



Land-use Impacts on Rivers

Project 2B: Sediment Budgets for Modelling Water Quality in River Networks

Project Leader: Scott Wilkinson (CSIRO Land and Water)

Deputy Project Leader: Harold Hotham (CSIRO Land and Water)

Project Objectives

- Implement the SedNet model of catchment sediment budgets into the Catchment Modelling Toolkit incorporating inputs from other CRC for Catchment Hydrology projects.
- Develop a module to predict patterns of hillslope sediment delivery across large catchments.
- Improve the compatibility between SedNet and other models in the Catchment Modelling Toolkit and support its use in CRC's Development Projects.
- Support industry adoption of SedNet through the Development Projects.

Background

State and regional catchment management agencies are faced with the problem of degraded water quality in rivers, estuaries and marine environments. An important aspect of water quality is the increased load of suspended sediment. Fine suspended sediment carries with it nutrients that are ultimately available to algal growth. Agencies recognise that past attempts to improve water quality have not been successful because the scale of the problem is far greater than the resources available. This has led to current policy initiatives, such as the National Action Plan for Salinity and Water Quality, the Natural Heritage Trust Phase II, and the Great Barrier Reef Protection Plan which aim to focus remedial actions to locations where they can significantly improve water quality. This is being achieved through a process of target setting, implementation of remedial action, and evaluation of outcomes.

Project focus

To successfully implement water quality management at regional scales requires knowledge of the sediment and nutrient sources and their relationship to downstream water quality, and an ability to predict future changes. Often pollutant sources are hundreds of kilometres upstream from impacted water bodies and only a small proportion of the total sediment and nutrient load moving within a catchment is delivered downstream. The rest is deposited or transformed along the way. Thus the link between pollutant generation and downstream impact is often tenuous. Furthermore, large catchments have complex patterns of land-use, soil, climate, terrain and other factors that determine pollutant transport. There is a need to integrate all the available environmental information and process understanding to make large scale predictions of pollutant transport patterns in catchments. Models that do this need to be responsive to land management and need to make predictions relevant to environmental impact and target evaluation.

For further information please contact:

Dr Scott Wilkinson
CRC for Catchment Hydrology
CSIRO Land and Water
GPO Box 1666
Canberra, ACT 2601
scott.wilkinson@csiro.au

Dr Peter Wallbrink
CRC for Catchment Hydrology
CSIRO Land and Water
GPO Box 1666
Canberra, ACT 2601
peter.wallbrink@csiro.au



Current Projects

2003-2006

Project 2B: Sediment Budgets for Modelling Water Quality in River Networks

The SedNet model developed to date by CSIRO Land and Water and the CRC for Catchment Hydrology, has progressed a long way over the past three years to meeting the needs of catchment management agencies. There remain, however, significant deficiencies in accessibility of the model that need to be overcome to fully meet the potential of SedNet for regional planning. Improvements also need to be made to how the pollutant models link to other aspects of catchment modelling in the Toolkit. This project aims to meet those needs.

1. Software engineering to deliver SedNet in the Catchment Modelling Toolkit

SedNet is currently being incorporated into the Toolkit environment and this project will ensure the completion of this work, including testing and evaluation of the completed product. SedNet was developed in the ArcInfo environment which requires users to have a high level of programming expertise and an ArcInfo licence. Re-engineering SedNet into the Toolkit will allow its delivery in a user-friendly format and make it more widely available to catchment managers.

2. Hillslope sediment delivery ratio (HSDR)

This work will incorporate the outcomes of previous hillslope erosion mechanics work into methods for predicting patterns of hillslope sediment delivery across large catchments over multi-year time-scales. This technique will be engineered into a software module for routine application in the Toolkit. The method will be tested against observed hillslope sediment yields in the CRC's Focus Catchments and elsewhere where there is available data. The model will be able to predict sediment delivery ratio for individual events or years, as well as produce mean annual values for time series of rainfall data.

3. Model integration and application

The SedNet model uses hydrological and other information that will be provided by other CRC projects. Methods for disaggregating the mean annual suspended sediment and nutrient loads to a time series of daily loads will be developed and the software constructed in a modular format to help reuse of the spatial analysis functions in other projects. The final SedNet model, its underlying algorithms and parameterisation will be described in a user manual to assist adoption by industry.

4. Support development projects

Each of the CRC's Focus Catchment Development Projects aims to increase regional capacity in water quality assessment through use of SedNet. This project together with Project 1A will support these projects, by contributing to training, documentation for the SedNet model, user support, and through dissemination of the techniques and underlying principles in each region.

Project Team

Project Leader

Scott Wilkinson, (CSIRO Land and Water)

Researchers:

Peter Hairsine, (CSIRO Land and Water)

Harold Hotham (CSIRO Land and Water)

Shane Seaton (CSIRO Land and Water)

Yun Chen (CSIRO Land and Water)

Hua Lu, (CSIRO Land and Water)



Current Projects

2003-2006

Tim Ellis, (CSIRO Land and Water)

Rodger Grayson (The University of Melbourne)

Guy Geeves, (Department Infrastructure Planning and Natural Resources)

Christoph Zierholz, (Department Infrastructure Planning and Natural Resources)

Pat Feehan, (Goulburn-Murray Water)

Bofu Yu, (Griffith University)

For further information

<http://www.catchment.crc.org.au/landuseimpacts>

<http://www.toolkit.net.au/sednet>

Project 2B:
Sediment Budgets for
Modelling Water
Quality in River
Networks