Australia's National Science Agency

GROUND AND SURFACE WATERS

GISERA | Gas Industry Social and Environmental Research Alliance

Microbial communities and their ability to degrade prospective chemicals used in coal seam gas activities

This project will investigate microbial degradation of chemicals used in coal seam gas (CSG) activities in soils and waters in the Narrabri region, NSW, and establish microbial and chemical baselines to be used in future research and monitoring.

Key points

- Research outcomes will reduce uncertainty and help address community concern around potential impacts from CSG production on water and soil quality in the region.
- The project will establish microbial and chemical baselines in waters and soils to be used in future research and monitoring of CSG activities in the Narrabri region.
- The project will investigate the ability of microbial communities in soils and waters to degrade typical chemicals used in CSG exploration and production activities.
- These outcomes will assist in the assessment of potential environmental impacts from CSG resource development in the Narrabri region.

CSIRO has developed a growing body of knowledge of microbial degradation of typical chemical compounds used in onshore gas development activities. This project focuses on generating new information directly relevant to the Narrabri region.

Researchers will establish microbial community and chemical baselines in agriculturally important surface and groundwaters along with the two major soil types of the Narrabri region – the agriculturally important clay soils (vertosols) and the dry sandy (sodosolic) soils of the Pilliga Forest.

This project will assess and understand the capacity of microbes of these environments to degrade a range of chemicals likely to be used in CSG activities.

This research is part of a suite of projects being conducted in the Narrabri region through CSIRO's Gas Industry Social and Environmental Research Alliance (GISERA). These projects reduce uncertainty around the environmental, social, and economic risks associated with proposed CSG activities.

Narrabri Shire

The Narrabri Shire, in north-west NSW, covers approximately 13,000 square kilometres and is home to around 13,000 people with 6,000 living in the main town of Narrabri.

The shire is primarily a grazing and farming region, with irrigated cotton the main high-value crop. Regionally important aquifers including the Namoi alluvium and the Pilliga Sandstone have significant cultural, environmental and economic values.

In 2020, oil and gas producing company Santos gained state and federal environmental approval for a CSG project in the Narrabri region. The proposed gas project is situated approximately 20 kilometres south of the town of Narrabri.

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

Research need

To monitor the environment and reduce uncertainty around the potential impact of CSG production on water and soil quality in the Narrabri region, it is important to establish environmental baselines.

This baseline needs to be established before extensive development occurs to detect unintended environmental disturbance.

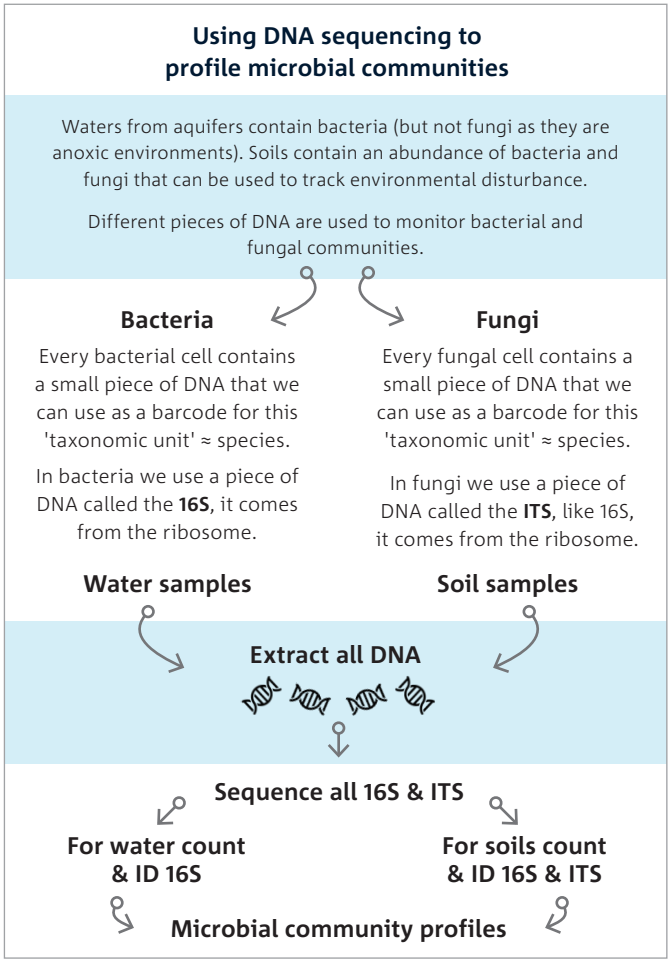
To assess water and soil quality and establish this baseline, researchers will use a process called microbial biomonitoring.

Biomonitoring

Biomonitoring uses biological assessment techniques to measure changes in microbial communities and identify organisms sensitive to specific environmental contaminants.

These include genomic techniques such as environmental DNA-based counts (e-DNA), which count all organisms in an environment. 'Marker' genes can then identify members of various microbial groups.

These assessment techniques are an emerging and effective research tool for determining ecosystem health.



Objectives

This research project has two specific objectives.

The first is to establish microbial community and chemical baselines in surface and groundwater samples and in two major soil types of the region. These water and soil samples will be collected in the vicinity of proposed CSG activities in the Narrabri region.

The second objective is to extend CSIRO's growing body of knowledge of microbial degradation processes by understanding potential microbial degradation of CSG chemicals likely to be used in the Narrabri region.

Methodology

Research project methodology will include the following activities:

- Establish water and soil sampling sites in consultation with local stakeholders, particularly for fertile agricultural soils.
- Develop a representative list of typical CSG chemicals for microbial degradation experiments.
- Conduct a detailed review of current relevant literature.
- Establish microbial and chemical baselines using highly sensitive e-DNA microbial genomic biomonitoring.
- Determine the ability of microbes in these environments to degrade typical CSG chemicals either through analytical chemistry techniques or microbial growth assays.
- Collate baseline data with microbial degradation, microbial community impact and useful indicator taxa for individual chemicals.
- Make all results publicly available via CSIRO's GISERA web site.

More information

Find out more about the project

Read about other GISERA projects in NSW

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

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