

# Assessing groundwater development opportunities in northern Australia

## Part of the Northern Australian Water Resource Assessment

There is at least 16 million hectares of soil that is potentially suitable for irrigated agriculture across northern Australia, and water sufficient to irrigate up to 10% of that area.

Access to water is therefore a key constraint for irrigation and other development in this vast region that stretches from the Pilbara to Rockhampton, and comprises 40 percent of Australia's land mass.

In recognition of some of the challenges and opportunities facing communities and primary producers, the Australian Government initiated the Northern Australia Water Resource Assessment to be completed by June 2018.

The Assessment involves 10 different activities that will provide a comprehensive overview and integrated evaluation of the feasibility, economic viability and sustainability of water and agricultural development in key parts of the north.

This factsheet explains one of these activities – groundwater hydrology.

Our researchers are working with communities and the Western Australian, Northern Territory and Queensland Governments to complete an assessment of groundwater development opportunities in three priority regions: the Mitchell catchment in Queensland, Darwin catchments in the Northern Territory, and the Fitzroy catchment in Western Australia.

The groundwater hydrology activity will identify areas that are potentially suitable for groundwater development in each of these regions.

## Groundwater hydrology activity

Characterising groundwater flow systems in northern Australia is essential to understanding the potential scale and location of groundwater development opportunities. The groundwater hydrology activity will provide a comprehensive assessment of the aquifers identified as most suitable for development. Both opportunities for and risks associated with groundwater resource development will be identified for each of the three priority regions. Some of these aquifers encompass vast geographical areas where water resources are unallocated. Existing groundwater infrastructure in these areas is often sparse and is typically associated with isolated mining or agricultural developments. This lack of infrastructure (and consequently, groundwater data) has limited past assessments of groundwater resources in northern Australia and therefore hindered the understanding of groundwater processes, the assessment of development potential and the identification of risks associated with development.

## What does the activity involve?

This activity will collect a variety of information through a combination of targeted field investigations and desktop analyses. The purpose of field investigations will be to strategically collect new groundwater data in each region that complements existing data and can be used in a range of desktop analyses. Due to the data-sparse nature of these large regions, the new data collected from field investigations will be critical to



estimating the scale of groundwater development opportunities. CSIRO is working closely with a range of stakeholders to tailor field work programs for each region.

#### The nature and purpose of field investigations in this activity include:

- drilling and geophysical surveying to improve current mapping of aquifers
- water quality sampling to understand variability in water quality and its suitability for different applications
- groundwater level observations to identify recharge and discharge areas and the direction of groundwater flow
- environmental tracer sampling to quantify water age and the time scales of groundwater flow and recharge processes
- pump testing and aquifer core testing to estimate the ability of aquifer materials to transmit water
- salinity profiling to understand the potential risks of irrigation induced salinity.

#### The nature and purpose of desktop analyses in this activity will include:

- groundwater level analyses to understand aquifer responses to seasonal fluctuations in groundwater levels and to estimate the directions of groundwater flow
- groundwater quality analyses to identify the spatial variability in groundwater quality
- environmental tracer sampling, numerical modelling and analysis of remotely sensed data to estimate the amounts of recharge and discharge
- conceptual modelling and water balance estimation to characterise the inflow, outflow and storage components of groundwater flow systems
- numerical modelling to determine the potential impacts of hypothetical groundwater extraction scenarios on groundwater dependent ecosystems and determine the potential scale of the available groundwater resource
- analytical modelling to estimate the risks of irrigation-induced water table rise and soil salinisation
- spatial analysis highlighting the potential locations for different types of managed aquifer recharge (MAR) schemes.

## Outcomes

The Assessment aims to lower barriers to investment in each of the three priority regions by addressing many of the questions that potential investors may have about agricultural production systems and methods, yield expectations and benchmarks, and potential profitability and reliability.

However, the Assessment does not seek to replace any planning processes, and will not recommend changes to existing plans or planning processes. The results, however, can be used to inform planning decisions by citizens, councils, investors, State and Commonwealth Governments, and any other potential or existing stakeholders. Please contact the relevant government department to discuss matters such as water allocation, clearing, change of land use, including diversification permits, and land development approval processes.

The groundwater hydrology activity will build on existing knowledge to provide all levels of government and current and potential farmers with an understanding of the groundwater resource development opportunities in each region.



*The Northern Australia Water Resource Assessment is part of the Australian Government's Agricultural Competitiveness White Paper, the government's plan for stronger farmers and a stronger economy.*

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