Predicting Catchment Behaviour

Project 1B: Methods for Integration in Catchment Prediction

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Project Objectives

- Facilitate the integration of each of the Cooperative Research Centre (CRC) for Catchment Hydrology research projects in the construction of the whole-of-catchment system view.
- Develop the basis for the whole-of-catchment modelling capability.
- Develop methods for assessing and communicating risk and uncertainty.
- Combine existing and emerging CRC for Catchment Hydrology products and relevant industry products to inform decision making related to complex catchment problems.

Background

The CRC for Catchment Hydrology is fulfilling its mission through development of a modelling capability that supports prediction of catchment behaviour. In addition, the priority strategic issues and directions identified by the CRC for Catchment Hydrology Board include target setting, land and water accounting frameworks, and uncertainty and risk aspects of land and water management. The complex nature of these issues requires that we take a whole-of-system view of catchments. To provide this view, the CRC for Catchment Hydrology must establish methods for integration in catchment behaviour that, at least, support bio-physical and economic assessment. In addition, a risk management approach to catchment issues requires methods for communicating uncertainty to those involved in decision making.

CRC research projects provide the 'building blocks' for this integrated approach, in the form of new knowledge, packaged as modules for inclusion in the Catchment Modelling Toolkit. Successful integration will rely not only on linking of these modules in the Toolkit, but also on conceptual developments that ensure that this linking is possible. These conceptual developments include defining and quantifying the data exchanges, spatial and temporal scaling, and conceptual matching between modules, and ensuring that modules utilise the right inputs and provide the right outputs to fit with the whole-of-systems view. Project 1A (Implementation of the Catchment Modelling Toolkit) will provide the technical means for module development and linking, while this project will develop, use and communicate the methods needed to ensure technical and conceptual compatibility between modules, so that the whole-of-catchment modelling capability will work.

Project focus

The project will uses a variety of techniques to coordinate the outcomes of research projects so that they fit with the whole-of-catchment system modelling approach. Techniques appropriate to specific activities will be selected from:

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- One-on-one discussions with project leaders;
- Project and program meetings;
- Workshops focussed on particular integration problems, such as disaggregation of annual estimates of load to daily estimates, or integration of urban models into whole-of-catchment models. Some of these workshops will involve senior staff from industry parties and research programs to facilitate a high degree of commitment by programs, enable reality checks on the practical utility of methods, ensure integration with relevant industry tools, and ensure a high level of communication between researcher and industry partners;
- Involvement in model specification meetings of each project;
- Involvement in Development Projects at both inception and review stages to capture the user needs for the whole-of-catchment modelling capability.

The primary 'big picture' activity of this project will be ongoing development of a 'blueprint' for the systems model/view of catchment behaviour that brings together the relevant modules from each project. This blueprint can be considered as a set of module specifications and will be developed through analysis of the inputs, outputs and parameter needs of all models/modules developed in the CRC for Catchment Hydrology, along with consideration of the modelling capability needed to deal with the CRC's mission. The blueprint will enable key gaps to be identified (and action taken to fill these) and provide a basis for ensuring that the outcomes of each project are able to be integrated into the Toolkit.

Project outputs

The techniques above will be used to:

- Refine details of the modules required to achieve the blueprint. This will involve matching time and space scales, parameter requirements etc.;
- Define critical feedbacks that need to be accommodated in the whole-of-catchment modelling capability;
- Establish how to bolt modules together (i.e. detail the feedbacks between modules and ensure their structures are such that the feedbacks can be accommodated);
- Adaptively refine the preceding steps as the project matures and as Development Projects discover new areas where integration should take place;
- Inform the module and modelling system development via collaboration with Project 1A. This will include involvement in development of Toolkit elements used to add value to industry models; methods for aggregation and disaggregation of inputs/outputs to assist in matching space and time scales across different modules; development of basic Toolkit infrastructure that is not being developed within existing projects.

Activities within 1B also include:

- Development and testing of uncertainty communication methods. This was investigated by a Visiting Fellow and has resulted in development of practical methods that can be incorporated into the Toolkit and be widely applicable across the range of modules.
- Development of the 'Toolkit Assistant' and methods for providing advice to Toolkit users on appropriate model structuring, module selection and limitations on usage.
- On-going communication activities that will be directed at developing a deeper understanding of systems thinking across the CRC Parties and other wider audiences.

Current Projects
2003-2006

Project 1B:
Methods for Integration in Catchment Prediction

Project Team

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For further information

http://www.catchment.crc.org.au/catchmentprediction

http://www.toolkit.net.au