TRaCK
Tropical Rivers and Coastal Knowledge

Foodwebs and Biodiversity **FACT SHEET 2**

Waterhole foodwebs

Importance of waterholes as aquatic refugia and the biophysical processes that sustain these waterholes

A safe place

The waterholes occurring along the length of tropical rivers provide a critical refuge for plants and animals when water flow ceases, often representing the only permanent habitat during the long dry season. These refuge areas enable the "re-seeding" of broader regions when the rivers flow again and suitable habitat expands.

Waterholes are also highly valued by local communities, particularly the indigenous communities of northern Australia. Unfortunately waterholes are also vulnerable to increasing water demands, uncontrolled stock access, fishing pressure and the effects of climate change.

This study seeks to understand how waterholes in northern Australia respond to such pressures by better understanding the physical processes that create them and the food webs they support.

Photo: Ian Dixon

Natural forces at play

Using a combination of remote sensing, on-the-ground observations and discussions with local people, researchers will describe when and where waterholes are present in the river landscape and investigate the main sources of water that sustain them (groundwater or surface water). Tools will be developed to map the distribution and persistence of waterholes and predict the consequences of changes to the frequency and duration of dry spells.

Web of life

Food webs describe "who is eating who" in an ecosystem – from the microscopic algae at the bottom of the food chain to the top predators such as fish and crocodiles. These complex interrelationships are a cornerstone of ecology – they govern how rivers function and help explain patterns of biodiversity. Essentially they tell us how ecosystems are "put together".

Plants and algae kick start food webs and their growth may be affected by various factors such as light and nutrients. Researchers will identify the primary sources of carbon and nitrogen (the building blocks of life) in waterholes and determine the factors that may limit plant growth.

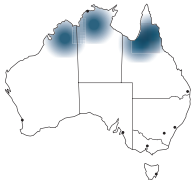
Further up the food chain, things become even more complex. In times gone by, scientists would look at the stomach contents of wildlife to determine what they ate. In more recent times, naturally-occurring stable isotope methods have also been used to unravel the complex relationships in food webs. TRaCK scientists will use these methods to identify the major sources of organic carbon that support the animals in waterholes, particularly species of recreational, commercial or cultural value. The method measures the different forms (stable isotopes) of carbon and nitrogen which occur naturally in the environment. The ratios of these different (non-radioactive!) forms in an organism are its "signature". The signature of algae and other plants

Photo: Ian Dixon

is passed on to the animals that eat them, so by analysing the tissue of an organism we can see what type of things it has been eating.

Who is on the team?

The project is led by Professor Stuart Bunn (Griffith University) working with researchers from Griffith University, CSIRO, University of Western Australia, Charles Darwin University and the Queensland and Northern Territory Governments.



Where is the research happening?

Researchers will commence their research in the Daly (NT) and Fitzroy (WA) rivers. Work will then move to the Flinders and Mitchell Rivers (Qld). Work on this project started in May 2007 and will finish in 2010.

How will this research help?

This research will help water resource managers determine the river flows necessary to maintain the plants and animals, and physical / chemical processes found in waterholes. A sound basis for determining environmental flows is a pre-requisite for ensuring north Australian rivers are not over-allocated by consumptive uses.

For natural resource managers and land holders, this research will help understand the consequences of feral animals, domestic stock and fishing on the functioning and health of waterholes, enabling more targeted management and rehabilitation methods to be developed. Indicators for monitoring the physical persistence of waterholes along tropical rivers and the important factors that keep them healthy will be determined. Management and monitoring programs for waterholes can then be developed to protect their significant environmental, economic, cultural and social values.

Photo: Michael Douglas

Team contacts

For more information about this project contact:

Stuart Bunn
Griffith University, Brisbane
S.Bunn@griffith.edu.au
phone 07 3735 7407

Australian Government
Department of the Environment, Water, Heritage and the Arts
Land & Water Australia
Australian Government Water Fund
Raising National Water Standards

To find out more about TRaCK
visit **www.track.gov.au**
email **track@cdu.edu.au**
phone **08 8946 7444**

TRaCK receives major funding for its research through the Australian Government's Commonwealth Environment Research Facilities initiative; the Australian Government's Raising National Water Standards Programme; Land and Water Australia and the Queensland Government's Smart State Innovation Fund

Foodwebs and Biodiversity