

Modelling the flow of our river water in the Murray-Darling Basin

Water for a Healthy Country Flagship

Factsheet 2 of 7, 2010

National Research
FLAGSHIPS
Water for a Healthy Country



To ensure a sustainable water future for the Murray-Darling Basin, water managers turn to river modelling software to understand the benefits of alternative water management actions on water supply and the health of the river system.

River modelling uses computer-based programs to track water in rivers and make inferences on the quantity of the water available for river catchments and for the Basin as a whole.

These tools can help all river users including irrigators, urban water supplies and environmental water managers.

CSIRO's research

CSIRO's expertise in developing, modifying and linking river models has provided important support for integrated surface water planning across the Basin. A major application of this technology was for the Murray-Darling Sustainable Yields Project.

This project was commissioned by the Australian Government and involved CSIRO's Water for a Healthy Country Flagship undertaking an assessment of water availability in the Murray-Darling Basin and quantifying water resources under different climate and development scenarios.

With a project region of more than one million square kilometres, this study provided a benchmark for doing water assessments over large areas in a consistent fashion, enabling valid comparisons across valleys. While river models for individual tributaries had been used previously for assessing water availability, they had not been done consistently across the Basin. The study also enabled the cumulative flow-on impacts from tributaries into the main trunks of the Darling and Murray rivers to be explored.

Integrating water information

This cumulative impact was able to be explored through the use of a modelling framework which not only linked different models together but also different datasets corresponding to different land use and climate scenarios.

Within the modelling framework, separate models interact and can be run as an integrated whole-of-Basin model.

It allows water sharing plans to be explored under different climate and development conditions. It can be used to study individual valleys, then explore linked valleys and finally the entire Basin.

Supporting development of the Basin Plan

The Murray-Darling Basin Authority (MDBA) plans for new sustainable diversion limits for the Murray-Darling Basin have been supported by a range of modelling capabilities provided by many parties, including CSIRO.

The modelling capability that underpins the Plan is derived from models and data provided by the Basin States, the MDBA and CSIRO and are similar to those used as part of the Murray-Darling Sustainable Yields project in 2008.

CSIRO has linked these models to enable the MDBA to evaluate alternative scenarios in a consistent fashion. CSIRO made adjustments to allow them to be used for including environmental water demands, as specified by the MDBA.



> River models help to quantify the amount of water in our waterways, so we can better manage our water resources.

The modelling framework has also been developed to allow data to be accessed through databases in a relevant and meaningful way.

Best practice

The methods used to produce these results were considered to be best practice, given the scale of the modelling work and the time constraints. The wide range of future water predictions and estimated environmental water needs are likely to create more uncertainty in determining diversion limits, than uncertainties inherent in the river models. It is also hard to predict how irrigators would respond to changes in diversion limits, and this will impact the modelling of future irrigation water use.

Models are calibrated for flow regimes in each particular river and track the storage and movement of water within these rivers.

CSIRO has used its modelling expertise to develop assessments for the MDBA about the suitability of models for determining sustainable diversion limits for Basin water resources.



> River modelling research is helping support sustainable water management across the Murray-Darling Basin.

Leading research

CSIRO is the leading Australian research group in river modelling and hydrological software development. It is supported by partnerships with a range of universities through the eWater Cooperative Research Centre.

Its research in this area is supporting sustainable water management and efficiency gains from the development of nationally consistent modelling tools for river managers.

Water assessments

CSIRO researchers have delivered the most comprehensive and technically challenging water modelling project ever undertaken in Australia.

In 2008, the Murray-Darling Basin Sustainable Yields Project provided the world's first rigorous assessment of the potential impacts of climate change on surface water and groundwater availability across the Basin.

The project involved generating a massive data set of more than 14 terabytes of information. A computer-based 'supermodel' of the Basin's water resources was created by linking 40 existing and new models of surface and groundwater flows and extractions within the Basin's individual regions.

This was the first attempt in the Basin to dynamically link groundwater balances with surface water availability, calculating flows through and between the system's rivers, and groundwater-surface water interactions under current water-sharing arrangements, before estimating the water available under each scenario.

This research is providing governments and industry with an unprecedented level of water information to guide future resource planning, management and investment.

Want to know more?

Modelling river systems across Australia: <http://www.csiro.au/science/River-Modelling-Project.html>

CSIRO Murray-Darling Basin Sustainable Yields project: <http://www.csiro.au/partnerships/MDBSY.html>

Uncertainty in river modelling across the Murray-Darling Basin Report, a technical report on uncertainty in river modelling across the Murray-Darling Basin, from the CSIRO Murray-Darling Basin Sustainable Yields Project: <http://www.csiro.au/resources/RiverModellingUncertaintyMDBSY.html>

For more information contact:

Geoff Podger

Phone: 02 6246 5851

Email: geoff.podger@csiro.au

Web: www.csiro.au/science/MDBSY

Contact Us

Phone: 1300 363 400

+61 3 9545 2176

Email: enquiries@csiro.au

Web: www.csiro.au/flagships

CSIRO and the Flagships program

Australia is founding its future on science and innovation. Its national science agency, CSIRO is a powerhouse of ideas, technologies and skills. CSIRO initiated the National Research Flagships to address Australia's major research challenges and opportunities. They apply large scale, long term, multidisciplinary science and aim for widespread adoption of solutions.