

Sunwater Smart Schemes: Improving efficiency in water delivery

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Abstract: Sunwater is Queensland's largest regional bulk water service provider. We manage 19 dams and an extensive network of weirs, pipelines, channels and pump stations to supply water to our agriculture, community and industrial customers. Water security is at the core of our business, which considering the diversity of climates where we operate, and the projected increase in frequency and severity of extreme events due to climate change (CSIRO and Bureau of Meteorology, 2015), requires adaptive planning and constantly seeking new ways of improving efficiency in water delivery.

Smart Schemes (SS) are decision support tools designed to assist operators with optimisation of water releases. Each SS is tailored to the specific characteristics of the water supply scheme (WSS) it represents. It comprises monitoring data, models, and advice. Deployment of a SS involves the installation of a dense network of stream flow gauges and smart meters at main water withdrawal locations; this provides the highest possible visibility of the system. A spatially explicit continuous hydrological model is used to estimate catchment inflows. A 1D hydraulic model is used to simulate water movement throughout the distribution network. Information about water availability, water allocations, water orders, and Resource Operations License (ROL) compliance requirements is combined to create the schedules of release for each dam and weir. This information is communicated to the operators through dashboards that facilitate access to all monitoring and modelling data.

SS facilitate identification and reduction of water losses along the distribution network. In addition, having more accurate information about current and forecasted water availability and water demand, helps with the planning and can reduce the dam releases required to fulfil water orders. Overall, SS improve operational efficiency and drought resilience for the WSS. Across different WSS, the framework allows more consistent water operations.

SS extend the capabilities of the existing Sunwater Decision Support System (SuDS), initially configured to provide flood early warning information, to include appropriate advice during mid- and low-flow conditions. The shift from a fully functional flood forecast system to a drought resilience tool has the advantage of reducing the resources, time, and budget required for implementation of the SS. Nevertheless, forecasting low flows presents its own challenges (Pal et al. 2015; Seybold et al. 2023) that must be considered to provide appropriate advice and create realistic expectations on the accuracy of the results that can be achieved.

In this presentation we will elaborate on experiences from development of the SS for Macintyre Brook WSS and Dawson Valley WSS. We will present some preliminary results, discuss lessons learnt, and comment on challenges for the successful implementation of the SS.

REFERENCES

- CSIRO and Bureau of Meteorology (2015) Climate Change in Australia Information for Australia's Natural Resource Management Regions: Technical Report, CSIRO and Bureau of Meteorology, Australia
- Pal I, Towler E and Livneh B (2015) How can we better understand low river flows as climate changes?, *Eos*, 96. Published on 6 August 2015.
- Seybold EC, Bergstrom A, Jones CN, Burgin AJ, Zipper S, Godsey SE, Dodds WK, Zimmer MA, Shanafield M, Datry T, Mazor RD, Messenger ML, Olden JD, Ward A, Yu S, Kaiser KE, Shogren A and Walker RH (2023) How low can you go? Widespread challenges in measuring low stream discharge and a path forward. *Limnology and Oceanography Letters*, 8(6), 804–811.

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