include are outlined in the following.

Water banking opportunities for water utilities and other water users

+ Reducing vulnerability through water source diversification particularly for remote communities that may be entirely reliant on a single water source.
+ Potentially delaying or avoiding the need for a higher cost water supply such as desalination.
+ Providing flexibility for water demand requirements to be met using fit-for-purpose supply sources including for a range of consumptive, amenity and/or environmental uses.
+ Demand reduction on utility networks, potable supplies or native water resources by promoting water users to drought-proof their own supplies through strategic storage.
+ Supporting groundwater resource recovery or water quality improvements.

Characteristics needed to support water banking:

Several general characteristics supporting the successful integration of water banking, and four possible conceptual frameworks to implement water banking have been identified. Key characteristics identified include:

+ Suitable physical conditions including hydrogeology and water sources to draw on for recharge.
+ Policy settings including defined secure rights to recharge and retrieve stored water supported by planning frameworks.
+ Water resource management mechanisms including effective accounting, monitoring and feasibility and risk management frameworks.
+ Funding and institutional settings to support development of demonstration sites and ensure schemes are appropriately authorised and regulated.

The frameworks developed demonstrate how alternative water sources can be managed at water resource and water user scales to support water security outcomes and ensure potential impacts are appropriately managed. For example recharge may supplement reliability of all users with shares in a consumptive pool or be quarantined to specific entitlements of a designated MAR consumptive pool where entitlements reflect the volume of water recharged.

The paper explores existing policy frameworks of jurisdictions and identifies some policy issues and potential barriers to water banking schemes including some specific challenges with entitlement arrangements relating to MAR and water banking in Australia. Better defined property rights, more integrated water planning and regulatory frameworks, and streamlined approval requirements are identified as measures that could be further explored to encourage adoption and investment in water banking schemes. A key next step identified is a need to test these frameworks in the context of different state policy and regulatory frameworks to determine the extent of any changes needed to accommodate them.

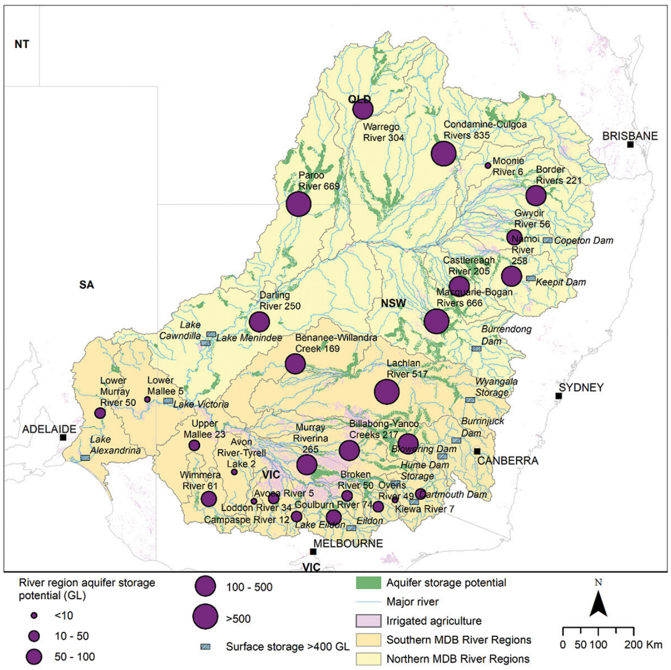

Figure 1. Aquifer storage potential in unconsolidated sediments within 5 km of major rivers in the MDB, adapted from (Gonzalez et al. Citation 2020).