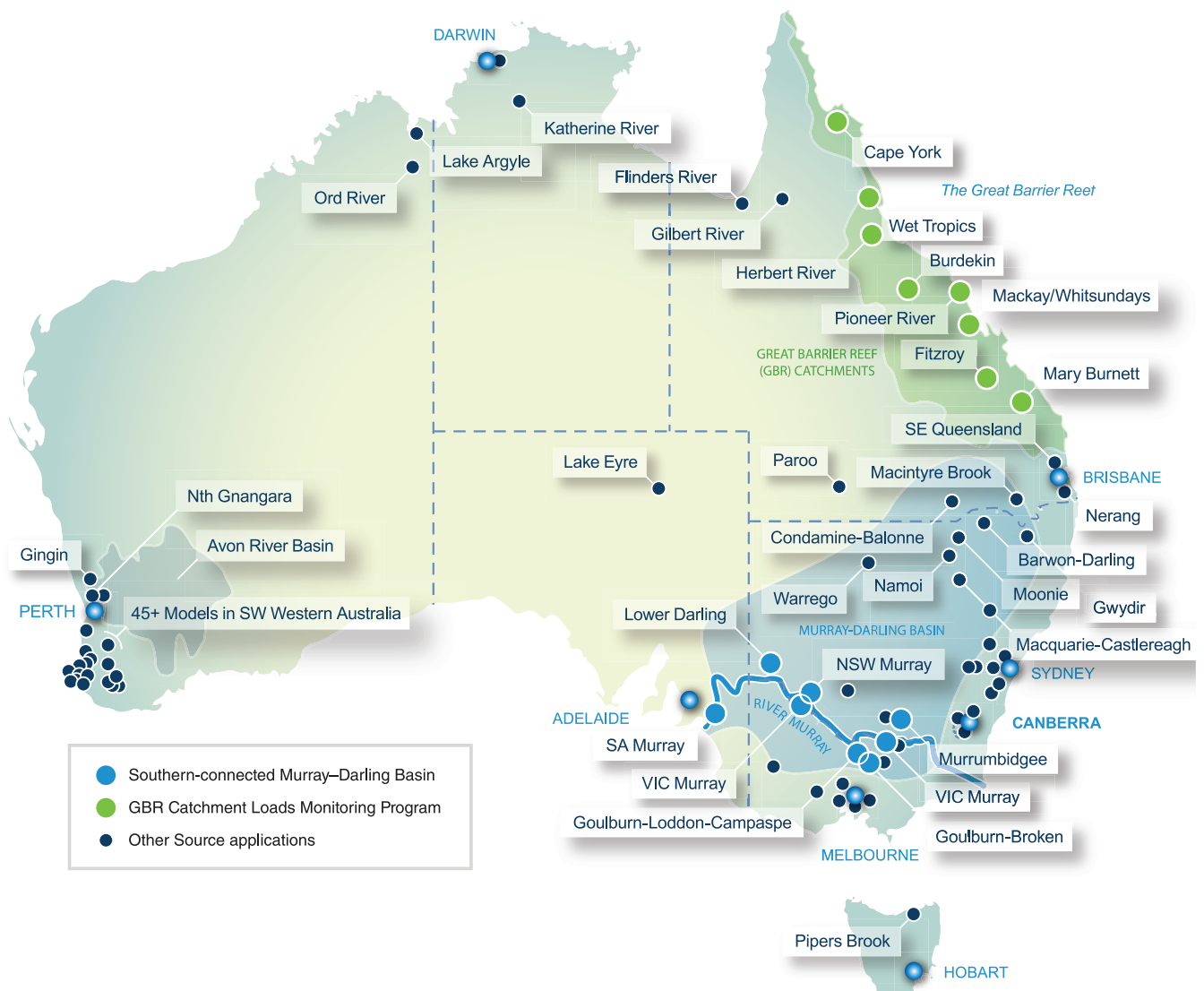


Hydrological analysis for equitable sharing and operational management of scarce water resources

eWater Source is Australia's national hydrological modelling platform which integrates water resource assessment with policy. An adaptive customisable platform which enables the

technical assessment of water balance is combined with a unique governance modelling capability to produce water accounts and operate rivers according to agreements and treaties.



