

COOPERATIVE RESEARCH CENTRE FOR



CATCHMENT HYDROLOGY

## Project 2.2 Managing Pollutant Delivery in Dryland Upland Catchments

### Project Objectives

*There is considerable detailed knowledge on the delivery of sediment, nutrients and salt from rural lands to streams. In this project we aim to combine this knowledge into a structured form, which will enable us to predict the delivery of pollutants to the stream network at the catchment scale, and to link our models with those for climate and nutrient behaviour within the streams.*

### Expected Outcomes

- A sound understanding of the issues of sediment, nutrient and salt delivery to streams
- Technically sound forecasts of the impact of land-use change on the pollutants delivered to streams, at a catchment scale, for both current and proposed land-uses
- An informed Australian community on the impacts on our streams of dryland land-use
- In the medium term, changes to land management decision-making concerning the specific issues of: riparian zone management, stock access to streams, unsealed roads, conservation tillage and grazing management

### Target problems

Delivery of all land surface pollutants to the stream edge is the product of pollutant concentration at source, the generation (or erosion) rate and the pollutant delivery ratio. To achieve a balanced approach to prediction, all three components of the pollutant delivery problem need equal levels of certainty. For instance, quality data on soil phosphorus content and soil erosion rates is only of real value when they are combined with sediment delivery models that consider sediment size-sorting and resulting nutrient enrichment effects.

### Research Plan

Our challenge is to combine the considerable knowledge and data concerning the movement of these pollutant groups in a structured way, to enable predictions of land use impacts and related mitigation measures. This will require:

- Moving from the hillslope to catchment scale through explicit recognition of a stream network
- The acquisition of data for pollutant delivery for all of the major land uses currently in, or proposed for, our focus catchments
- Linking models of terrestrial pollutant movement with climate models
- Linking models of terrestrial pollutant movement with models of pollutant behaviour within stream networks

We plan to produce:

- Tested algorithms of sediment, sorbed pollutants (including nutrient) and salt wash off to the stream's edge, incorporated in the toolkit being developed in CRC Project 1.1
- Guidelines for the management of such pollutant wash off, written in plain English
- A set of algorithms that establish the linkage between rainfall variability and runoff and erosion processes. These algorithms when combined with the output of CRC Programs 1 and 5 give a forecasting methodology for the impact of land use on rivers

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

- Construct a model of pollutant delivery for the 'toolkit' (see CRC Project 1.1)  
Review appropriate models, define pollutant generation areas and hydrological paths to the stream networks, construct and test options against available data for focus catchments (for each land use, range of events and range of hillslope characteristics)
- Develop and evaluate models for runoff and soil erosion for surface processes  
Review predictive models (first 0.5 years), assemble available data sets from two major sources (QDNR and DLWC) and collect additional data if needed. (1-1.5 years), test model outputs against the observed runoff, soil erosion and sediment delivery at selected sites, incorporate surface condition algorithms into the above development, recommend the appropriate model and transport it to the 'toolkit'.
- Evaluate the weather generators developed and tested in Project 5.2 and determine their suitability for providing the climate inputs for runoff and soil loss predictions
- Develop an understanding of the salt wash-off process and incorporate it into the project's models of runoff and into the 'toolkit'
- Organise technical seminars to the land and water industry that take balanced approaches to land productivity and environmental impact

## Linkages

This project will link with other CRC for Catchment Hydrology programs.

- 1.1 Development of a catchment modelling toolkit
- 2.1 Sediment movement, water quality and physical habitat in large river systems
- 2.3 Prediction of water yield for large multi-use catchments
- 5.2 Stochastic climate and streamflow models
- This project links with other external research projects, including the sediment nutrient delivery activity with in the National Land and Water Resources Audit. The project will also input to other major national initiatives including the National Rivers Consortium, the National Riparian Zone program and phase two of the National Dryland Salinity Program

## End users and Stakeholders

End users are those concerned with managing the impacts of land upon the quality of stream water. We will provide technical input and seminars aimed at stakeholders in both the focus catchments and nationally, and Guidelines for Management, in plain English. Users of the 'toolkit' will benefit.

## Staff Involved

### Project Leader

Peter Hairsine (CSIRO Land and Water)

### Researchers

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## Participating Organisations

CSIRO Land and Water • Department of Land and Water Conservation, NSW •  
Department of Natural Resources, Qld • Griffith University

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