



GISERA

Gas Industry Social and Environmental Research Alliance

Summary of research projects

JULY 2018



GISERA is conducting research that addresses the social and environmental impacts and opportunities arising from onshore gas developments.



Australian Government
Department of Industry,
Innovation and Science



Supported by
Government of
South Australia



Surface and groundwater

Hydrocarbons in groundwater, Surat and Bowen basins **Q**

SCOPE: review and assess the presence of organic compounds in groundwater found in the Surat and Bowen basins using existing open source and company held data.

OUTCOMES: information and methods to assess possible sources of hydrocarbons in groundwater to help differentiate naturally occurring hydrocarbons and those potentially introduced during gas extraction process.

Air, water and soil impact of hydraulic fracturing **Q**

SCOPE: to design an intensive monitoring campaign that will measure the air, water and soil impacts of hydraulic fracturing of production wells in the Surat Basin.

OUTCOMES: a report summarising the current state of knowledge regarding sources of air, water and soil pollutants associated with CSG extraction using hydraulic fracturing, a peer-reviewed design for a measurement program that will provide enhanced information of the impacts of hydraulic fracturing and a report presenting an analysis of air, water and soil quality before commencement of hydraulic fracturing activity.

Air, water and soil impact of hydraulic fracturing: Phase 2 **Q**

SCOPE: this project involves undertaking a comprehensive monitoring campaign to measure the air, surface water, groundwater and soil impacts of hydraulic fracturing of gas production wells in the Surat Basin, Queensland.

OUTCOMES: a series of reports summarising the impacts of hydraulic fracturing on air, water and soil quality, developed through a comprehensive on-site program of measuring air, water and soil before, during and after hydraulic fracturing activity.

Improving groundwater flow models **Q**

SCOPE: measuring and modelling specific chemicals called environmental tracers to gain a better understanding of the speed and direction of groundwater flow.

OUTCOMES: new data and modelling approach to assess flow rates and volumes of usable groundwater resources in CSG regions in Queensland.

Groundwater contamination risk assessment **N Q**

SCOPE: assessing the likelihood of groundwater contamination from hydraulic fracturing and wellbore damage.

OUTCOMES: quantitative estimate of the risk of groundwater contamination at a basin/sub-basin scale. This will help management plans and strategies to reduce the risk of surface and groundwater contamination and provide communities a better understanding of potential impacts to local water resources.

Impacts of CSG depressurisation on the Great Artesian Basin (GAB) flux **N**

SCOPE: improve the understanding of the GAB groundwater flow in the Pilliga region through integration of existing information from models, hydrochemical data and environmental tracers.

OUTCOMES: assess the chances of extreme changes in GAB groundwater flux (flow volumes) as a result of CSG development using state of the art uncertainty analysis and modelling.

Spatial design of groundwater monitoring network in the Narrabri Gas Project area **N**

SCOPE: analysis and design of groundwater bore networks for optimal groundwater monitoring and early detection of changes.

OUTCOME: optimal spatial design of groundwater monitoring networks to improve confidence around predicted groundwater impacts, and help minimise the risk of environmental damage.

Improving the representation of the impact of CSG extraction in groundwater flow models for the Namoi region **N**

SCOPE: develop more representative models for estimating the groundwater impacts from coal seam gas well fields.

OUTCOME: improving the prediction of groundwater impacts by ensuring accurate representation of the effects of CSG production in the groundwater models being developed for the Namoi region.

Onshore gas and water contamination: causes, pathways and risks **S**

SCOPE: investigate potential groundwater contamination causes, pathways and vulnerability to understand onshore gas water quality impacts for south east South Australia.

OUTCOME: achieve a realistic quantification of groundwater contamination risks in gas, providing improved knowledge for regulators, industry and community.



Agricultural land management



Inside the heard

SCOPE: monitoring grazing land with coal seam gas (CSG) infrastructure to better understand the impacts of CSG infrastructure, traffic and dust on animals and pastures.

