# Water budgets

Catchment water budgets and water resource assessment

## A tool for water managers and researchers

The water budget of a catchment has the same type of elements as a household budget except we look at water instead of money. To build one, we need to know how much water there is, where it goes and when. Such water budgets are a useful tool for catchment managers making decisions about water extraction. They are also essential for researchers looking at how aquatic systems are linked or isolated within a catchment and how other materials such as sediment and nutrients move through catchments. Water budgets generally don't exist for northern Australian catchments.

This project aims to start measuring and calculating the different elements of water budgets in three of the TRaCK focus catchments. The team will also develop at least one complete budget (for the Daly River catchment).

## Putting together a water budget

To build a complete water budget, we need to know the fate of rainfall falling on catchments: how much ends up as evapotranspiration (evaporation and water use by plants); how much goes underground; and how much flows into streams, etc. An important but often difficult aspect of building water budgets is developing an understanding of the links between surface water (water you can see in lakes, streams, etc) and groundwater (water you can't see underground). In some places, surface water flows into the ground to become groundwater, and in other places groundwater flows into rivers to become surface water. These flows are important to quantify.

*Photo: Lindsay Hutley*

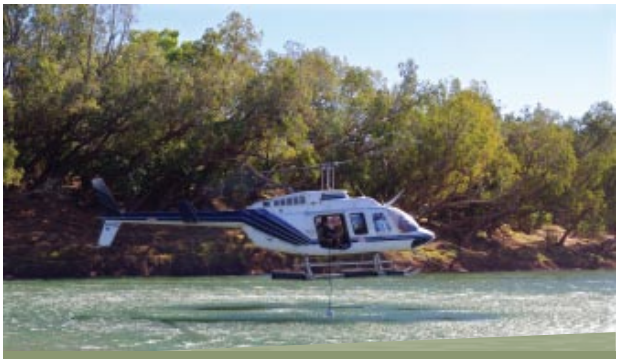

*Photo: Rebecca Doble*

The type of vegetation in a catchment will also have an influence on the water budget. To try and quantify these effects, the team will measure vegetation water use at sites in the Daly with different vegetation management histories. These include uncleared, recently cleared, and long-term cleared areas, plus improved pastures. Rainfall which is not used by vegetation will evaporate, run off, or infiltrate deeply into the soil to become groundwater. The team will try to quantify the relative importance of these different water balance components.

## High technology and on-ground support

Many of the rivers in Australia's Tropical North are difficult to access, particularly during the wet season. So, the project team will need to use a combination of high technology and local know-how to collect their data. For example, remote sensing technologies will be used to determine the extent of flooding of northern rivers, and how rivers expand and contract through the wet – dry season cycle.

*Photo: Rebecca Doble*

The project will also use helicopters for water sampling. The helicopter will hover above the river, a pump will be lowered into the river, and water will be pumped into the helicopter, where samples can be taken. The team plan to use this method to collect samples from a 200 km length of the Fitzroy River without the need to land the helicopter.

Another way the team will gather information about remote river systems is to involve local communities. Indigenous communities living near the Fitzroy River will be involved in collecting samples at different times of the year.

## Who is on the team?

The project is being run by Dr Peter Cook from CSIRO Land and Water in Adelaide. In addition to CSIRO the project team includes researchers from Charles Darwin University and the Environmental Research Institute of the Supervising Scientist (eriss) – both based in Darwin.

The project team will also be working closely with other projects in the material budgets theme who will need water budgets to describe sediment and nutrient movements. Likewise mapping of inundation will be important to the foodwebs and biodiversity projects looking at waterhole dynamics.

## Where is the research happening?

This project will involve activities in the Daly (NT), Fitzroy (WA) and Mitchell (Qld) catchments, but not all activities will take place in all catchments. Evapotranspiration measurements and water balance calculations will take place in the Daly catchment. Groundwater- surface water characterisation and modelling will take place in both the Daly and Fitzroy catchments. Mapping of areas of inundation and persistence of water holes will take place in the Daly and Mitchell catchments. The project started in September 2007 and will finish in 2010.

## How will this research help?

Government policy and water planning staff will benefit from increased understanding of the links between surface water and groundwater systems in tropical environments. For example, they will be better able to predict the effects of groundwater pumping on groundwater levels and river flows. Government staff and regional natural resource management bodies will also better be able to predict of the effects of landuse change (in terms of vegetation cover) on groundwater levels and river flows. This information is critical for management of riparian ecosystems, and for protecting aquatic species which live in the rivers.

Other researchers will benefit through better knowledge of surface water – groundwater interaction and tropical hydrology. Practicing hydrologists will also be able to use methods developed in this project.

## Team contacts

For more information on this project contact:

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Australian Government
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Land & Water Australia
Australian Government Water Fund
Raising National Water Standards

To find out more about TRaCK
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Material Budgets

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