Nutrients in rivers

Towards understanding the impacts of land management on productivity in the Daly and Flinders Rivers

Linking nutrient inputs to river food webs

A common result of human activity in catchments is an increase in the amount of sediment and nutrients (phosphorus and nitrogen) found in rivers. Extra nutrients in rivers can feed plant growth in the form of algae and aquatic plants (known as primary production). On the other hand, fine sediments suspended in the water column can restrict the amount of light available for plant growth. So how do tropical rivers respond to these increased inputs? That is one of the issues this project will investigate.

Primary production is also the basis of food webs as plants provide a food source for other organisms. It is likely, therefore, that the key to understanding and predicting how aquatic ecosystems respond to land-use change is through understanding how aquatic plant growth is linked to changes in nutrient and sediment inputs.

So this project will answer questions about how changes to the nutrients found in rivers affect the processes and plant growth in rivers. In so doing the project is an essential link between the TRaCK projects studying river flows, carbon, nutrient and sediment inputs and other projects studying foodwebs and patterns of biodiversity.

How much and where from?

The project team will make a range of measurements to calculate the quantities of carbon, nutrients and fine sediments in the Daly River across the wet and dry seasons. The project will investigate to what degree the nutrients within the river originate from the decomposition of plant and soil material that has washed in during floods or from aquatic plants and algae. Measurements will also be taken from springs to determine how they contribute to the nutrient load.

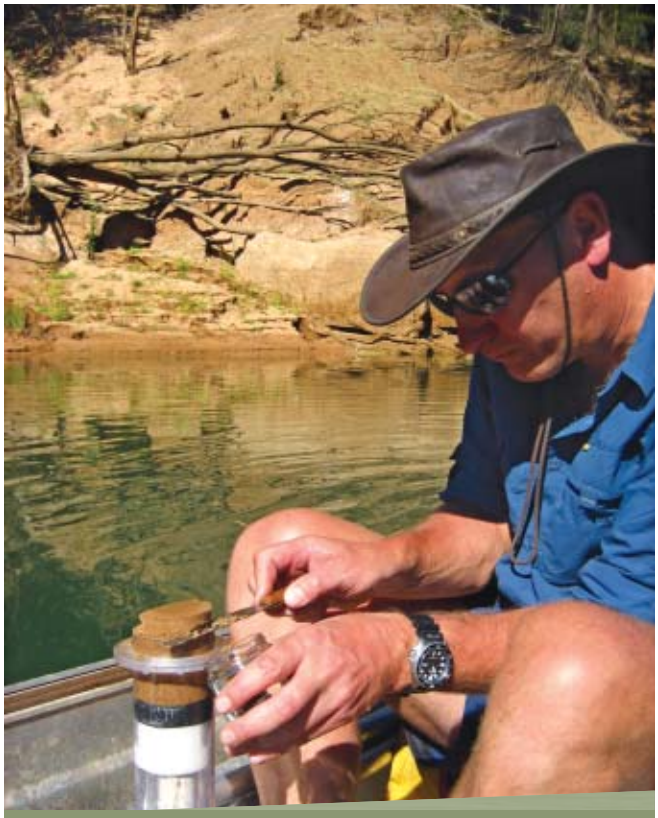
Photo: Julian Olden

What happens to nutrients in rivers?

Once sediments, organic material and their associated nutrients are in waterways the questions turn to what becomes of them. The project team will investigate a number of processes including:

- if and how nutrients attached to sediments are released into the water;
- measuring the cover and density of plant growth (macrophytes and algae) through the dry season to see how fast nutrients are being used in this way;
- how algae attached to the river bed and to plants responds to changes in nutrient concentrations.

Data from a routine sampling program combined with flow data will be used to describe the downstream transport of fine sediments and nutrients. This will include their apparent sources and sinks (where they accumulate or are removed from the system).



Slicing a sediment core. *Photo: Jodie Smith*

Getting the full picture

The wet season is the time when most water, fine sediments, and nutrients move through tropical river systems. Yet, only very limited sampling of rivers during the wet season has been undertaken so far. This project is devoting a significant effort to sampling these materials through the wet in the Daly River. This will provide an important source of information on what material delivery at this time of the year really is.

Who is on the team?

The project is being lead by Dr Barbara Robson from CSIRO Land and Water in Canberra. Other researchers in the team come from a broad range of agencies and institutions including CSIRO Marine & Atmospheric Research (Hobart), Griffith University (Queensland), Charles Darwin University (Darwin), Geosciences Australia (Canberra) and the NT government. Different contributors bring different specialist expertise to the team.

Where is the research happening?

The project will focus on the Daly River (NT) for the first two years and then switch to the Flinders River (Qld) in the years following. The Daly River component includes the length of the main channel and will define the nutrient and fine sediment inputs from the Douglas, Katherine and Flora Rivers. The work in the Flinders will be less intensive and closely linked to the TRaCK waterholes project. The project started in July 2007 and will finish in 2010.

How will this research help?

Regional NRM groups, government policy-makers, and water planners will benefit through:

- Improved understanding of the origin, transport and fate of carbon, nutrients and fine sediments in tropical rivers;
- Improved capacity to predict the consequences of land use and water resource changes on primary production in the Daly and Flinders rivers;
- Improved understanding on the linkage between flows and the transport and fate of nutrients and fine sediments.

This (predictive) capability is essential to assessing impacts of land-use change on ecological condition in tropical rivers, an important step for effective management of river catchments.

Team contacts

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To find out more about TRaCK
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