

GISERA | Gas Industry Social and Environmental Research Alliance

Groundwater baseline study of the Canning Basin

CSIRO researchers have reviewed existing knowledge about groundwater systems in the Canning Basin in Western Australia. Researchers aimed to identify information gaps that require future investigation, characterisation and monitoring.

Research scope

This project represents the first comprehensive groundwater baseline review of the Canning Basin – a sedimentary basin in Western Australia with an onshore area of about 530,000 square kilometres.

Although numerous groundwater studies have previously been undertaken in parts of the Basin, generating vital knowledge about the groundwater resource potential of specific aquifers, their geographic locations were highly dispersed and findings were segregated in different libraries and databases.

To address this significant knowledge gap CSIRO researchers completed the first collation, review and summary of groundwater information for the entire Canning Basin, in line with recommendations of the Independent Scientific Panel Inquiry into Hydraulic Fracture Stimulation in Western Australia.

This essential research identified where new, higher resolution or improved hydrogeological information would support increased groundwater demand.

The project findings will support informed decision making in government, industry and communities, and will help evaluate potential impacts from oil and gas development in the region.

Image: Canning Basin escarpment. Image courtesy of Arthur Mory, WA Geological Survey and Resource Strategy Division, Department of Mines, Industry Regulation and Safety

Key findings

The review framework identified four groundwater baseline assessment components: hydrogeological systems, groundwater processes, groundwater quality and groundwater dependencies.

Results confirmed that the most detailed regional hydrogeological characterisation exists in parts of the region where agricultural, mining or energy developments have been planned.

Hydrogeological characterisation is poor in the remote central, eastern and southern parts of the basin, and many parts of the study area remain underexplored or unexplored.

Information is sparse regarding vertical separation between deep geological units prospective for unconventional oil and gas resources and overlying hydrogeological units important for supplying fresh groundwater.

The ecological and cultural significance of the study area's environmental and cultural water assets is growing due to ongoing interest in economic development across the basin, as well as further recognition of Indigenous water uses, values and aspirations.

Increased competition for water resources from the agricultural and energy sectors across the northern part of the basin requires careful management to protect key assets should further regional development proceed.



Australian Government Department of Industry, Sc Energy and Resources





Supported by Government of South Australia









Next steps

During the Independent Scientific Panel Inquiry into Hydraulic Fracture Stimulation in Western Australia, one of the largest concerns raised by stakeholders was the sustainable development of water resources.

With increasing focus on the Canning Basin's potential for use by shale gas and other industries, a baseline knowledge of the region's groundwater is essential for assessing the potential risk of any future development.

This work is especially important given that the basin encompasses one of the driest parts of the Australian continent and is subject to climate extremes.

The recent groundwater baseline study by CSIRO identified several areas where hydrogeological data and information could be improved, and provided a suite of options for future work should further groundwater development proceed.

These options include:

- further integration and analysis of geophysical datasets, such as the Australian Airborne Electromagnetic (AusAEM) survey and the Department of Water and Environmental Regulation's Water Information Reporting (WIR) system
- applying an integrated geophysical approach to improve the understanding of the basin's stratigraphy and hydrogeology
- developing a basin-scale geological model to define a number of key characteristics
- further evaluating potential contamination risks to groundwater.

This research complements other GISERA research projects carried out by CSIRO in the Canning Basin focusing on biodiversity and seismic analysis.

The robust, evidence-based scientific analysis provided by this research can be used to inform future planning, investment and management of the Canning Basin's groundwater resources.

It will assist the community, government and industry to make informed decisions regarding development in the Canning Basin.

Image: Canning Basin sand and scrub. Image courtesy of Arthur Mory, WA Geological Survey and Resource Strategy Division, Department of Mines, Industry Regulation and Safety





Spatial distribution of water information reporting (WIR) groundwater bores and previous groundwater study areas across the Canning Basin – (Department of Water and Environmental Regulation (DWER); Royalties for regions – Water for Food; Department of Water (DoW); and CSIRO's Northern Australia Water Resource Assessment (NAWRA).

Study data sources

In addition to georeferenced data available in scientific literature, the review examined data held by:

- Department of Primary Industries and Regional Development
- Department of Water and Environmental Regulation
- Geological Survey of Western Australia
- Geoscience Australia
- Bureau of Meteorology

- Western Australia Department of Mines and Petroleum
- Western Australia Department of Biodiversity, Conservation and Attractions
- Kimberley Land Council
- Western Australia Biodiversity Science Institute
- CSIRO departments
- Industry stakeholders.



Image: Canning Basin termites. Image courtesy of Arthur Mory, WA Geological Survey and Resource Strategy Division, Department of Mines, Industry Regulation and Safety

More information

This project was co-funded by the Federal Government (75%) and CSIRO (25%).

More information about the project, including the final report, is available <u>online</u>.

Further information | 1300 363 400 | gisera@gisera.org.au | gisera.csiro.au

GISERA is a collaboration between CSIRO, Commonwealth and state governments and industry established to undertake publicly-reported independent research. The purpose of GISERA is to provide quality assured scientific research and information to communities living in gas development regions focusing on social and environmental topics including: groundwater and surface water, greenhouse gas emissions, biodiversity, land management, the marine environment, and socio-economic impacts. The governance structure for GISERA is designed to provide for and protect research independence and transparency of research.