



Newsletter of the  
Australian Chapter of the  
*International Association of  
Hydrogeologists*

October to December 2016  
Volume 32, No. 4

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# International Association of Hydrogeologists Australian National Chapter

The International Association of Hydrogeologists is a professional association for those within disciplines related to groundwater, its occurrence, utilisation, testing and management. IAH is a scientific and educational organisation that is truly international, and was established to foster closer ties, cooperation and information exchange related to the study of groundwater. IAH is non-government and non-profit and has over 4000 members internationally from around 120 countries. The Association is affiliated with the International Union of Geological Sciences (IUGS), and was founded during the 20<sup>th</sup> International Geological Congress in 1956. By its statutes the IAH is an association of individuals and corporate members, and not a federation of national committees. National groups do, however, organise local meetings and other activities. A proportion of the national committee membership goes to the local organisation to support these activities, the remainder to the international body. The country of the international secretariat is changed every several years. The IAH publishes Hydrogeology Journal, various workshop and conference proceedings and an international newsletter.

The main objectives of the IAH are to promote international and national cooperation between involved scientists and engineers; sponsor international and national technical/management meetings and symposia on hydrogeology; publish hydrogeological reports, papers and maps; establish investigation commissions and working groups to report on special topics; encourage the international application of relevant approaches and techniques for the benefit of the hydrological and human environment.

Our national chapter was founded in 1983 and is one of the most active. Activities tend to be organised locally within each state and territory, but national activities also occur. Each state body has its own meetings, usually monthly. Conferences are held in Australia around every two to three years, and seminars on a more frequent basis.

**Membership Requirements:** IAH will accept as individual members anyone directly or indirectly engaged in study or research on, or management of water in its various forms related to hydrogeology, if sponsored by two members in good standing. Companies and research organisations can apply for corporate membership. The current membership categories and annual subscriptions for 2015 (see [www.iah.org.au](http://www.iah.org.au)) are:

▪ Member	\$140
▪ Online member	\$120
▪ Student	\$55 (full time students)
▪ Online Student Member	\$35
▪ Corporate member	\$790
▪ Partial sponsor	\$155
▪ Full sponsor	\$190
▪ Retired	\$75

We are pleased to announce that the student membership fees have been reduced by \$20 in 2015 as an added incentive for full-time students to become IAH members. In addition, we have maintained the Member and Online Member fees at their current level, despite a rise in the IAH International fees for these membership categories for 2015.

Membership of this professional association is tax deductible in Australia, and individual members are entitled to use 'MIAH' (Member of the International Association of Hydrogeologists) after their name.

# From the President

Welcome to the first IAH Newsletter of 2017!

It is my great privilege to serve as the President of IAH Australia this year, succeeding Chris McAuley in this role. I would like to express deep gratitude on behalf of the National Committee for Chris' steady hand and capable stewardship of our national chapter during his tenure. Equally, I would like to thank our outgoing Secretary, Kyle Horner, for his invaluable service to the IAH in this busy role. I am also grateful that our long serving Treasurer, Ron Colman, will be continuing in the role this year.

Unfortunately, we did not receive nominations for the vacated roles of Vice President and Secretary at the AGM last November, which will be important to fill as a matter of priority for our committee to function effectively this year. Contributing to your local industry is rewarding, and as the saying goes: many hands make light work. I encourage our members, and especially our state committee members, to consider nominating for either role, and joining us for what will be a fruitful year for IAH Australia.

IAH Australia is embarking on a busy year in 2017, hosting and collaborating on a range of events. A preview of the years' coming attractions includes:

- The Australasian Groundwater Conference, 11–13 July 2017 at the University of NSW in Sydney. The "AGC" is a biennial event that provides an opportunity for our industry to come together to share knowledge, experience, and expertise; to catch up with colleagues near and far; and to broaden our horizons. The call for abstracts and early bird registration are currently open, as are opportunities to sponsor and exhibit:  
<http://www.groundwater.com.au/australasian-groundwater-conference-2017>
- For the 2017 instalment of the Darcy Lecture, Dr Kamini Singha will discuss the challenges of measuring and predicting groundwater flow and contaminant transport in the subsurface. A schedule will be available soon.
- The 2017 Australian Distinguished Lecturer has recently been selected, with official details to be made available soon.
- We are in discussion with the 2017 Birdsall-Driess Lecturer, Dr Forrest "Ed" Harvey, who is discussing the challenges and complexities of water resource stewardship in the U.S. National Park Service. Stay tuned for details!
- In addition, your state branches will have their usual active schedule of local meetings, presentations and events.

