

**Submission
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INQUIRY INTO COAL SEAM GAS

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NSW Parliamentary inquiry into coal seam gas exploration

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The environmental health of subsurface waters is crucial to sustaining many activities necessary for human survival and to maintaining the health of above ground ecosystems. The attention the public is currently paying to these issues in response to coal seam gas exploration and extraction is long overdue, and would have likely stemmed damage to our precious aquifers other mining and agricultural practices have imposed over the past century.

It is widely appreciated that the impacts of mining and agriculture on aquifer health can be monitored through collection of hydrological and geochemical information. What isn't widely appreciated is that subsurface waters are colonized by an enormous diversity of microorganisms that drive geochemical transformations in this environment. The genetic diversity in microbiological communities inhabiting subsurface waters is far greater than the plant or animal diversity on the land above. Changes in these microbiological communities are also sensitive indicators of environmental perturbation.

With these facts in mind, it is suggested in this submission that monitoring the impact of coal seam gas exploration and extraction on subsurface microbiota is an essential practice in assessing the environmental impact of the industry.

Technologies for assessing the composition of microbiological communities in the environment are now highly developed and are used routinely in environmental microbiology research. Describing microbial community composition is also becoming common practice in the bioremediation industry, which stimulates or adds bacteria to groundwater to accelerate contaminant degradation. It is likely that profiling the composition of microbiological communities in environmental samples will be used in the future to assess soil health.

By describing the composition of communities of microbes before, during and after gas extraction over distances conceivably impacted by the practice, a clear picture in space and time of its ecological impact can be generated. Based on such data in combination with information gathered by hydrologists and geochemists, a well-founded legal framework can be established ensuring the coal seam gas industry functions profitably and sustainably.