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Applying the Bureau of Meteorology's national hydrological projections dataset to assess risks to future water supply scheme reliability

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Abstract: In August 2021, the world's leading climate scientists delivered their starkest warning on climate change yet, with some changes now considered inevitable and irreversible (IPCC 2021).

In Western Australia climate change already affects, and will continue to affect, surface water and groundwater availability, water quality, ecohydrology and integrated water and land use developments. In the north-west of Western Australia, a warming climate combined with continued uncertainty in projected future rainfall present a particular challenge to long-term water availability planning. In this region climate projections indicate a broad range of potential risks to water availability. The acute risk of extreme rainfall and associated weather events, beyond our current experience, have the potential to damage infrastructure, while the longer-term chronic impacts of higher temperatures, potential declines in average annual rainfall and significantly longer drought periods influence the future sustainability of essential water resources (CSIRO 2018; DWER 2021).

To make informed decisions about managing current and future climate risks, water resource managers and service providers need up-to-date, and fit-for-purpose data and information, representing localised climate conditions, to rigorously assess the plausible impacts to the ongoing sustainability of essential water supplies.

The Water Corporation (the Corporation), working closely with the Western Australian Department of Water and Environmental Regulation (DWER) and the Bureau of Meteorology (the Bureau), have been investigating the potential future risk that climate change presents to the reliability of the Corporation's Water Supply Schemes.

This co-designed case study, expanding on previous water resource modelling within eWater Source, aimed to investigate how sensitive the West Pilbara Water Supply Scheme (WPWSS) is to varying patterns of demand, abstraction, rainfall, and evaporation. The modeling employed the latest generation of downscaled future climate projections from the Australian Water Outlook – the Bureau of Meteorology's National Hydrological Projections (https://awo.bom.gov.au/).

Modelling results have illustrated the potential challenges to the future reliability of sources within the WPWSS and the viability of alternative supply options such as Managed Aquifer Recharge and Seawater Desalination to meet future demand. The work also informed DWER's development of a framework for the application of climate change projections in impact and risk assessment, water resource planning, and decision-making in Western Australia.

This project highlights how localised climate projections are a valuable tool in enabling informed decisions regarding climate change risk. Importantly, it also demonstrated the challenges in communicating the resulting uncertainty and confidence in the results. The number of projections/modelled scenarios and variability in the results has the potential for information overload to negatively impact the decision-makers' and stakeholders' confidence in the assessment result. Clear understanding of the vulnerabilities of a scheme at the outset is imperative to set a clear direction for an assessment and its outcomes.

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