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Short-term Water Forecasting and Prediction

Water for a Healthy Country February 2012

Australian Government
Bureau of Meteorology

National Research FLAGSHIPS
Water for a Healthy Country

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Water Information
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The Short-term Water Forecasting and Prediction project is developing methods and tools to improve the Bureau's operational flood forecasting and generate continuous short-term streamflow forecasts across Australia.

Transforming Australia's water resources information

The need to accurately monitor, assess and forecast the availability, condition and use of Australia's water resources is now more important than ever. The past decade of severe drought and recent extreme climatic events in Australia pose significant challenges to the management of Australia's water resources as we attempt to deal with an ever-increasing demand for water. The Water Information Research and Development Alliance is transforming the way Australia manages water resources, by bringing together the research and development expertise of CSIRO's Water for a Healthy Country Flagship in water and information sciences, and the Bureau of Meteorology's operational role in hydrological analysis and prediction.

Objective

The current hydrological model used by the Bureau for flood forecasting is event-based. The Bureau's forecasting and warning services will be expanded to include continuous flow forecasting to improve river and water resources management. A new system of Short-term Water Information Forecasting Tools (SWIFT) is being developed to provide a continuous forecast capability.

> The Murrumbidgee River – one of the rivers for which seasonal streamflow forecasts are now being generated (Image credit: CSIRO)

The Short-term Water Forecasting and Prediction project will extend the current modelling system, enabling:

- increased accuracy of streamflow forecasts
- extended lead time for forecasts
- forecasts of high and low water conditions
- verification tools to support improvements
- the ability to calculate and communicate uncertainty in forecasts
- a diverse suite of new products, including catchment wetness states.

Researchers are studying short-term forecasts (up to 10 days ahead) on many fronts, including using rainfall forecasts for streamflow forecasting, and developing practical and effective methods for quantifying forecast uncertainty.

The project is improving short-term forecasts through the better use of models, recent observations, error correction and weather forecasts.

Key research areas

The Short-term Water Forecasting and Prediction project is developing SWIFT, which is well suited to the challenges of a fast-paced forecasting environment. SWIFT includes:

- methods for calibrating and downscaling numerical weather predictions of rainfall and generating rainfall forecast ensembles
- methods for quantifying hydrological uncertainty, as well as calibrating and updating model parameters
- integration of rainfall and river flow observations, rainfall predictions and hydrological modelling to produce reliable ensemble river flow forecasts
- verification methods that specifically focus on criteria matching service needs.

The Bureau's aim is that forecasts will be available all year round, even during low flow periods. This makes the forecasts applicable to a wider audience, not just those interested in floods.

Delivering Outcomes

Experimental forecasts for the Ovens catchment, Victoria

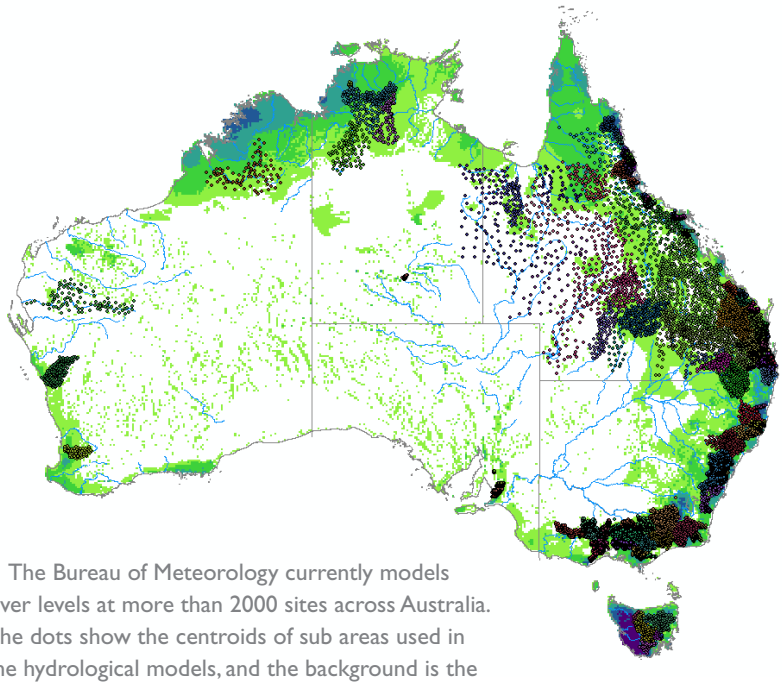
The Bureau is putting research into practice through adoption of the SWIFT system to generate experimental forecasts for the Ovens catchment in Victoria. SWIFT was set up to run within the Bureau, relying on operationally available data streams and rainfall forecasts from the newest generation of weather models. The Bureau is trialling this system with potential users as a first stage of developing the new service.

Partners

From 2008 to 2013, the world-class Water Information Research and Development Alliance is delivering the scientific and research innovation required by the Bureau to fulfil its national water information mandate. Through a strategic investment of $50 million over five years, more than 40 researchers are focusing on several challenging areas. These include large-scale information architectures, earth observation, hydrological modelling, water accounting, water resource assessment and water forecasting.

Other partners in the Short-term streamflow forecasting project include:

- The Centre for Australian Weather and Climate Research



> The Bureau of Meteorology currently models river levels at more than 2000 sites across Australia. The dots show the centroids of sub areas used in the hydrological models, and the background is the long-term average percentage of rainfall that becomes runoff. (Image credit: Dr Thomas Pagano, CSIRO)

A water information R & D alliance between the Bureau of Meteorology and CSIRO's Water for a Healthy Country Flagship

Contacts

Dr David Robertson
Project Leader
CSIRO's Water for a Healthy Country Flagship
Phone: 61 3 9252 6554
Email: David.Robertson@csiro.au

Find out more about the Water Information Research and Development Alliance at www.csiro.au/partnerships/WIRADA.html

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.

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