

COOPERATIVE RESEARCH CENTRE FOR



CATCHMENT HYDROLOGY

## Project 4.2 Stormwater Best Management Practices

### Project Objectives

*There is currently insufficient understanding of the efficacy and efficiency of many structural stormwater management practices in Australian conditions. This project aims to monitor their performance and to review current non-structural measures. Field experiments will be used to increase our understanding and quantify some of the prominent treatment processes in common stormwater quality improvement facilities.*

### Expected Outcomes

- Better understanding of the factors influencing the performance of structural stormwater management practices
- A physical basis for accounting for the effect of vegetation (including its type and density) on stormwater pollutant removal, which would then be incorporated into the various models of stormwater Best Management Practice
- Incorporation of non-structural stormwater management measures (eg. community measures, administrative framework, maintenance regime) into the Decision Support Systems of Project 4.1
- Augmentation of the modelling toolkit developed in Project 4.1


### Target problems

There is currently insufficient understanding of the efficacy and efficiency of a wide range of structural stormwater management practices in Australian conditions. Economic analysis of the performance of stormwater management practices is currently poor and, as a consequence, urban stormwater quality management cannot be fully integrated into a holistic approach to catchment management

A number of stormwater quality improvement facilities involve treatment processes using vegetation and stormwater infiltration. Vegetation has been shown to be an important feature of these systems, although the role and efficiency of different vegetation types and hydrologic formats (eg. permanent versus ephemeral wetlands) in the treatment process has not been quantified. Stormwater retention systems tend to be storage-reuse designs, such as rainwater tanks, or subsurface infiltration trenches feeding soil moisture or groundwater aquifers. A variation of this system includes the use of a collection system to retrieve filtered water for reuse or discharge to surface flow systems. Infiltration systems have been trialed in Australia and overseas, but require evaluation for their water quality treatment function (under a range of soil and filter media conditions, hydraulic loading and pollutant loading) to make them more broadly applicable. The water quality treatment mechanism involving adsorption of contaminants onto various organic and inorganic media needs to be better understood to ensure their proper design, utilisation and maintenance. Currently, locally derived data is limited and not of sufficient detail to enable quantitative modelling and transferal to different geographic regions.

Urban catchment managers are also implementing a range of non-structural stormwater management practices, principally aimed at achieving longer term outcomes for sustainable reduction in pollutant loads. These include a wide range of community awareness campaigns, water sensitive urban design, planning controls, legislative controls, etc. There has not been sufficient quantitative measure of their effectiveness nor the time-frame required to achieve the full benefits of such initiatives. As a consequence, there is no quantitative basis for defining the appropriate relative funding between structural and non-structural initiatives to achieve a balanced urban stormwater management strategy.

[www.catchment.crc.org.au/urbanstormwater](http://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

## Research Plan

The research plan will:

- Derive reliable information for the development and verification of conceptual stormwater quality treatment models by developing a standardised protocol for monitoring and assessing the life-cycle cost, performance and processes of structural stormwater management practices
- Monitor the performance of a range of stormwater quality improvement facilities in the field
- Undertake field experiments aimed at quantifying the effectiveness of vegetation in the removal and transformation of stormwater pollutants in constructed wetlands and grass swales and evaluating the influence of hydrologic regime (permanent vs ephemeral, wetting and drying cycles)
- Quantify the effectiveness of infiltration/adsorption systems for stormwater quality improvement and evaluate the influence of such design parameters as hydraulic loading, type of infiltration media, depth of infiltration media etc on the performance of these systems in stormwater quality improvement
- Assess the effectiveness of non-structural stormwater management measures and develop a basis for incorporating their application into the Decision Support System

## Key Research Tasks - 2000-2003

- Conduct field experiments directed at understanding and quantifying the functional roles of vegetation and infiltration/adsorption mechanism in stormwater quality improvement
- Monitor and evaluate existing stormwater quality improvement facilities in Brisbane and Melbourne
- Conduct a review on the effectiveness of non-structural stormwater management measures

## Linkages

This project has direct linkages to CRC Project 4.1 and all the research efforts in this project are directed at providing scientific rigour to the development of the modelling toolkit and the Decision Support System. There may also be a number of local and overseas projects involving the monitoring or field experiments of stormwater quality improvement facilities, which may be incorporated if appropriate, into the project.

## Staff Involved

**Project Leader**

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**Researchers**

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## Participating Organisations

Brisbane City Council • Griffith University • Melbourne Water • Monash University • Department of Natural Resources, Qld

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