

COOPERATIVE RESEARCH CENTRE FOR



CATCHMENT HYDROLOGY

Project 1.1 Development of a Catchment Modelling Toolkit

Project Objectives

Prediction of catchment behaviour currently is done with a wide variety of models, many of which are limited in purpose; most are not compatible with other models. Our aim is to provide a generic 'toolkit' of compatible models from which land and water practitioners can select components suitable for their particular purposes.

Expected Outcomes

- Development of commonly accepted protocols for effectively describing, designing, documenting and deploying new and existing models for the prediction of catchment behaviour
- Demonstration of the ability to integrate a variety of models that permit holistic analysis of catchment function and decision making across multiple issues
- Provision of a catchment hydrology prediction 'toolkit', containing a suite of existing and newly developed models, appropriate to a broad range of spatial and temporal scales, which will deliver improved catchment prediction modelling capability to the land and water management industry

Target problems


Many models used in catchment prediction have been developed for specific research problems or locations, and are appropriate to particular space and time scales. As catchment prediction increasingly encompasses hydrological, meteorological, ecological, economic, and social systems, it is imperative that procedures incorporating appropriate software engineering principles are specified and adopted. Integrating existing and new models into a 'toolkit' is not simply a matter of plugging models together. Many existing models have been developed by individuals using software engineering practices that are now considered obsolete. This has resulted in a range of models dealing with similar problems, using similar data input and output interpretation, but with significant differences in operation.

Research Plan

We plan to integrate existing and new models into a 'toolkit' for predicting aspects of catchment behaviour. The work includes model design, documentation, help systems, production and delivery via a common framework.

The work will extend to a framework for developing models and an information system that will allow catchment managers and researchers to select which model components (such as rainfall-runoff and flow routing modules) are appropriate to particular problems.

The initial testing and development of possible modelling frameworks will involve the end users. At the same time, alternative design and delivery approaches for the modelling toolkit will be tested to determine the most appropriate to their needs. The long term benefits of this approach include a common "feel" and consistent delivery approach for CRC software, and reduced development requirements for other CRC researchers whose work will become part of the toolkit.



The Cooperative Research Centre for Catchment Hydrology is a cooperative venture formed under the Commonwealth CRC Program between:

- Brisbane City Council
- Bureau of Meteorology
- CSIRO Land and Water
- Department of Land and Water Conservation, NSW
- Department of Natural Resources, Qld
- Department of Natural Resources and Environment, Vic
- Goulburn-Murray Water
- Griffith University
- Melbourne Water
- Monash University
- Murray-Darling Basin Commission
- Southern Rural Water
- The University of Melbourne
- Wimmera Mallee Water

Associates:

- Hydro-Electric Corporation, Tas
- SA Water
- State Forests of NSW

Key Research Tasks – 2000-2003

- Review and select (or specify) standards for model, data and metadata documentation, including options for contextual help on both models and data. Review and select (or specify) quality control approaches
- Determine which models are in use, which are not, the problems associated with them, and the current state of model development within the CRC. Select a representative group for trial in possible frameworks
- Identify the desirable features of a modelling framework, including "standard" items such as cross platform, long term support, interface design processes, multi-language capability, and open source coding. Evaluate the capability of existing frameworks to meet these needs, and select, test and analyse a small number of models in potential frameworks
- Select a pilot framework from the group of candidates and determine further problems, difficulties, and options for future model inclusion
- Finalise pilot framework

Linkages

This project will link with, and provide guidelines for, models and modelling algorithm development taking place in other CRC for Catchment Hydrology Programs. The modelling protocols and products are strongly linked to the following four projects:

- 2.3 Prediction of water yield for large multi-use catchments
- 3.1 Integrated water balance, climatic and economic models
- 4.1 Development of an urban stormwater quality management decision support system (DSS)
- 5.2 Stochastic climate and streamflow models

End users and stakeholders

Primary end-users will be researchers and graduate students, also technical planning units within urban, rural and state resource management authorities.

Secondary users will include catchment management authorities, community-based catchment groups, consultants, policy and extension groups at all levels of government, and undergraduates.

Staff Involved

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Participating Organisations

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Department of Natural Resources, Qld • Department of Natural Resources and Environment, Vic
Monash University • The University of Melbourne.

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