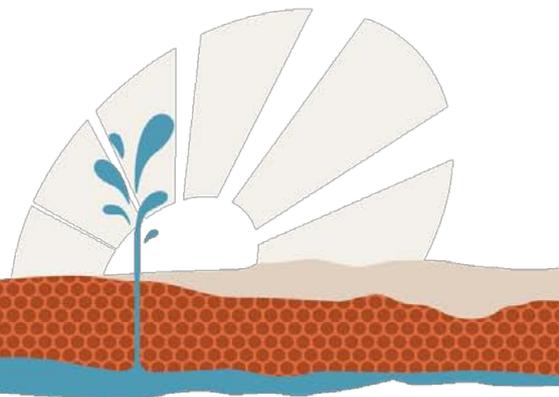


# ReSource

## NATIONAL CENTRE FOR GROUNDWATER RESEARCH AND TRAINING

Newsletter Volume 1



### Welcome from the Director



Welcome to the first edition of the National Centre for Groundwater Research and Training's (Centre) quarterly e-newsletter. We'll be using this to bring you news of our latest research activities and our program of forthcoming events which we hope will provide extra opportunities for you to get more closely involved in the Centre's work.

We're launching this Newsletter at the end of the Centre's first year of major operational activity. It's been an amazing year - one that's finally seen the Centre spring off the drawing board into life! We have welcomed 27 Chief Investigators, 24 Post Doctorates, 34 PhD and 17 Honours student who are now working within the Centre's five Research Programs. Our corporate governance systems are up and running with our Advisory Board and International Scientific and Industry Advisory

and Liaison Committees meeting regularly throughout the year.

We have refined our areas of research focus and have produced a Research Portfolio document that will guide our future research activities. These activities are already starting to produce promising results, with a large number of staff and students presenting papers and participating at workshops at the recent National Groundwater Conference in Canberra.

Several members of our research team have received awards for their research and we congratulate them on their achievements. The Centre will be co-hosting the 2011 Australasian Environmental Isotope and Hydrogeology Research Conference in Cairns in July. This will provide another important opportunity to showcase our work.

The Centre has also successfully completed negotiations with a number of new partner and collaborating organisations. The NSW Office of Water has joined the Centre's partnership fold. The Danish Hydraulic Institute has entered into a major collaboration agreement which will enable Centre staff and

researchers to access their world-leading groundwater modelling software. We have joined forces with the Primary Industry Centre for Science Education to promote careers in groundwater science in High Schools. We have entered into a strategic alliance with the US-based National Ground Water Association aimed at extending the range and quality of training programs available to Australian groundwater professionals. We have more exciting collaboration opportunities in the pipeline and we're looking forward to sharing details with you in 2011.

The Centre has completed a substantial program of work over the last 12 months and I would like to take this opportunity to thank the key people who have made this possible:

Our Research Program leaders: Peter Cook (Flinders University), Ian Acworth (University of New South Wales), David Lockington (University of Queensland) and Tony Jakeman (Australia National University) for their inspiring leadership in bringing our research programs, staff and students together. A special mention also goes to Andy Baker who has deputised for Ian Acworth during the final quarter of this year.

Our Partner Universities for their patience and hard work in helping us set up the governance and reporting systems necessary to manage a national research centre operating across 12 sites.

Members of the Centre's Advisory Board and our Industry Liaison International Scientific Committees for their wise counsel and encouragement; and our industry partners for their unstinting and enthusiastic support.

Our focus in 2011 moves away from establishment and on to delivery across all areas of our operations. Our staff and students are currently working on 36 research projects and will be bringing news of their progress through a series of podcasts, workshops, debates and publications next year. A large number of these activities will be delivered via a new web-portal that we will be launching early in the New Year.

We will also be delivering a new range of exclusive, invitation only research forums for senior leaders in the groundwater research and policy communities. You can register your interest by contacting me at: [director@groundwater.com.au](mailto:director@groundwater.com.au)

We will also be delivering a reinigorated industry training program which includes more specialised courses and a new panel of presenters.

