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## Waterway Management Program

Program Leader: Dr Peter Hairsine

### Project W1: Controlling sediment and nutrient delivery from hillslopes to streams

#### Introduction

This project built on earlier research (Project B1) based in a 'focus' catchment (Tarago Reservoir, West Gippsland), which supports both forestry and agriculture. The initial aim was to help Melbourne Water develop a catchment-wide approach to solving water quality problems in the reservoir. Outcomes of the earlier work included identifying source areas of reservoir sediment and pollution, and developing guidelines for vegetation buffer strips to reduce sediment and nutrient input from rainfall runoff to streams and rivers.

When sediment is eroded from a hillslope, only a portion of it reaches the stream. The work in this project involved describing ways of minimising the delivery of sediment and related nutrients to the stream and providing guidance for managing sediment. It specifically addressed the following management issues (using the methodology as shown in brackets):

1. Where are catchment measures best targetted? (sediment tracing)
2. Sediment delivery from road surfaces? (sediment tracing and rainfall simulator experiments)
3. Sediment delivery from stock tracks? (simulation experiments and modelling)

To do this researchers focused on quantifying the relative contributions of unsealed roads and stock-tracks to stream pollution in the Tarago catchment. They aimed to develop road and drainage design guidelines to reduce stream sedimentation. Researchers combined data from rainfall simulation and water sampling studies, with isotope tracer analysis of sediments and potential sources. They established unique chemical 'signatures' for different sources (e.g. gravelled and ungravelled roads and forested areas). This was the first time such a clear separation of potential sources was reported.

The research outcomes enable catchment managers to precisely target areas producing the most sediment (e.g. a particular section of an unsealed road), ensuring a better result from investment in pollution-control works. During the final year of the project, activity centred on publication and communication of project outcomes to user groups.

#### Project's Intended Outcomes

Land management approaches to improve water quality by:

- Assessing the relative contribution of roads to in-stream sediment (this will be combined with the existing methodology for assessing the relativity of surface and sub-surface sediment sources)





## Completed Projects

1997-1999

**Project W1:**  
Controlling sediment  
and nutrient delivery  
from hillslopes to  
streams

- Estimating the contribution of forest roads to in-stream sediment in the Tarago Catchment
- Describing the movement of water and sediment through catchments

Design guidelines for catchment roads and facilities to improve water quality, covering the:

- Assessment of unsealed road designs and road outfall types (culverts, filter zones, outsloping/insloping)
- Impact of stock tracks on in-stream water quality and the delivery of sediment from hillslopes to streams

### Key Project Achievements

- Completed analysis of rainfall simulations in the Tarago catchment to evaluate sediment generation rates from six different source areas (including gravelled/ungravelled roads; stock tracks; cultivated paddocks; and grazing areas).
- Identified unique chemical 'fingerprints' for source areas that allow for a clear separation of stream sediment. This was the first time that such a result has been reported.
- Measured and analysed stream sediment following rainfall events in the Tarago catchment to identify relative contributions of farm and forest roads, stock tracks, tilled fields, and rivers with stock access.
- Presented a seminar on sediment and nutrient trends in the Tarago River and a model for evaluating the impact of catchment-wide changes to land-use practices.
- Participated (with Project FO1 researchers) in developing a model to simulate runoff from snig tracks to streams in forest areas. Findings were presented at the CRC's *Second Erosion in Forests Workshop* in May 1999.
- Contributed to a consultancy report on the impact of forestry activities on water quantity and water quality in NSW.
- Completed monitoring of the hydrological performance of a near-stream zone in southern NSW.

### Staff Involved:

#### Project Leader

Dr Peter Hairsine (CSIRO Land and Water)

#### Senior Researchers

Dr Peter Wallbrink (CSIRO Land and Water)

Dr Rodger Grayson (The University of Melbourne)

Dr Brian Finlayson (The University of Melbourne)

John Riddiford (MelbourneWater)

#### Participating Organisations

CSIRO Land and Water

Melbourne Water

The University of Melbourne