Final Report

CRDC Project ID: UNSW1401
UNSW ID: RG124140

Project Title

Quantifying the uncertainty associated with predicting CSG production impacts

A summary of public documents and public presentations

Project Summary

This project examined the impact of the expansion of Coal Seam Gas (CSG) production in the Surat Basin on groundwater levels in the upper Condamine alluvium and the eastern portion of the Great Artesian Basin. The research highlights potential concerns that would impinge upon the future availability of groundwater to the irrigation sector. This project benchmarked in priority areas in the Condamine Alluvium groundwater quality, major ion chemistry, and groundwater and air methane concentrations.

UNSW SYDNEY Australia's Global University

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ROYAL HOLLOWAY UNIVERSITY OF LONDON

Australian Government
Cotton Research and Development Corporation

Researchers:
Associate Professor Bryce Kelly (Project Leader), UNSW Sydney
Prof Euan Nisbet: Royal Holloway, University of London
Dr Dioni Cendón (Leader hydrogeochemistry) ,ANSTO

Students Associated with the project

Summer Scholarship Students

Charlotte Iverach Hons 2014 CRDC Grant UNSW1402 $5,000

Ongoing PhD Candidates

Charlotte Iverach
The application of isotopes for assessing the impacts of the gas sector on groundwater and air
Supervisors: Bryce Kelly (BEES), Dioni Cendón (ANSTO, CWI Affilate)

Mark Hocking
Assessing the Impact of Coal Seam Gas Developments in the Condamine Catchment.
Supervisors Bryce Kelly (BEES) and Craig Beverly (External).

PROJECT OUTPUTS

Listed below are all publicly available documents and presentations that were associated with this project. Documents can be freely downloaded from the links provided.

Publications

Journal Publications

Iverach, C.P., Cendón, D.I., Hankin, S.I., Lowry, D., Fisher, R.E., France, J.L., Nisbet, E.G., Baker, A., Kelly, B.F.J. (2015). Assessing Connectivity Between an Overlying Aquifer and a Coal Seam Gas Resource Using Methane Isotopes, Dissolved Organic Carbon and Tritium.. Scientific Reports, 5, 15996. doi:10.1038/srep15996

Hocking, M., Kelly, B. F. J. (2016). Groundwater recharge and time lag measurement through Vertosols using impulse response functions. Journal of Hydrology, 535, 22-35. doi:10.1016/j.jhydrol.2016.01.042

Charlotte P. Iverach, Sabrina Beckmann, Dioni I. Cendón, Mike Manefield, and Bryce F. J. Kelly (2017) Biogeochemical constraints on the origin of methane in an alluvial aquifer: evidence for the upward migration of methane from a coal seam, Biogeosciences, http://www.biogeosciences.net/14/215/2017/

Presentations to Qld Office of Groundwater Impact Assessment

29th August 2014, Graham Clapham's property "Tathra", Norwin (Cecil Plains)

10th September 2015, OGIA 61 Mary Street Brisbane.

Conference presentations affiliated with the project

Hocking, M., Beverly, C., Kelly, B. F. J. (2015). Quantifying the Potential Impact of Abandoned Exploration Wells on Groundwater. In M. Grundy (Ed.), Australian Cotton Scientists Research Conference. University of Southern QLD, Toowoomba, QLD.

Hocking, M., Beverly, C., Kelly, B. F. (2015). Quantify the impact of leaky wells using AEM in the Condamine Catchment. In Quantify the impact of leaky wells using AEM in the Condamine Catchment. Canberra.

Cendon, D., Kelly, B. F., Larsen, J., Hankin, S., Hughes, C., Meredith, K., Iverach, C. P. (2015). Shallow groundwater recharge and residence in two separate flood plains along an aridity gradient in south Queensland, Australia. In Australian Groundwater Conference, The Shine Dome, Canberra, 3-5 Nov 2015.

Hocking, M., & Kelly, B. F. (2015). Proportioning Groundwater Hydrography Fluctuations to Rainfall Recharge and Quantifying Recharge Lag-Time Using Impulse Response Function Modelling. In Australian Groundwater Conference, The Shine Dome, Canberra, 3-5 Nov 2015. Canberra.

Iverach, C.P., Cendón, D.I., Hankin, S.I., Lowry, D., Fisher, R.E., France, J.L., Nisbet, E.G., Baker, A., Kelly, B.F.J. (2015). Assessing the hydraulic connection between fresh water aquifers and unconventional gas production using methane and stable isotopes. Geophysical Research Abstracts Vol. 17, EGU2015-3284-1, 2015 EGU General Assembly 2015 http://meetingorganizer.copernicus.org/EGU2015/EGU2015-3284-1.pdf

Kelly, B. F., Iverach, C. P., Lowry, D., Fisher, R. E., France, J. L., Nisbet, E. G. (2015). Fugitive methane emissions from natural, urban, agricultural, and energy-production landscapes of eastern Australia. In Geophysical Research Abstracts, Vol. 17, EGU2015-5135, 2015. Vienna, Austria. Retrieved from http://meetingorganizer.copernicus.org/EGU2015/EGU2015-5135.pdf

Iverach, C.P., Cendón, D.I., Hankin, S.I., Lowry, D., Fisher, R.E., France, J.L., Nisbet, E.G., Baker, A., Kelly, B.F.J. (2015). Detecting hydraulic connection between fresh water aquifers and coal seam gas production using the isotopes of carbon in methane.. In Australasian Environmental Isotope Conference. Sydney, Australia.