On behalf of everyone at the Centre I would like to thank you for your help in establishing the National Groundwater Centre.

I'm looking forward to working with you in 2011 as we start work on the next exciting chapter in the life of the Centre.

Craig Simmons

## Research Highlights

The Centre is undertaking a review of all its Programs. The first program reviewed was Program 5 (P5): Integrating Socioeconomics, Policy and Decision Support, and was held in Canberra in November. To ensure the Centre received independent feedback, two external reviewers were invited to attend. The external reviewers commended P5 on being a "world class" research program, and provided us with excellent suggestions and opportunities that the Centre will now explore.

This year for P5 has been characterised by the startup and progression of several case studies and PhD student projects. The Chief Investigators regard case studies as essential to anchor and realize the general aim of P5 which is "To develop, through research and research training, the knowledge and tools for integrating the understanding of social, economic, biophysical and governance factors in ways that support more informed decision-making about groundwater management."

The case studies are located in the Namoi, Upper Murrumbidgee and Lachlan catchments as well as the Gngangara Mound and the Willunga/McLaren Vale Prescribed Water Area. The

Namoi study is exploring adaptation options for the farming community to improve socioeconomic and environmental outcomes under reduced water availability, including sustainable diversion limits. The Upper Murrumbidgee study is on adaptation to climate change with a focus on water supply, water quality and ecosystem impacts, while the more recent Lachlan study will examine impacts on the river and wetlands of water management.



The Gngangara work is assessing the feasibility of groundwater trading and the Willunga study is developing a process and decision support system for assessing acceptable aquifer yield. All the case studies are designed so that the lessons, knowledge and tools developed are maximally transferable to other catchments facing similar issues.

Eight PhD students have started in P5, with two from the University of Western Australia (principally supervised by Alex Gardner and David Pannell), one each from the University of South Australia (Jennifer McKay) and Charles Sturt University (Allan Curtis), and four from the Australian National University (Barry Croke and Tony Jakeman).

## Student Profile

For James McCallum, researching groundwater has become a career.

After graduating from Flinders University with Honours in Environmental Sciences in 2005; he began his career as an environmental scientist working with a major consultancy.

He discovered his enthusiasm for research while completing his Honours, when he studied how contaminants move through structures in rocks.

He discovered through vigorous testing of two models using data from fieldwork, that the simpler of the models was not as accurate.

He has returned to academia after winning a place as a PhD researcher at the Centre, examining how aquifer heterogeneity affects transport of environmental tracers.

His work will provide important insights into how these tracers can be used to measure groundwater velocities.

He hopes to have some answers to his current research project within three years.



## Training Highlights

One of the highlights of this year's industry training program was the national launch of the Centre's first Field Methods Course.

This course, which has been championed by Professor Ian Acworth at the University of New South Wales, was held at the Groundwater Education Investment Fund/ NCGRT training facility in Wellington (NSW) in November.

The course provides practical advice and training on hydrological methods including: Geophysical techniques, Hydrogeo-chemical sampling, Aquifer testing and borehole construction.

The feedback from the first cohort of students has been extremely positive, with all the participants taking away new skills and insights that will enhance their day jobs.

Special thanks go to Ian Acworth, his deputy Andy Baker and their team at the Connected Waters Initiative for designing and delivering this groundbreaking course.

We expect the field Methods Course will become one of our Flagship Courses alongside our Australian Groundwater and Getting to Know Groundwater and Surface Water Schools.

For more information about the Field Methods course visit our website

[www.groundwater.com.au](http://www.groundwater.com.au)



L-R: Mayor of Wellington Ms Anne Jones, Professor Ian Acworth and Papua New Guinean student Simon Egara.