History

A new generation tool created to support the transformation of Australia's water modelling capability, Source is the outcome of two decades of collaboration between State and Federal Government water organisations, leading universities, water utilities and regional rural water authorities through the eWater CRC and its predecessors the CRC for Catchment Hydrology and the CRC for Freshwater Ecology.

Endorsed and defensible – Source has been endorsed by the Council of Australian Governments as the national hydrological modelling platform.

Applications

eWater Source is the definitive integrated water resource management (IWRM) modelling software for:

- integrated water resource assessments, including agricultural, hydropower, urban, industrial and environmental requirements
- water balance studies from catchment to river basin scale
- water accounting and analysis of supply/demand balances
- inflow forecasting and multi-objective reservoir operations
- resource assessment and allocation policy development and planning
- trade-off analysis to balance sharing and equitable use of scarce water resources
- low flow and drought management
- water quality analysis based on catchment land use scenarios
- impacts of climate change and transboundary transfers
- bulk water systems optimisation, planning and operations including multiple supply options (reservoir/recycling/desal)
- conjunctive groundwater-surface water use analysis.



Features

Water Governance

Source introduces the fourth dimension of water management, the opportunity to assign water to users from sources according to agreements and treaties. Sharing and management methods include:

- resource assessment methods to allocate water between different competing uses and users within a jurisdiction or legal structure
- tracking of water based on state or country boundaries
- prioritisation of access according to policy decisions which can vary over time to represent policy adjustments (e.g. adaptive climate change approach)
- the ability to determine the effectiveness of water markets in order to tie development of policies to equitable outcomes.

Rainfall Runoff Models

Source includes a range of rainfall runoff models to allow you to choose the most suitable method for the system being modelled and your objectives:

- Observed Runoff
- AWBM
- GR4J
- IHACRES CMD
- Sacramento
- SimHyd and SimHyd with routing
- SMARG
- PERFECT GWlag.

Source also allows you to specify your own rainfall runoff model using a function or by installing an externally developed plugin.

Storages and Reservoirs

Storages and Reservoirs in Source are configured by importing stage-storage-surface area tables. Additional features include:

- Multiple outlets with priority setting
- Valves, Gates and Spillways
- Hydropower Generation
- Multi-purpose operations
- Evaporation from the water surface
- Seepage.



Water Users and Demands

Water Users in Source can represent:

- urban, industrial and domestic use demands are specified through time series, patterns and custom functions and plugins
- irrigation and command area demands include multiple crops with planting decision dates for multiple cropping, on farm storages, check dams and return flows
- environmental demand (extractive and non-extractive), including the capacity to specify complex flow and watering regimes.

Water Users can extract via pump, diversion weir or from groundwater. Demands can be met by a combination of Surface Water and/or groundwater with the ability to manage conjunctive extractions.

Water Quality

Source provides a variety of catchment constituent generation and filtering options. Channel routing, Reservoir Sedimentation and simple decay are included in the core model, with in-stream processing via specialised plugins.

Groundwater

Groundwater-surface water interaction is simulated through a range of approaches at different scales according to the study requirements and data availability.

In stream Routing

Source simulates the movement of water through river reach or pipes by travel time or hydrological routing approaches. Reach processes include net evaporation from the water surface and exchanges between groundwater and surface water.

River and Reservoir Operations

Operational forecasting allows you to create alternate forecasts for inflows, water demands, stream flow losses and gains (unaccounted differences) and constituents within a single project scenario.

