## Key findings to date

- Tree water use is similar all year round, despite large seasonal differences in rainfall.
- Groundwater of the Top End is being recharged very slowly when compared to the rapid increase in the number of bores. In the 1960s, there were less than 100 bores in the Darwin rural area – now there are over 4000.
- The amount of water entering groundwater aquifers in the Howard East catchment each year has been estimated at 200 mm per year (or 2 megalitres per hectare each year).

## Working with water users and managers

- This project will help the Division of Water Resources, Lands Planning & Environment, the principal water resource manager in the Northern Territory, set sustainable pumping rates of groundwater.
- These project techniques can be used across Australia and are relevant to other water users and managers from the pastoral, mining and tourism industries and Aboriginal, defence, and conservation interests.

***Researchers adjust equipment at one of the study's sites. Results so far show that groundwater is recharged slowly compared to the growing number of bores in the Top End.***

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CRC AUSTRALIA

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# Sustainable use of groundwater in the Top End

A LWRRDC & TROPICAL SAVANNAS CRC PROJECT

Land & Water Resources Research & Development Corporation

Tropical Savannas CRC
Cooperative Research Centre for the Sustainable Development of Tropical Savannas

**A study, based at Howard Springs near Darwin, is examining how tropical woodlands depend on groundwater.**

**This work aims to help people use groundwater wisely in northern Australia.**

**For this project, the Tropical Savannas CRC brings together groundwater scientists, soil scientists and plant scientists from the following partner agencies:**

NTU Northern Territory University

CSIRO AUSTRALIA

Northern Territory Department of Lands, Planning & Environment, Water Resources Division


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# What are the tropical savannas?

They are the landscapes of dense grass and scattered trees that stretch across northern Australia.

This country dominates the top third of Australia, and is home to a rich variety of plants and animals. Industries in this region generate $7.5 billion in income each year.

***The shaded area shows the tropical savannas. CRC research is carried out right across the region.***

# Groundwater in tropical savannas

- Groundwater is found beneath the land surface. It is the largest water reservoir in any landscape and is known as an aquifer.
- The Northern Territory has a large amount of good quality groundwater.
- Increased domestic, industrial and agricultural development, especially in the Darwin rural area, will place pressure on our groundwater supplies.
- By the end of the dry season there has been a large drop in the groundwater level (up to 7m).
- If this drop is largely because plants use groundwater during the dry, then we need to be careful not to reduce groundwater supplies too much. Plant health, the quality of the landscape, and water supplies for future generations may be affected.

***One of the researchers in the study, Lindsay Hutley, installs equipment for measuring plant water use.***

# What we need to know

- How much water do woodland plants need and how much of this comes from groundwater?
- How does the rate of water use change with the season, in particular during the dry season?
- How much water enters the soil and is stored there, and how much continues on to the groundwater aquifer?
- If we increase our use of groundwater we could change the way groundwater levels vary between seasons. How will woodland plants respond to this change?

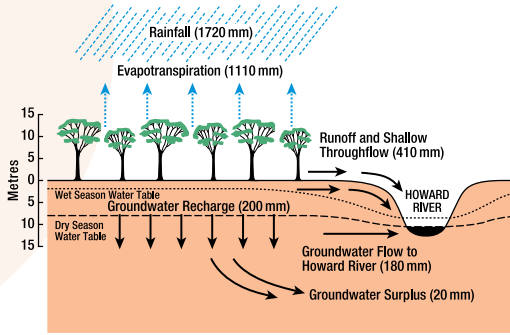
***In the Top End swampy paperbark forests and rainforest patches may depend on shallow aquifers during the dry season.***

# A new way to tackle the problem

To understand how woodland plants depend on groundwater, you need to track water as it flows from rain, to plants, into the soil and finally down to the groundwater in the rocky aquifers. To trace these complex flows, a broad range of scientific techniques must be used. The Tropical Savannas CRC has links to different scientific agencies so it can bring together researchers with expertise in many areas. These include:

- Plant physiologists to measure how plants use water.
- Ecologists to map and classify different types of plants in the area.
- Soil scientists to analyse soil moisture changes through the seasons.
- Hydrologists to measure groundwater age and the rate at which it is renewed.
- Modellers to work out how the whole system is affected by climate.

## EUCALYPT SAVANNA WATER BALANCE




***Wet season rainfall becomes***

- ***evapo-transpiration (water drawn up by plants and evaporated from the soil).***
- ***surface or sub-surface flow of water to creeks and rivers.***
- ***drainage to deep groundwater storage aquifers.***

***A key question is how much of the drop in the water table over the dry season is due to water used by plants and how much is due to flow through the soil.***