

Australian Water Resources Assessment (AWRA)

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Abstract: Accurate water information (water accounts, water resources assessments, and information on water availability, spatial and temporal water distribution, storage and use) is essential for good and informed water management and water planning. The water information must be accurate, up-to-date and account for local and regional climatic and hydrological conditions. The water information must also be robust, transparent and produced in a repeatable manner. The Australian Water Resources Assessment (AWRA) system has been developed by CSIRO and the Australian Bureau of Meteorology and is used by Bureau (together with other water data) to deliver water accounts and assessments of water resources across continental Australia.

The current AWRA (v4.5) modelling system provides water balance estimates at the national to regional and catchment scale. AWRA consists of sub-components that represent processes between the atmosphere and the landscape (AWRA-L), in gauged rivers (AWRA-R) and in groundwater (AWRA-G). This constitutes a unique example of implementing a coupled landscape, groundwater and regulated river system model at a regional and continental scale and rolled out in high priority regions (National Water Account regions) across Australia. The system uses on-ground observations and remotely sensed data sets, combined with hydrological science and computing technology, to estimate key water fluxes and stores. This includes all major water storages, and the movement of water in and between these, at a 5-km spatial resolution and daily time step. It is flexible enough to use all available data sources, whether modelling data-rich or data-sparse regions, to provide nationally consistent and robust estimates of water balance terms. Outputs from operational versions of the model, such as estimates for soil water storage, streamflow, groundwater recharge and vegetation water use, inform the Bureau of Meteorology's water information products.

The AWRA modelling system will be continually improved and enhanced. Current efforts are focusing on parameterising AWRA-L for regions and across Australia, data-driven system calibration of AWRA-R (together with L and G) in all the key river basins, and establishing an operational AWRA system in the Bureau of Meteorology. Future efforts will build on the above as well as improving the modelling of surface-groundwater interaction and using data assimilation and reanalyses methods to improve modelling of the water fluxes and stores. Over the next decade, improvements in AWRA will come from more and different types of data (from remote sensing and affordable technologies to measure water fluxes), innovations in hydrological science integrating knowledge, models and data, and developments in computing technology. The vision is for the AWRA of tomorrow to take advantage of these developments and be the source of scientifically robust, consistent and agreed information on water accounts, assessments, forecast and prediction.

Keywords: *Water assessments, water accounts, AWRA, regional calibration, landscape modelling, river system modeling*