OUTCOMES: a detailed study of livestock behaviour, pastures, soil processes, and dust deposition for a real CSG property.

Gas impacts and opportunities on primary industries

SCOPE: analyse possible impacts and opportunities from gas development for rural areas in South Australia's south east.

OUTCOMES: information to assist community understanding and inform policy regarding potential impacts and opportunities from conventional gas development on primary industries.

Greenhouse gas and air quality

Methane seepage in the Surat Basin

SCOPE: detect and measure methane seeping from underground in the Surat Basin, and identify sources of methane to provide a baseline of methane emissions on a regional scale.

OUTCOMES: a methane emissions data set that can be used to compare changes in methane concentrations as coal seam gas production in the Surat Basin increases.

Ambient air quality in the Surat Basin

SCOPE: comprehensive assessment of air quality in the Surat Basin region in Queensland using air quality measurement network and modelling.

OUTCOMES: identify the impact of CSG production activities on air quality in the Surat region.

Greenhouse gas (GHG) emission assessment of the Surat Basin Gas Reserve

SCOPE: analysis of the whole of life cycle GHG emissions, including extraction, transportation and usage of CSG in the Surat Basin.

OUTCOMES: assessments of benefits and risks related to the extraction, transport and usage of gas in terms of their GHG emission footprint.



Health impact

Potential human health impacts from CSG activities **Q**

SCOPE: establish processes and governance to ensure research quality, define the project boundary, conduct hazard identification and exposure pathways, and screen data.

OUTCOME: identify potential chemical and physical hazards and exposure pathways assess the quality of existing data and gaps in the data collected. Key issues will be selected for further in-depth assessment as part of the project to enable the health study framework to be demonstrated in its entirety.



Social and economic

Trends in community wellbeing and attitudes to CSG development, Survey 3 **Q**

SCOPE: monitor and communicate changes and trends in community wellbeing, resilience and attitudes to CSG development across different phases of industry operation in south west Queensland.

OUTCOME: a more comprehensive understanding of community wellbeing and attitudes to CSG over time and between regions to enable more strategic and proactive policy and planning around CSG development.

Decommissioning pathways for CSG projects **N**

SCOPE: review regulatory frameworks in relation to principles derived from international literature and consider social concerns with regard to decommissioning of wells and well pad infrastructure.

OUTCOME: recommendations for an integrated approach to improving the social, economic and environmental effectiveness of decommissioning of wells and well pads.



Community well-being and attitudes to conventional gas **S**

SCOPE: measure levels of perceived risk, benefits, knowledge, and other underlying drivers of trust and social acceptance of conventional gas development in SA's south east, and develop baseline data on community values, well-being and future expectations.

OUTCOMES: baseline information about community well-being, perceptions, expectations and resilience for conventional gas development, to improve awareness and knowledge.

Assessing the value of locally produced conventional gas in SA's South East **S**

SCOPE: develop a profile of the gas industry and its role within the regional economy and develop scenarios for how the local gas industry may evolve.

OUTCOME: knowledge for policy makers and local businesses regarding the socio-economic value of gas activity for local communities, and an improved capacity to forecast outcomes from industry development.

Research projects by region

GISERA’s integrated research program and regional focus ensures that its research identifies cumulative impacts from onshore gas developments and informs coordinated responses across industry, community and government.