IAH Australia has a lot to offer this year; if you haven't already renewed your membership now is the perfect time. Membership offers you the chance to network with other hydrogeologists and groundwater-related specialists. You will receive a great range of benefits, including the Hydrogeology Journal and a variety of discounts. You will also be able to participate in groups, events and schemes, sharing knowledge and experience with others. If you need additional incentive, IAH members are entitled to discounted registration fees for the AGC 2017 that will effectively offset the cost of membership. No excuses – join or renew today! <https://www.iah.org.au/membership/online-sign-up/>

I hope 2017 is a productive and optimistic year for our members, and I look forward to serving you.

Lange Jorstad

President - Australian Chapter, IAH

# National Corporate Sponsors

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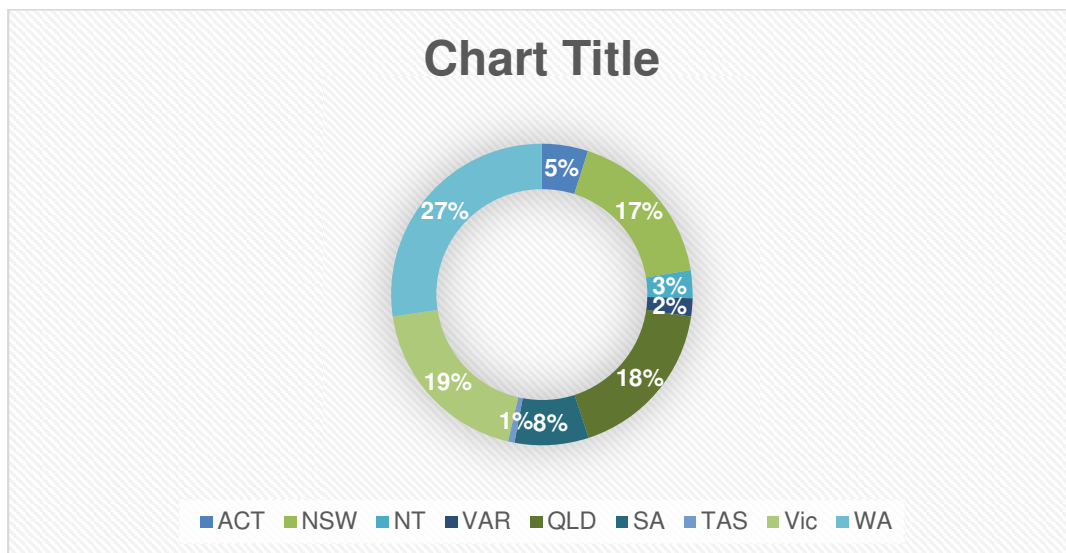
[www.rockwater.com.au](http://www.rockwater.com.au)

# Membership

The 2016 membership year saw 567 members across the Australian Chapter renew their memberships or sign up as new members. Members benefit from being part of a global community of groundwater practitioners and professionals. Networking and linking with a wide range of individuals, organisations and institutions is becoming more important as economic conditions tighten.

Check your state chapter events page on the IAH Australia website ([www.iah.org.au](http://www.iah.org.au)) to keep up to date with events and meetings. Don't forget if you are an IAH member you will receive a significant discount off the 2017 Australasian Groundwater Conference in Sydney (in fact, enough to offset the cost of membership this year!). Early bird registrations for AGC2017 are now open, so now is the perfect time to renew your IAH membership to access the registration discount.

