

Modelling multiple drivers

B1

Project Leader: Dr Michael Stewardson

The role of Project B1 is to identify impacts of multiple human disturbances in river ecosystems.

Project summary

River managers deal with numerous simultaneous disturbances (e.g. water resource development, land clearance, invasion by exotic pests). At present management actions may focus first on the disturbances that are best understood, rather than on those that are potentially most damaging, because there is limited information on the relative contributions of each disturbance to river decline.

Project B1 is identifying the individual and interacting effects of factors that drive river condition in lowland rivers. The project develops conceptual and mathematical models of driver-stressor-responses. These models are based on a meta-analysis of previous studies relating catchment disturbances to river conditions and field studies.

By the end of the project, the team will have:

- an evidence-based conceptual model of relatively long-term ecosystem responses to factors that influence river condition, singly or via interaction;
- identified and ranked the critical factors and their interacting effects on targeted river ecosystems;
- quantitative models of ecosystem responses to multiple drivers in case study systems;
- reconstructed long-term trajectories of river ecosystems;
- research methods for ranking large-scale factors that drive ecosystem condition.

These outputs will feed into the following eWater projects

- P6 Restoration, planning and prioritisation tools
- P7 Integrated monitoring and assessment systems
- R2 Ecological modelling platform.

Key achievements 2006

- A method for systematic review of literature, so the team can now build conceptual models based on evidence linking human disturbances to freshwater ecosystem responses.
- A review of more than 12,000 journal abstracts, identifying published papers that contain evidence linking human disturbances to impacts in river ecosystems.
- A database of references indexed by the type of disturbance and responses dealt with in each paper.

2007–2008 key deliverables

- A second-stage literature review, which will use the evidence to build models of effects on ecosystems.
- A conceptual response model dealing with the impacts of land clearance and river management in small un-incised rural streams, supported by fieldwork in tributaries of the Goulburn River, Victoria.
- A tool for building evidence-based conceptual models of the impact of human disturbances on rivers (in collaboration with Project R2).

The project team

Project leader Dr Michael Stewardson is a Senior Research Fellow with the School of Anthropology, Geography and Environmental Studies (SAGES) at The University of Melbourne. Mike is a hydrologist researching the interactions between river hydrology, hydraulics, geomorphology and biology. He is particularly interested in the non-biological factors affecting aquatic communities.

Please contact him at <mjstew@unimelb.edu.au> for further details on Project B1.

The research team also includes staff of: The University of Melbourne, The University of Adelaide and Queensland Department of Natural Resources and Water.