



A spatially distributed model of sources and loads of suspended sediment in large river basins

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Increased yields of suspended sediment from river basins are degrading marine and freshwater ecosystems. Often the aquatic ecosystems of concern are at the end of, or within, large river basins where the sources of sediment can be many hundreds of kilometres upstream. River sediment can be derived from a range of processes including surface wash erosion, gully erosion landslides, and riverbank erosion. There are also diverse environments in large river basins and the bulk of eroded sediment is not transported to the river mouth but is deposited on footslopes, floodplains and in reservoirs on route. These features of river basins make it difficult to identify the sources of sediment that cause aquatic pollution, but they can all be addressed using a sediment budget approach.

In this paper we describe a spatially distributed model of river sediment budgets (Sed-Net). The model conceptualises the main sediment transport processes involved and parameterises them using available geographical and hydrological data. The model maps erosion processes, river sediment deposition and the spatial patterns of river loads. The predicted suspended sediment loads have been tested against observations across a range of Australian rivers.

A novel feature of the model is the ability to trace the contribution to downstream load of each source sub-catchment. These analyses show that typically 80% of river suspended sediment load is generated from just 20% of the upstream catchment area, identifying priority areas for sediment remediation. The model and its results are illustrated by application to the problem of sediment delivery to the Great Barrier Reef.