GROUND AND SURFACE WATERS

GISERA | Gas Industry Social and Environmental Research Alliance

Examination of stygofauna ecosystems of the Beetaloo Sub-basin

This project will improve understanding of the extent to which stygofauna present in water bores reflect their presence more widely within aquifers in the Beetaloo Sub-basin, Northern Territory.

A recent pilot-scale study demonstrated that aquifers in the Beetaloo Sub-basin support a diverse range of stygofaunal species. However, a number of key knowledge gaps remain.

CSIRO's Gas Industry Social and Environmental Research Alliance (GISERA) is undertaking a project that will build on previous work and target those knowledge gaps by closely linking groundwater studies with biological sampling in the Beetaloo Sub-basin.

Key points

- Stygofauna are valued as a biodiversity resource and as indicators of groundwater ecosystem health.
- This project aims to address knowledge gaps about our understanding of where stygofauna exist and whether they are vulnerable to above-ground activities.
- The research builds on previous GISERA work to characterise stygofauna communities in groundwater-dependent ecosystems.
- Researchers will undertake a combination of desk- based work and field programs in the Northern Territory.
- Project outcomes will help drive understanding of potential risks to stygofauna from onshore gas development in the region.

Research objectives

This research aims to understand the extent to which stygofauna present in bores reflect their presence more widely within aquifers. It also seeks to understand which physical and chemical drivers determine where stygofauna exist, and the extent to which communities may be connected. This improved understanding of environmental conditions and stygofauna ecology provides a scientific basis for assessing potential impacts associated with above-ground development.

The Beetaloo Sub-basin

The Beetaloo Sub-basin lies south-east of Katherine in the Northern Territory and spans an area of about 30,000 square kilometres. The estimated gas resources for the Beetaloo sub-basin are of similar size to other major gas producing basins in Australia, such as the Surat Basin in Queensland and the Bonaparte/Browse basins in Western Australia.

The Cambrian Limestone Aquifer (CLA) system is the major aquifer in the Beetaloo Sub-basin with important cultural, environmental and economic values.

Understanding any potential risks associated with gas development activities in the Northern Territory requires detailed knowledge of the types of stygofauna present in the aquifers, a clearer picture of the distribution of stygofauna, and the extent to which bore samples accurately reflect colonisation of the CLA.

CSIRO | Australian Government Department of Industry, Science, Energy and Resources | Queensland Government | NSW Government | Supported by Government of South Australia | Northern Territory Government | Australia Pacific LNG | QGC | origin | Santos

The importance of healthy groundwater

Maintaining the health of groundwater in Australia is important because over 70 per cent of the country is arid or semi-arid and surface waters are scarce. This is especially relevant in the Beetaloo region.

In many remote areas, groundwater is the only source of water for human infrastructure, agriculture, horticulture, mining, and oil and gas resources. Communities in regions where there is proposed oil and gas development often identify potential impacts on groundwater as an area of concern.

Stygofauna are valued as a biodiversity resource, an indicator of groundwater ecosystem health, and potential providers of ecosystem goods and services, such as nutrient cycling.

Improved understanding of stygofauna in the Beetaloo will enable consideration of how those ecosystems may be impacted by onshore gas development, and what the implications are for monitoring, management and mitigation.

Building on previous work

In a recent pilot-scale study in the Beetaloo region, researchers from CSIRO and Charles Darwin University (CDU) sampled 26 bores across a distance of approximately 500km. Live stygofauna samples were found in 6 of the 26 bores, with additional DNA evidence in many others.

The fauna showed little affinity with the stygofauna sampled from more extensively studied aquifers in Western Australia, indicating that new genera and species are present in the Beetaloo.

The outcomes of the pilot-scale project demonstrated the importance of carrying out a widespread systematic survey in the Beetaloo region. This survey will examine a diverse range of bores and aquifers for the presence of stygofauna.

The Northern Territory Government's Strategic Regional Environmental and Baseline Assessments (SREBA) is currently conducting a regional stygofauna assessment as part of aquatic ecosystem baseline studies required for the Beetaloo Sub-basin. The program aims to sample approximately 70 bores.

This GISERA project expands on and complements these existing studies to address key knowledge gaps.

Filtering bore water through a plankton net.

Project methods and outcomes

The first phase of this project will include a review of all available existing data and literature on stygofauna and groundwater systems in the Beetaloo. The review will note any aspects that are particularly relevant to impacts from development activities.

Phase two of the project involves three field campaigns to undertake bore sampling, likely to take place in the 2022, 2023 and 2024 dry seasons. This will be followed by sample analysis carried out at CSIRO laboratories.

On completion, the project findings will be made publicly available on the GISERA web site.

More information

Read more about the project to examine stygofauna ecosystems of the Beetaloo sub-basin

Read about other GISERA projects based in the Northern Territory

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

B&M | 22-00401 W30