A snapshot of where our Australian members are from:



IAH membership spans a calendar year. The call for membership renewals for 2017 is now open; 2016 members should have received a renewal message by email. If you didn't receive a renewal email, the steps to renew your membership are outlined on the following page. If you know anyone who might be interested in signing up as a new member, you can refer them to the following link: <https://www.iah.org.au/membership/online-sign-up/>.

Any inquiries regarding the memberships can be emailed to the IAH membership team [membership@iah.org.au](mailto:membership@iah.org.au).

## Current/Lapsed Membership Renewal Process

As a repeat from a previous issue of the newsletter, here's how an inactive member can become active again.

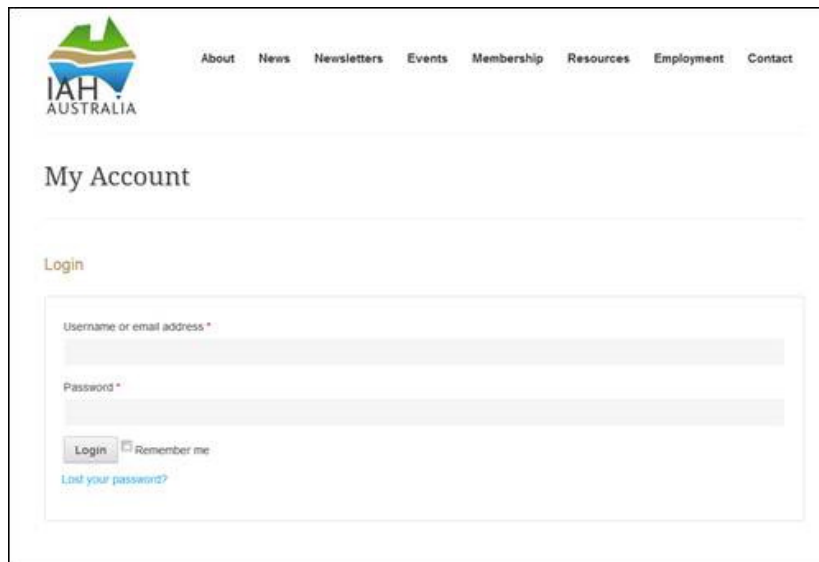
Note that if you were a member in 2016, and **did not receive** a membership renewal email in December 2016 or January 2017, some common issues are listed below:

- The email was intercepted by your **spam filter**. Check your spam folder or quarantine archive for IAH emails, and consider adding the IAH sender details to your safe list.
- Your **email details changed** in the past year (for example, change of employment) and you have not yet updated your email address with IAH. You can update your details at any time through the [iah.org.au](http://iah.org.au) website, by selecting "My Account" under "Membership", and editing account details.
- **Corporate "firewalls"** at some companies block all suspected incoming spam emails (IAH emails may be classified as "marketing" emails by some systems). Speak with your IT administrator about adding IAH to your corporate safe list, or switch to a personal email account.
- Your membership has **lapsed for more than a year** without renewal, and your details have been removed from our database. You can still use the new membership system to renew your lapsed membership.

Contact [membership@iah.org.au](mailto:membership@iah.org.au) with any questions.

Log into [your account page](https://www.iah.org.au/membership/my-account/) on the IAH website (<https://www.iah.org.au/membership/my-account/>).

**Your username is the email address the email was sent to (which should be the email address you have registered with IAH).** If you have forgotten your password, you can reset it using the "**Lost Your Password**" link at the bottom of the page **using the email address the email was sent to.**