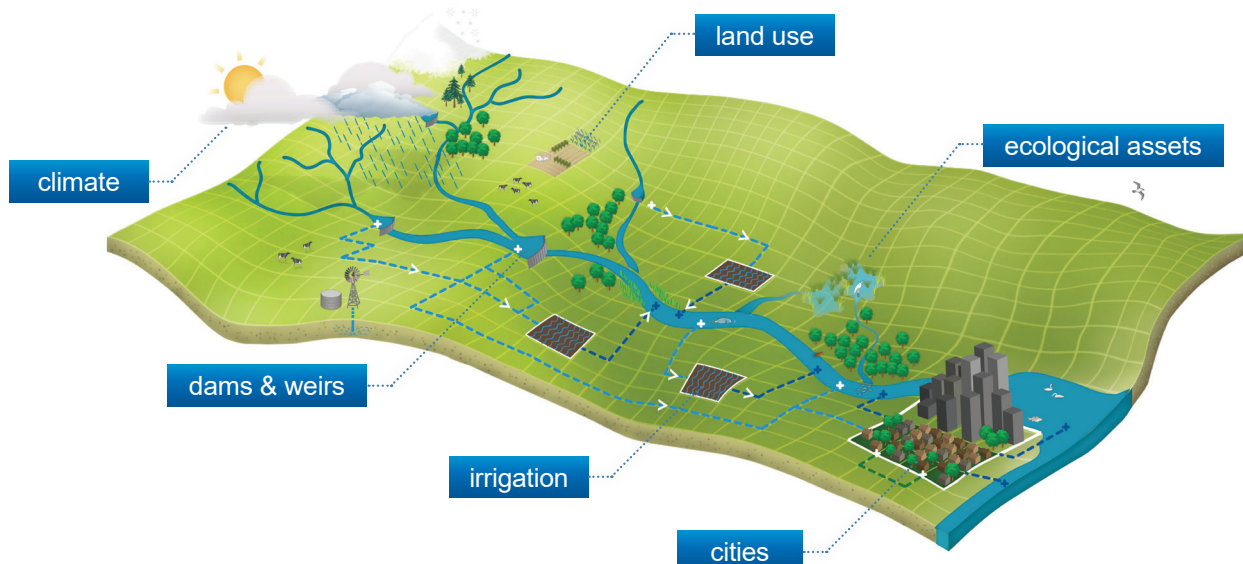
Results Management and Charting

Source includes a comprehensive results manager with the ability to compare model results with data, transformations and a wide range of statistical analysis and alternative views to communicate model outputs.

Calibration Tools

Calibration tools support the matching of model with measured data by adjusting model parameters for both the rainfall-runoff and stream routing phases.

- Choice of objective functions, e.g. Combinations of NSE (daily, log daily, flow duration, monthly, bias penalty)
- Calibration to single or multiple observation gauges, including weighting
- Flexible calibration time periods and ability to vary for different gauges
- Automatic (mathematical CSE optimiser) or manual (visual inspection) with objective functions.



Features

Function Manager

The Source function manager provides a flexible way of configuring relationships, operational rules, custom reporting metrics and agreements between users which are unique to the river system being investigated. Functions can be informed by many inputs such as:

- Modelled variables which can modify the model simulation based on state variables
- Piecewise linear, patterns and time series
- Time of day, month, year of simulation which allows the model to represent changes in policy or characteristics.

Customisation and Plugins

Source's capabilities can be extended through the use of plugins, which can modify or replace many of the standard tools within Source. They can be new component models (e.g. new rainfall runoff or Water User demand model) and data processing tools.

Component models, such as the River Harvesting Diversion Node model, can be manually loaded into Source. A range of component models are available where specific user interfaces have been constructed.

Optimisation and Trade-off Analysis

Source includes both spatial optimisation (via Network Linear Programming) and Genetic Algorithms as a comprehensive multiple-objective optimisation capability. The flexible function manager allows definition of a wide range of custom decision variables and objective functions to support the evaluation of planning options and the resulting trade-offs between potential outcomes.

Documentation

eWater maintains context-sensitive help within the software, as well as version specific, online, interactive user and scientific reference guides for a transparent and informative user experience.

Free Version

The free Source (public version) is a fully featured hydrological, water balance and water quality modelling platform limited to 20 nodes.

By removing price as a barrier, Source (public version) promotes transparency and knowledge sharing. It allows sharing of models across governments, NGO's and the wide range of stakeholders necessary to engage in IWRM. It is an ideal entry point for IWRM research and transboundary studies.

Adaptive complexity

Source provides a flexible structure that allows you to select a level of model complexity appropriate to the problem at hand and within any constraints imposed by your available data and knowledge.

Openness and community

eWater encourages a collaborative approach to development and knowledge sharing within the Source user community. We maintain a collection of online community resources including best practice modelling guidelines – a series of quality assurance principles and actions to ensure implementation and application are the best achievable.

Training and Capacity Building

In addition to a wide range of web-based and video training packages around the functional operation on Source, eWater also provides capacity building support in a structured approach to learning through applying the tools to meaningful problems. We initially demonstrate the process with case studies based on Australian experiences and then move on to work alongside you in building models and exploring issues on problems that are directly relevant to your work and objectives.

Supported

Source is continuously being developed and improved by eWater's software development and hydrology teams using an Agile development process. We are available to respond to your bug reports, and your modelling support and training needs.

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