

Characterising stygofauna and microbial assemblages in the Beetaloo Sub-basin

This project will involve sampling of water bores in the Northern Territory's Beetaloo Sub-basin to determine the distribution and abundance of stygofauna and microorganisms that characterise groundwater-dependent ecosystems in the region.

KEY POINTS

- The Scientific Inquiry into Hydraulic Fracturing in the Northern Territory identified the composition of groundwater ecosystems to be a critical knowledge gap in the region.
- This project will involve a pilot survey of bores in the Beetaloo Sub-basin and Roper River system, to characterise groundwater-dependent ecosystems.
- The study will provide the first description of stygofauna in an otherwise understudied region of Australia.
- The baseline data is essential for biodiversity conservation and the maintenance of the ecological integrity of groundwater systems in the region.

Community concerns

The recent Scientific Inquiry into Hydraulic Fracturing in the Northern Territory highlighted community concerns about the potential of the onshore gas industry to affect the quality and quantity of groundwater. Groundwater is important for agriculture, tourism and the supply of water to communities.

The inquiry identified the need for a regional assessment on groundwater-dependent ecosystems within the Beetaloo Sub-basin and the Roper River region. According to the final report, the assessment should include the *'identification and characterisation of aquatic ecosystems and provide measures to ensure the protection of these ecosystems'*.

Aims of the project

This project will provide new knowledge about stygofauna (any fauna that live in groundwater systems or aquifers) and microbial assemblages of groundwater ecosystems in the Beetaloo Sub-basin and Roper River system.

The project aims to define species composition and distribution, to build an understanding of habitat requirements and species resilience to disturbance. This baseline information will allow in-depth ecological understanding of groundwater-dependent ecosystems in the region and support appropriate policy and resource management decisions in relation to proposed gas development in the Northern Territory. This is one area of study within a larger project that will improve the overall understanding of the groundwater system of the Beetaloo Sub-basin.



Image: A spring-fed pool at Mataranka, Elsey National Park.

What the project will involve

Researchers will undertake a broad-scale pilot survey of bores in the Beetaloo Sub-basin and Roper River region. Laboratory studies will characterise the community structure and function of the stygofauna and microbial assemblages, and determine environmental variables of the shallow subterranean aquifers of the study area.

Some of the benefits of the study include:

- Promotion of healthy groundwater-dependent ecosystems
- Greater understanding for maintaining groundwater quality
- Improved knowledge to inform policy, guidelines and decision making.

The project will build on existing work on groundwater-dependent ecosystems undertaken in Western Australia, Queensland and New South Wales. The results will be publicly available when the project is completed.



Figure 1. Beetaloo Sub-basin and Roper River regions of the Northern Territory.

The Beetaloo Sub-basin

The Beetaloo Sub-basin lies 180km southeast of Katherine in the Northern Territory and spans an area of about 30,000 km² (Figure 1). One of the most prospective areas for shale gas in Australia, it contains an estimated resource of 178,200 petajoules (PJ) of gas.

The Roper River is a large perennial river with a catchment area of more than 80,000 km². It is one of the largest river catchment areas in the Katherine region.

Selecting bores

Before field sampling begins, a desktop study will be undertaken to identify accessible bores with attributes that are known to support stygofauna. In addition, some bores that sit outside this 'typical range' of conditions will also be included in the survey, to determine whether any specialised organisms are occurring in conditions outside of the expected range.

Field sampling

Field sampling will take place across a broad range of landscape features during the 2019 dry season and include between 20-30 bores. Sampling and storing methods will be developed as part of this project to optimise the survey process.

Measurements will help characterise:

- Stygofauna composition, abundance and distribution
- Microbial assemblages
- Water quality (pH and Electrical Conductivity, EC)
- Potential inputs of dissolved organic carbon – via the assessment of the aboveground vegetation in the vicinity of each bore.

Laboratory and data analysis

Identification of stygofauna will be undertaken at Charles Darwin University. Molecular analyses, at CSIRO's Albury-Wodonga laboratory, will assist with stygofaunal identification, characterisation of microbial assemblages and functional analysis.

Analyses of survey data will identify the spatial distribution of stygofauna and microbial communities and explore how their presence or absence is influenced by the physical and water quality properties of the bores selected for study.

Analyses will also help determine the sampling intensity needed for modelling and the prediction of stygofaunal distribution across basins of interest.

FAQs

What is the timeline for this project?

15 June 2019 to 30 June 2020

When will the results be available?

Reporting will take place in May 2020

Who is funding this project?

The project is co-funded by the Australian Government and the Northern Territory Government (38%); CSIRO (20%); and by Origin Energy, Santos and Pangaea (25.8%). An in-kind contribution is provided by Charles Darwin University.

MORE INFORMATION

- More about [the project](#)
- Scientific Inquiry [final report](#)
- About the [Beetaloo Sub-basin](#)

ABOUT GISERA

The Gas Industry Social and Environmental Research Alliance (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, 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. Visit gisera.csiro.au for more information about GISERA's governance structure, projects and research findings.

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