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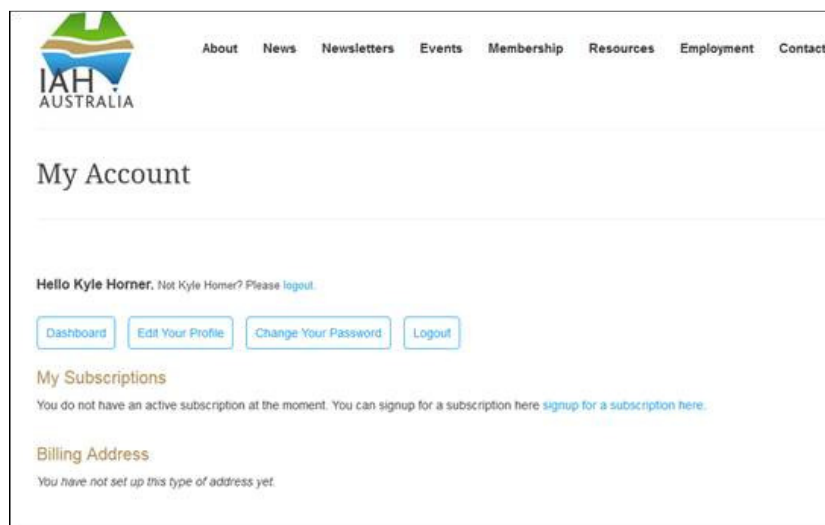
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Under the **My Memberships** section, click on the link to sign up for a new subscription. This will direct you to a new page where you can select your desired membership category from the options. Details of each membership type can be found at the bottom of the registration page. Once you have chosen your desired category, follow the prompts to finish your membership renewal.



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If you have any questions, please do not hesitate to contact the membership team at [membership@iah.org.au](mailto:membership@iah.org.au).

# IAH National Committee

<b>President</b>	Dr Lange Jorstad	<a href="mailto:ljorstad@geosyntec.com">ljorstad@geosyntec.com</a>
<b>Vice-President</b>	Position vacant	
<b>Treasurer</b>	Ron Colman	<a href="mailto:Ron.Colman@royhill.com.au">Ron.Colman@royhill.com.au</a>
<b>Secretary</b>	Position vacant	
<b>Membership Secretary and Web Administration</b>	Kyle Horner	<a href="mailto:secretariat@iah.org.au">secretariat@iah.org.au</a>
<b>Newsletter Champion</b>	Dr Ben Rotter	<a href="mailto:Ben.Rotter@mottmac.com">Ben.Rotter@mottmac.com</a>

# Finance Update

Term Deposits as of 31/12/16	\$99,768.61
Cash Account as of 31/12/16	\$49,783.79
Total Cash Balance as of 31/12/16	<b>\$149,552.40</b>

**Outgoings** during the quarter included:

- Final payment of 2016 subs to UK office \$7,511.59
- 2016 State Branches capitation \$4,430.00
- Overseas student sponsorships \$3,000.00
- Darcy Lecture expense refunds to States \$3,424.70
- Australian Geosciences Council 2016 subs \$1,905.75

Signature:



*Ron Colman, IAH National Treasurer*

Date: 18/01/17

# National Conferences and Events



Join us for the 2017 biennial Australasian Groundwater Conference.

The theme for the conference program will be **Groundwater Futures: Science to Practice**.

An exciting three-day event is being planned that will enable delegates to examine the multi-dimensional challenges affecting the sustainable development of the regions groundwater resources.

Engaging panels, informative presentations, exhibitions and networking opportunities will engage the over 300 delegates from Australasia's groundwater research, industry, and management and policy organisations.

## **2017 AGC Abstract themes:**

- Emerging Groundwater Initiatives
- Groundwater Science and Future Innovations
- Interdisciplinary Groundwater Problems
- Groundwater Resources and Climate Change
- Energy and Groundwater
- Groundwater Quality and Human Health

**The call for abstracts opened 1 November 2016, and closes 1 March 2017.**

**Early bird registration is now open through 11 May 2017.**

Keynote, plenary presentations and panel sessions will include climate change and groundwater resource challenges, energy futures, social license to operate and future directions and innovation in groundwater.

**Stay tuned for the launch of the AGC2017 website.**

# Feature News

## ***Approval of the Carmichael Mine – An Australian failure to understand and apply groundwater science***

*By Adrian Werner, Professor of Hydrogeology, Flinders University  
(Originally published on LinkedIn, republished here with the author's permission)*

As an expert witness called by a conservation group to assist the Court, I had the privilege of observing the legal battleground of the Queensland Land Court in action in 2015. I held high expectations and optimism that my knowledge would provide useful service to the decision-making process, and I felt a great honour to represent my chosen scientific discipline by contributing to a groundwater decision of international importance.