| RESEARCH AREA | QUEENSLAND | NEW SOUTH WALES | SOUTH AUSTRALIA |
|---------------------------------------|--|--|---|
| Surface and groundwater | <ul style="list-style-type: none"> Hydrocarbons in groundwater, Surat and Bowen basins Geochemical responses to re-injection* Re-injection of CSG water* Isotope and geochemical groundwater baseline study* High performance groundwater modelling* Improving groundwater flow models Groundwater contamination risk assessment Air, water and soil impact of hydraulic fracturing Air, water and soil impact of hydraulic fracturing: Phase 2 | <ul style="list-style-type: none"> Impacts of CSG depressurisation on the Great Artesian Basin (GAB) flux Spatial design of groundwater monitoring network in the Narrabri Gas Project area Improving the representation of the impact of coal seam gas extraction in groundwater flow models for the Namoi region Groundwater contamination risk assessment | <ul style="list-style-type: none"> Onshore gas and water contamination: causes, pathways and risks |
| Terrestrial biodiversity | <ul style="list-style-type: none"> Priority threat identification, management and appraisal* Fire ecology of grassy woodlands* Ensuring biodiversity offset success: the right kind of seed for a rare daisy* Habitat selection by two focal species* Guidelines for offset population sizes* | | |
| Marine environment | <ul style="list-style-type: none"> Sustaining turtles and their homes* | | |
| Greenhouse gas and air quality | <ul style="list-style-type: none"> Methane seepage in the Surat Basin Ambient air quality in the Surat Basin Greenhouse gas (GHG) emission assessment of the Surat Basin Gas Reserve | <ul style="list-style-type: none"> Regional methane emissions in NSW CSG basins* | |
| Agricultural land management | <ul style="list-style-type: none"> Preserving agricultural productivity* Shared space* Gas farm design* Making tracks, treading carefully* Without a trace* Telling the story* Inside the heard | | <ul style="list-style-type: none"> Gas impacts and opportunities on primary industries |
| Health impact | <ul style="list-style-type: none"> Potential human health impacts from CSG activities | <ul style="list-style-type: none"> Human health effects of CSG activity: Review and study design* | |
| Social and economic | <ul style="list-style-type: none"> Monitoring regional transition* Understanding community aspirations* Economic assessment and forecasting project* Community functioning and well-being* Community function and well-being survey 2* Trends in community wellbeing and attitudes to CSG development, Survey 3 | <ul style="list-style-type: none"> Analysing economic and demographic trajectories in NSW regions experiencing CSG development and operations* Social baseline assessment of the Narrabri region of NSW in relation to CSG development* Decommissioning pathways for CSG projects | <ul style="list-style-type: none"> Community well-being and attitudes to conventional gas Assessing the value of locally produced conventional gas in SA’s South East |

*These projects have been completed and their reports are available at gisera.csiro.au

Completed projects

The projects listed below have been completed. Their reports and fact sheets are available at gisera.csiro.au

| PROJECT TITLE | RESEARCH AREA | REGION OF RESEARCH |
|--|--------------------------------|--------------------|
| Isotope and geochemical groundwater baseline study | Surface and groundwater | Queensland |
| Geochemical responses to re-injection | Surface and groundwater | Queensland |
| Re-injection of CSG water | Surface and groundwater | Queensland |
| High performance groundwater modelling | Surface and groundwater | Queensland |
| Priority threat identification, management and appraisal | Terrestrial biodiversity | Queensland |
| Fire ecology of grassy woodlands | Terrestrial biodiversity | Queensland |
| Ensuring biodiversity offset success: the right kind of seed for a rare daisy | Terrestrial biodiversity | Queensland |
| Habitat selection by two focal species | Terrestrial biodiversity | Queensland |
| Guidelines for offset population sizes | Terrestrial biodiversity | Queensland |
| Sustaining turtles and their homes | Marine environment | Queensland |
| Regional methane emissions in NSW CSG basins | Greenhouse gas and air quality | New South Wales |
| Shared space | Agricultural land management | Queensland |
| Making tracks, treading carefully | Agricultural land management | Queensland |
| Human health effects of CSG activity: Review and study design | Health impact | New South Wales |
| Monitoring regional transition | Social and economic | Queensland |
| Understanding community aspirations | Social and economic | Queensland |
| Economic assessment and forecasting project | Social and economic | Queensland |
| Community functioning and well-being | Social and economic | Queensland |
| Community function and well-being survey 2 | Social and economic | Queensland |
| Analysing economic and demographic trajectories in NSW regions experiencing CSG development and operations | Social and economic | New South Wales |
| Social baseline assessment of the Narrabri region of NSW in relation to CSG development | Social and economic | New South Wales |

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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