## Quick Facts

### Presentations

Centre Director, **Professor Craig Simmons** presented a lecture on *Groundwater Challenges and Opportunities for Australia in the 21<sup>st</sup> Century* at the Australian Academy of Science Shine Dome, Canberra.

This prestigious invitation provided an opportunity to discuss the critical role that groundwater plays in the environment, while highlighting groundwater issues in Australia such as: sustainable levels of groundwater extraction, licensing and metering, environmental water requirements, groundwater trading, key knowledge gaps in understanding groundwater resources, and education and training issues.

A key presentation feature were examples of recent technological developments relating to groundwater and the future of research.

More information can be viewed at: [www.science.org.au](http://www.science.org.au)

## Publications

**Research Associate, James Skurray and Chief Investigator, Professor David Pannell** submitted a paper to the Journal of Environmental Planning and Management: *Institutional Impediments to Groundwater Trading: the case of the Gngangara groundwater system of Western Australia.*

**Professor J. McKay, Dr G. Keremane and A. Gray** co-authored the book: *Picturing Fresh Water Justice in Rural Australia* which was released at the Australian Irrigation Conference in June.

**Ian Cartwright, Tamie Weaver, Dioni Cendon, Ian Swane** submitted an article in Chemical Geology: *Environmental isotopes as indicators of inter-aquifer mixing, Wimmera Region, Murray Basin, Southeast Australia.*

**Ian Cartwright** submitted a paper to Applied Geochemistry: *The origins and behaviour of carbon in a major semi-arid river, the Murray River, Australia, as constrained by carbon isotopes and hydrochemistry.*

**T.A. Watson, A.D. Werner and C.T. Simmons** submitted a paper to Water Resources Research: *Transience of seawater intrusion in response to sea level rise.*

**Y. Xie, C.T. Simmons, A.D. Werner and J.D Ward** submitted a paper to Water Resources Research: *Effect of transient solute loading on free convection in porous media.*

**C. Bradley, A. Baker, C. Jex and M.J. Leng** submitted a paper to Quaternary Science Reviews: *Hydrological uncertainties in the modeling of cave drip-water  $\delta^{18}O$  and the implications for stalagmite palaeoclimate reconstructions.*

**J. Doherty, M.N Fioren and R.J. Hunt** submitted a USGS Scientific Investigations Report 2010-5169: *Approaches to highly parameterized inversion: pilot point theory, guidelines and research directions.*

**M.N Fioren, J.E. Doherty, R.J. Hunt, and H.W. Reeves** submitted a USGS Scientific Investigations Report 2010-5159: *Using prediction uncertainty analysis to design hydrologic monitoring networks: example applications from the Great Lakes Water Authority availability pilot project.*

**J. Doherty, and R.J. Hunt** submitted a USGS Scientific Investigations Report 2010-5169: *Approaches to highly parameterized inversion: a guide to using PEST for Groundwater-Model calibration.*

**E. Keating, J. Doherty, J.A. Vrugt, and Q. Kang,** submitted a paper to: Water Resources Research *Optimization and uncertainty assessment of strongly nonlinear groundwater models with high parameterization dimensionality.*

**C. Moore, T. Wöhling, and J. Doherty** submitted a paper in Water Resources Research Volume 46: *Efficient regularization and uncertainty*

*analysis using a global optimization methodology.*

**D. Herckenrath, C.D. Langevin, and J. Doherty** submitted to Water Resources Research: *Predictive uncertainty analysis of a saltwater intrusion model using null space Monte Carlo.*

**Ty Watson** had a paper accepted in Water Resources Research: *Transience of seawater intrusion in response to sea-level rise.*

## Prizes

Congratulations to the groundwater students and staff who have been awarded prizes during 2010:

**Ms Alice Drummond** a Centre Honours student of UWA won the Australian Water Association State Prize for the best undergraduate thesis for her project examining the design and cost-effectiveness of artificial infiltration galleries designed to raise and maintain water levels in suburban lakes.

