

OUTCOMES FROM THE IESC RESEARCH WORKSHOP

On 19 March 2013, the Independent Expert Scientific Committee (IESC) on Coal Seam Gas and Large Coal Mining Developments hosted a high-level, scientific research workshop at Old Parliament House in Canberra. Participants were drawn from academia, government, industry and the community, with a mix of expertise and experience in geology, hydrology, hydrogeology and ecology, as well as a geographic coverage.

The purpose of the workshop was to assist the IESC in identifying research priorities and strategic national knowledge projects relevant to water-related impacts of coal seam gas and large coal mining developments. A key function of the IESC is to provide advice to the Commonwealth Environment Minister on research priorities.

The IESC circulated an overview of potential research topics, knowledge gaps and key research questions, based on consultations undertaken by Professor John Langford in late 2012 and subsequent work of the IESC Research Subcommittee chaired by Professor Craig Simmons. The core themes include Aquifer Interconnectivity and disruption of Flow Pathways; Co-produced Water; Chemicals: Water related risks to Environmental Health; and Ecosystems and Water.

A current program of approximately 30 research and knowledge projects, including critical science reviews, research projects and data projects which will feed into Bioregional Assessments, are being progressed by the Office of Water Science, with advice from the Interim and now the Statutory IESC.

Workshop participants were invited to identify their top three research priorities and discuss why they are important and what they envisage as the outcomes.

Science-based research

Potential research topics identified by participants are shown below grouped into five broad areas: aquifer connectivity; co-produced water; ecosystem response; chemicals; and cumulative impact assessment.

Aquifer connectivity

- Knowledge of aquitards including; anisotropy, vertical and horizontal permeability
- Addressing the challenge of up-scaling from point source data to regional modelling, and recognition and correction of systemic bias
- Post production aquifer response timescales and mechanisms
- Understanding changes in physical properties of systems including stress changes and, scales, particularly when systems are under stress
- Measuring connectivity using isotopes or tracers
- Bore integrity - understanding the risks posed by operational and legacy bores
- Definition of fracking in terms of wider concepts such as stimulation and acidation

Co-Produced Water

- Best practice and implications for reinjection of co-produced water and brine

Ecosystem Response

- Studies are needed to answer ‘What is the ecosystem response function of dewatering the landscape?’ including terrestrial and aquatic ecosystems. Are there thresholds of response?
- Classification of ecosystems in regions; drawing on existing databases such as the National GDE Atlas
- Identifying and modelling the responses of key species to altered ground and surface water dynamics, including dewatering and co-produced water; what are the impacts on species and communities classified as matters of national environmental significance?
- Best methods for monitoring ecological responses of GDEs, from short term measures to remote sensing
- Best methods for measuring aquatic ecosystem responses and ‘health’
- What are the exposure pathways that will determine impacts on receptors/assets, for example pathways between aquifers and springs?

Chemicals: water related risks to environmental health

- Impacts of above ground storage, handling, transport and disposal of chemicals, including salt (noting the importance also of operator training)
- Defining exposure pathways, including gas migration, methane in water etc. within systems
- Impacts of mixtures of chemicals or chemical compounds on ecosystems and species in the Australian context, including bioaccumulation

Cumulative Impact Assessment

- Research to inform thresholds that allow for risk based assessment and mitigation and allow assessment of likelihood and consequences
- Understanding connectivity between surface water and groundwater systems
- Consideration of the scale (local/regional) and timeframes (tens to thousands of years) for impacts
- Consideration and integration of climate change scenarios into assessments
- Inclusion of social dimensions and opportunity costs
- Adapting the National Water Commission Cumulative Impact Guidelines to include a coal seam gas case study

Research Priority Criteria

Participants suggested that the IESC’s research program should be outcomes oriented and assessed against criteria including where (1) the fundamental science could be improved (versus where the science is strong but the application could be improved), (2) the risks of getting decisions wrong are high, (3) solutions require coordinated action, and (4) research can make a difference in the next three years.

Other suggested project-specific criteria included research that challenges current concepts and augments work currently being undertaken by industry, noting IESC should focus on the science that companies cannot do or is not core business.

One of the broad aims is to ensure that the IESC has access to cross-disciplinary and integrated research to inform its advice to Government and regulators.

Managing the research

Many participants commented on how to best manage the research underscoring the importance of:

- collaborating with stakeholders including to ensure good quality products and to limit duplication of research effort, emphasising the need for involvement of stakeholders in project steering committees
- building community confidence in science by considering issues such as reputation, independence, trust, integrity and impartiality of those undertaking the research
- having good and transparent approaches to data access, collection and management, noting that current exploration activities provide an opportunity to collect data at a relatively small cost
- communicating effectively and progressively about the research plans, activities and results

Legislative, Regulatory, Policy and Planning Frameworks

While recognising that the IESC's role is to provide scientific advice (and therefore stops short of recommending or developing policy or guidelines), many participants identified areas where the development of (in some cases nationally consistent) guidelines would be beneficial, such as:

- waste management including brine and co-produced water
- reinjection of co-produced water (by expanding the existing Managed Aquifer Guidelines/recharge guidelines relating to CSG)
- review of the Australian water quality guidelines to ensure companies make 'fit for purpose' water treated for beneficial use
- standardised collection of drilling data
- post mine management, including voids
- establishing baseline (pre-development) conditions and ongoing monitoring
- capping and remediation of bores
- onsite waste storage facilities
- review of the effectiveness of water licensing for CSG and coal seam mining development
- operator training and surface handling of chemicals
- understanding and responding to the human and social impacts on communities

Next steps

The outcomes from the workshop will inform the IESC's development of its advice on short and medium term research priorities and knowledge acquisition and on the methodology for conducting Bioregional Assessments.

If you would like further information or wish to provide comment on the IESC's research priorities please email the IESC Secretariat: IESCSecretariat@environment.gov.au.

27 March 2013