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KEYNOTE

Linking hydrological and infrastructure models to evaluate the proposed Bradfield Scheme

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Abstract: Since first proposed 85 years ago, Dr John Bradfield's "nation building" 1500-km inter-basin water diversion scheme proposal has been a millstone around the necks of successive federal and state governments. So engrained is the scheme in the Australian psyche that drought in Australia has become synonymous with calls from high-profile Australians, media personalities and politicians for the construction of the scheme.

With the last technical evaluation of the Bradfield Scheme in 1982, the Australian Government commissioned Australia's national science agency, CSIRO, to undertake a comprehensive multi-disciplinary analysis of Bradfield's Scheme to objectively assess the numerous claims and counterclaims made by advocates and critics alike.

Rapidly yet objectively evaluating the scheme involved identifying optimal water storage and diversion infrastructure configurations along the potential water supply line, which required the development of novel water infrastructure alignment and optimisation tools, such as the DamSite model for automatic dam site evaluation and the WaterRoute model for optimal channel alignment and costing, and then linking these tools to a bespoke river system model.

This assessment found that the Bradfield Scheme and its modern variants were technically feasible, and that a series of potential dams and tunnels on the Tully, Herbert and Burdekin rivers in North Queensland could potentially result in the mean annual release of 1880 GL of water (after releasing water to meet the needs of downstream entitlement holders in the Burdekin catchment) into a 1600 km gravity water supply channel to St George on the Condamine-Balonne River, the closest major irrigation area in the 1 million km² Murray–Darling Basin (MDB). After losses it was calculated that a mean of 1270 GL of water could be diverted annually to St George, which is equivalent to 25% of the average annual volume of water used for irrigation in the MDB between 2015 and 2019.

The optimal backbone infrastructure configuration (i.e. dams, pipes, tunnels and channels) to St George was estimated to cost between $15 billion and $30 billion (assuming favourable geological conditions) with an annual cost of between $130 million and $255 million. Although technically feasible the cost of diversion infrastructure added such a large premium to the cost of water that future crop revenues would never pay off the cost of the water storage diversion infrastructure alone (Petheram et al. 2021).

This presentation will provide a high-level summary of the methods and key results of the assessment.

REFERENCES

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