

# Advancing environmental management through digital twin technology: A demonstration and future outlook for land and water resource development in Australia

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**Abstract:** Modern environmental management, planning and granting of social license demand innovative technological solutions to navigate their inherent complexities. In this presentation, we will demonstrate the state-of-the-art preliminary implementation of a comprehensive Digital Twin technology developed to model, visualize, and effectively manage varying scales and types of potential greenfield land and water resource developments in key catchment areas across Australia.

Our focus incorporates not only Digital Twin of landscapes and potential irrigated areas but also critical infrastructure such as road networks and human communities. The virtual representation encompasses an array of potential greenfield water resource developments including large engineered dams, earth embankment farm-scale gully dams, off-stream storage, groundwater bores, instream weirs, and managed aquifer recharge systems. Our technology provides dynamic and interactive visualization, allowing users to experience changes in river flow under diverse development scenarios and seasons, potential off-stream impacts, and temporal changes.

Our demonstration focuses on the user experience, designed to cater to environmental scientists such as ecologists, policy makers, and most importantly, Traditional Owners and other stakeholders. Recognizing that many public discussions regarding potential developments falter due to misunderstandings and misinterpretations, we aim to bridge this gap with our Digital Twin technology using the power of visualisation. This tool, we believe, can facilitate dialogue and decision-making processes around water resource and infrastructure, promoting informed consensus among all stakeholders and providing more beneficial outcomes for the environment and communities. We are currently implementing our technology in the Fitzroy (WA) and Roper (NT) catchments. However, the scalability of our project design allows for future expansion to other areas. This project aligns with the water resource assessment work that CSIRO is undertaking in northern Australia.

Our goal is to enhance these existing resources by providing a more interactive, immersive, and comprehensive approach to environmental planning and resource management. Now that we have a minimum viable product we are able to take it to stakeholders for their input and advice. In the next iteration, we plan to extend the functionalities of our Digital Twin technology, incorporating more variables and predictive capabilities to increase its versatility and predictive power.

## REFERENCES

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