**Professor Craig Simmons** of the NCGRT won the 2011 Anton Hales Medal for research in the Earth Sciences. The prestigious national award is made to outstanding researchers under 40 years of age and recognizes Craig's "transforming" influence in the discipline of hydrogeology.

**Mr James McCallum** (Flinders University) and **Mr Joseph Guillaume** (ANU) won awards for papers presented at the National Groundwater Conference.

**Ms Sondoss El Sawah** has been awarded the Australian Water Association Postgraduate Award 2010 which acknowledges professionals in the field of water studies and research.

**Associate Professor Bryce Kelly** has been awarded the cotton CRC Chief Scientist Achiever of the Month for the development of new approaches to constructing 3D conceptual hydrogeological models.

**Mr Tariq Laattoe** was awarded the Hodgson Medal at the AWA SA Branch Water Industry Awards. The award aims to encourage and reward students for excellence in the field of water studies and research.

### Visitors

**Mr Chris Wilson** delivered a lecture: *Archaeological Investigations of Ngarrindjeri life ways in Lower Murray, SA: Initial Results and Considerations for the Region.*

**Professor Christoph Hinz** delivered a lecture: *Pesticide leaching through soil as a hydrological threshold process – Implications for risk assessment.*

**Dr D.A. Nield** delivered two lectures: *Hydrodynamic Instability: Fundamentals*, and *Some recent research on convection in porous media.*

**Professor Chunmiao Zheng** was selected as the 2009 Birdsall-Dreis Distinguished Lecturer and presented two topics: *Understanding Solute Transport in Extremely Heterogeneous Porous Media: Lessons Learned*

*from 25 years of Research at the MADE Site, and Will China Run out of Water?*

**Professor Hans-Jörg Diersch** presented: *Computational aspects in porous media problems.*

**Professor John M. (Jack) Sharp** delivered a lecture: *Effects of urbanization on groundwater systems – Implications for urban water management.*

**Mr Koen Zuurbier** delivered a lecture: *Effects of Aquifer Thermal Energy Storage (ATES) on Mobile Contaminants in a Groundwater System: A Model Approach.*

**Mr Maciek Lubczynski** delivered a lecture: *Underestimated role of tree transpiration and bare soil evaporation in groundwater balances and modeling.*

**Dr Marie-Claire ten Veldhuis** presented a lecture: *Groundwater Research in the Dutch Delta.*

**Professor Raja Huilgol** delivered a lecture: *Free Boundary Problems in Fluid Mechanics.*

**Mr Remke van Dam** delivered a lecture: *Geophysical Characterization of Natural Free Convection in a Coastal Sabkha.*

**Dr Suzanne A. Pierce** delivered a lecture: *In Search of Sustainable Yield: Beyond Myth and Mystery through Socio-technical Groundwater Management.*

**Dr Timothy Schiebe** presented: *Beyond the Black Box: Integrating*

*Advanced Characterisation of Microbial Processes with Subsurface Reactive Transport Modes.*

### Upcoming Events

#### Program 2 Review

Tuesday 15 February, 2011  
Adelaide, SA

#### Program 3 Review

Wednesday 16 February, 2011  
Adelaide, SA

#### 4<sup>th</sup> Australian Hydrogeology Research Conference

(in conjunction with the 11<sup>th</sup> Australian Environmental Isotope Conference)

12-14 July, 2011

Rydges Hotel, Cairns QLD

**Dr Enrico Hamann** will be hosted as part of the Visiting Scholars Program and will be working on hydrogeology research projects during his 3-month stay.

**Dr Fabien Magri** will be hosted as part of the Visiting Scholars Program and will be working on a project entitled: *Hot geothermal fluid systems* during his 3-month stay.

**Dr Randy Hunt** will be hosted as part of the Visiting Scholars Program and will be working on hydrogeology projects during his 6-month stay.

### Contact Us

