URBAN STORMWATER QUALITY

COOPERATIVE RESEARCH CENTRE FOR
CATCHMENT HYDROLOGY

Project 4.1
Stormwater Pollutant Sources, Pathways and Impacts

Project Objectives

There is currently an inability to fully integrate the various disciplines of science and engineering into stormwater management strategies. We aim to develop a suite of models for estimating stormwater pollutant loads from different source areas, defining their impacts on aquatic ecosystems and predicting the performance of stormwater management practices, ie. a Stormwater Quality Management Toolkit. We also aim to formulate a Decision Support System for the development of cost-effective strategies and then communicate the cost/benefits of such strategies to non-technical decision makers.

Expected Outcomes

- A suite of models describing the processes of individual stormwater quality management practices
- A database of information on Australian urban stormwater pollutant characteristics
- The derivation of non-point source pollutant loading and pollutant-speciation relationships for typical urban catchments
- The formulation of "generic" non-point source pollutant loading relationships which can be directly applied in existing stormwater models
- The derivation of pollutant-speciation characteristic curves to assist in the design of stormwater quality improvement facilities through the identification of target pollutants and characteristics
- The development of a risk-based approach to setting flow management and water quality targets in urban catchments for the protection of urban aquatic ecosystems
- Input to the Institution of Engineers Australia's publication of 'Australian Runoff Quality – A Guide to Runoff Water Quality Estimation.' This publication will become an important tool for Australian professionals in the stormwater industry

Target problems

Urbanisation of catchments has both physical, chemical and biological impacts on urban aquatic ecosystems, with the former affecting the frequency of physical habitat disturbances (ie. geomorphological impacts) and the chemical and biological impacts affecting the water quality of the aquatic environment. Also, the hydrology and ecology of urban aquatic systems are highly dynamic in their response to the stochastic nature of urban stormwater quantity and quality. Many urban catchment management authorities and local municipalities are developing stormwater management strategies that address multiple objectives beyond flood mitigation and stormwater drainage, but there are currently a number of inadequacies in the manner that these strategies are formulated and implemented.

Research Plan

The formulation of a Decision-Support-System (DSS) will utilise a process modelling approach to predict the performance of stormwater management practices and define appropriate design standards for optimal resource management, socio-economic and environmental risk improvement outcomes.

The DSS will be able to operate in both developing and developed catchments, be easily updated when new or more applicable data is available, be transparent in its assumptions, and have a highly developed user interface to graphically present system outputs to non-technical decision makers. This will facilitate a more holistic approach to stormwater management.

www.catchment.crc.org.au/urbanstormwater




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

The research plan will:

- Develop a pilot Decision-Support-System for testing by our principal stakeholders
- Continually refine the DSS through calibration and re-development of individual models in the Stormwater Quality Modelling Toolkit, using results of research activities from Project 4.2, other research activities within this project and relevant results from studies undertaken by other organisations or individuals
- Undertake targeted monitoring of stormwater runoff from urban areas of different landuse and geology, in Melbourne and Brisbane, to develop pollutant export relationships for various types of pollutants and their respective pollutant speciation characteristic curves
- Quantify the impacts of catchment urbanisation to a level which will enable definition of flow quantity and quality management objectives necessary for sustainable ecosystem health, using a risk-based approach

Key Research Tasks - 2000-2003

- Develop the Urban Stormwater Quality Modelling toolkit and the integration of these models into the Urban Stormwater Quality Decision-Support-System
- Monitor and characterise urban stormwater pollutants
- Quantify the inter-relationship of the hydrological, geomorphological and ecological responses of urban aquatic ecosystem to catchment urbanisation

Linkages

- Direct linkages to CRC Project 4.2 and Project 1.1 in relation to the development of modelling toolkits
- The South East Queensland Regional Water Quality Strategy Study
- The Yarra River Study (CRC for Freshwater Ecology)
- CSIRO's Urban Water Program

End users and Stakeholders

End users include local government, regional urban catchment management authorities, state planning and environment protection agencies, consultants, land developers and research organisations.

Staff Involved

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Participating Organisations

Brisbane City Council • CSIRO Land and Water • Griffith University • Melbourne Water • Monash University • The University of Melbourne

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