Iverach, C.P., Cendón, D.I., Hankin, S.I., Lowry, D., Fisher, R.E., France, J.L., Nisbet, E.G., Baker, A., Kelly, B.F.J. (2015, September 8). Detecting Hydraulic Connection between Freshwater Aquifers and Coal Seam Gas Production using the Isotopes of Carbon in Methane.. In Association of Australian Cotton Scientists. Toowoomba.

Iverach, C.P., Cendón, D.I., Hankin, S.I., Lowry, D., Fisher, R.E., France, J.L., Nisbet, E.G., Baker, A., Kelly, B.F.J. (2015, November 3). Assessing Connectivity between an aquifer and coal seam gas production using water geochemistry and methane isotopes.. In Australian Groundwater Conference. Canberra.

Kelly, B. F.J. (2015, August 5). CSG Impacts on Water in the Namoi and Condamine Catchments. In Cotton Collective industry forum. Narrabri, NSW, Australia.

Iverach, C.P., Cendón, D.I., Hankin, S.I., Lowry, D., Fisher, R.E., France, J.L., Nisbet, E.G., Baker, A., Kelly, B.F.J. (2014, July 7). The Complexities of Continuous Air Monitoring in Attributing Methane to Sources of Production. In Australian Earth Science Convention 2014. Newcastle, Australia. Retrieved from http://www.aesc2014.gsa.org.au/assets/Various-reg-partner-opp-workshop-summ-/AESC-Abstract-Proceedings.pdf

Conference Posters affiliated with the project

Martel, L., Cendon, D., Hankin, S., Iverach, P., Kelly, B. F. (2014, July 7). Irrigation Bore Water in the Condamine Catchment: Baselining Groundwater Quality and Assessing Pathways of Hydraulic Connectivity. Poster session presented at the meeting of Sustainable Australia, Australian Earth Science Convention 2014. Newcastle, Australia. Retrieved from http://www.aesc2014.gsa.org.au/assets/Various-reg-partner-opp-workshop-summ-/AESC-Abstract-Proceedings.pdf

Other Conference Activities

Bryce Kelly, Dioni Cendon and Charlotte Iverach attend the 18th Australian Cotton Conference, Gold Coast, 2-4th Aug . Bryce was part of a Q & A session, plus a meet the finalist session in the trade hall.

Media (first versions, as there are many repeated/modified versions on the web)

Spotlight on Cotton R&D, Summer 2014-2015
"Floods Crucial for Ongoing Access to Groundwater"
http://www.cottoninfo.com.au/sites/default/files/documents/Summer14-15_Web.pdf

The Courier, 20th August 2015
"UNSW professor to study effects of CSG in Pilliga"

The Australian cottongrower, October 2015
Water Matters
http://www.cottongrower.com.au/issue.php?id=129

ABC Rural - web news - 2 Dec 2015
"Study into CSG effect on groundwater finds low risk of short-term impacts"
http://www.abc.net.au/news/2015-12-02/farmers-welcome-study-into-csg-impacts-on-groundwater/6994296

ABC Rural - radio - 2 Dec. 2015
(Radio interview with ARLIE FELTON-TAYLOR) WED 2 DEC 2015, 3:31 PM AEDT
Project leader Associate Professor Bryce Kelly discusses a new technique used to examine coal seam gas production and impacts on groundwater
http://mobile.abc.net.au/news/2015-12-02/associate-professor-bryce-kelly-talks-about-the-queensland-study/6994442?date=(none)&pfm=sm&section=latest

The Saturday Paper, December 12, 2015
"Coal seam gas leaks a climate debacle"
Hundreds of uncapped bores have for decades been leaking methane, a gas more polluting than CO2 – and the government knows almost nothing about them.
https://www.thesaturdaypaper.com.au/news/environment/2015/12/12/coal-seam-gas-leaks-climate-debacle/14498388002741

Spotlight on Cotton R&D, Autumn 2016 (page 5)
CRDC Research published in leading journals: http://www.crdc.com.au/publications/spotlight-magazine

Spotlight on Cotton R&D, Autumn 2016 (page 23)
Monitoring moved to wells: http://www.crdc.com.au/publications/spotlight-magazine

The Conversation
River on fire: even if it's not coal seam gas we should still be concerned
https://theconversation.com/river-on-fire-even-if-its-not-coal-seam-gas-we-should-still-be-concerned-58718
3rd May 2016

The Land
Multi-generational approach to groundwater recharge
http://www.theland.com.au/story/4081170/researchers-vision-for-ground-water-recharge/?cs=4937