

Sediment and Waterholes

Bedload transport in large tropical rivers and its effect on dry-season pool habitats

Are waterholes filling up?

The pools that remain in northern Australian rivers during the long dry season provide an important refuge for stream fauna and flora and are often culturally significant to indigenous people. There is a common perception, however, that many of these riverine waterholes are being filled by sediments, particularly sands that are transported down streams as bedload (i.e. along the streambed, often during high flows). Various hypotheses exist as to the cause of sediment accumulation in these waterholes including changes in land-use upstream and the effects of climate change. This project will determine, whether there is evidence for sustained infilling of pools within the Mitchell and Daly rivers of tropical north Australia.

Measuring change

Several aspects of bedload transport will be assessed to build an overall picture of sediment movement over time:

- The maximum depth of mobile sediment and the age of sediment deposits will be determined using optically stimulated luminescence (OSL).
- Current patterns of sediment transport will be assessed by direct measurement from a boat during high flows.
- Longer term patterns of bedload transport in rivers

will be assessed by using remote sensing techniques e.g. historical sequences of air photos.

Measuring the material that moves down the rivers during high flows is necessary to calculate current rates of bedload movement. However, observing and measuring what happens in tropical rivers during times of high flows is a big challenge. It's not possible to plan ahead, researchers must wait until it rains. Roads may be cut and getting boats, equipment and people out onto a fast-flowing river can be difficult. A combination of local assistance and know-how, coupled with the use of river gauges that can be examined via satellite to determine rising river levels, will be critical to the success of this aspect of the project.

Looking to the future

The results from this and other TRaCK research will be used to create computer models that quantify how water and sediment moves. Together, they will allow the transport and accumulation of bedload sediments in specific river reaches, to be simulated under different flow conditions. This is an important building block for developing models of how land-use change will affect sediment movement in north Australian rivers and in particular, the availability and function of waterhole habitats.



Photo: Ian Dixon



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Who is on the team?

The project is led by scientists at the Australian Rivers Institute (ARI) at Griffith University in Brisbane. They will be working with other scientists from CSIRO Land and Water (in Canberra), the Northern Territory Government and Charles Darwin University.



Where is the research happening?

The research will focus on two catchments with quite different characteristics: the Mitchell River in Queensland and the Daly River in the Northern Territory. Dry season sampling of stream beds commenced in the Daly catchment during 2007, with the Mitchell to follow in 2008. Wet season sampling of bedload movement will happen as high-flow events and logistics dictate. The project will finish in 2009.

How will this research help?

Increased sediment accumulation in river systems is one of the risks associated with water resource development, intensified land-use in catchments and potentially, climate change. If waterholes fill with sediment over time, this may have a major impact on the availability and diversity of pool habitat within these rivers. By clarifying the specific flow regimes required to maintain the balance of sediment movement and deposition, this research will allow water

planners and natural resource managers to better calculate the risk that current and future water extraction and land-use may have on sediment accumulation (and thus loss of habitat) in pools. The effects of climate change on sediment movement and accumulation will be better appreciated.

By better understanding how sediment is moving through the river system and the sources of sediment, land managers can better prioritise remediation works for erosion control.

For conservation planners, indigenous land holders and recreational fishers, this research will clarify the nature and extent of the threat posed by sedimentation to waterhole dependent flora and fauna and their associated natural, cultural and social values.



Photo: Ian Dixon

Team Contacts

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