A critical issue within the case was whether excavating one of the world's largest coal mines in close proximity to a nationally important wetland, fed by groundwater, would threaten the extinction of the associated Doongmabulla Springs and the endemic species that rely on them.

I feel compelled to offer hindsight on the case, now with the advantage of a year of rumination since the decision.

The science behind the approvals process of the Carmichael Coal Mine project should become an instrument of teaching to undergraduate students studying hydrogeology – for all the wrong reasons. There are only a handful of laws that hydrogeologists must understand and apply – Darcy's Law, Bernoulli's equation, conservation of mass, and a handful of others. These are taught to undergraduate students as the foundation of groundwater hydrology studies. Added to these are other concepts relating to mathematics, computer modelling, geology, chemistry and various other related disciplines that allow scientists to come to grips with the movement of water (and its constituents) beneath our feet.

The process of approving the Carmichael Mine involved the violation of several of these fundamental laws. The details of these violations require more space than this simple message can convey, but there are some basic ideas that I can pass by you to see if you share some of my concerns. In drawing the final decision together, President MacDonald (the judge) stated the following in response to a critical piece of evidence in the case: "It appears to me to be logical that the spring flow would be proportionate to the upflow until the drawdown caused by head difference causes the artesian head to match a geomorphic threshold." The key element of this statement is "It appears to me to be logical..." – the rest of the sentence is barely comprehensible for the hydrogeologically uninitiated. I maintain (and can easily prove) that the science within the quoted statement was misconstrued and yet foundational to the final decision. Under cross-examination, my counterpart expert, acting for Adani, acknowledged the same error in the analysis relied upon by the judge in making this statement.

It is my humble opinion that the quoted statement, cached in terms of the decision-maker's own logic, overturns fundamental laws of hydrogeology. Somehow, I failed to impress on the court undeniable theories of Conservation of Energy and Darcy's Law, in the context of upward groundwater flow (spring flow). The decision-maker's own logic has trumped my scientific advice to the court – spelt out in several reports and addressed at length under examination, cross-examination, and re-examination. Given a whiteboard and 15 min, I am confident that a classroom of undergraduate students armed with knowledge of Darcy's

Law and Bernoulli's equation (Conservation of Energy) would come to terms with the fallacy of the quoted statement. It remains troubling to me that the Carmichael Mine decision was based, at least in part, on what seemed logical to a Land Court Judge, but in my view is in direct contravention to fundamental groundwater laws.

The Land Court's recommendations and reasons were subsequently accepted by the Queensland Department of Environment and Heritage Protection, the Queensland Minister for Mines and Energy, and the Commonwealth Minister for the Environment (then Greg Hunt). These regulators – who have advice of internal experts – are the ones ultimately responsible for the approvals of the mine in spite of these fundamental errors.

So where does this leave us? We have one of the world's largest coalmines on our doorstep in close proximity to a set of springs that support endemic ecosystems, that are habitat for a threatened bird species, and that hold great importance to Indigenous Australians. The decision to approve the mine is underpinned by misconceptions and considerable uncertainty on the back of a deplorable lack of field measurements. While scientifically hapless politicians make deals about new rail lines and dream of an economic reprieve in Queensland, I lie awake at night wondering why I spent the last 20 years becoming an expert in hydrogeology. It must be wonderfully peaceful to be uninformed of the basics of groundwater science.

For more information: see [www.envlaw.com.au/carmichael-coal-mine-case/](http://www.envlaw.com.au/carmichael-coal-mine-case/)

## ***Raising the profile of women in STEM***

(Originally published by the National Centre for Groundwater Research and Training.)

NCGRT groundwater hydrology PhD student Megan Sebben on national television to discuss some of the issues around the lack of women taking up careers in science, technology, engineering and mathematics (STEM) and "Curious Minds", a hands-on mentoring program to ignite girls' passion in STEM.

Passionate NCGRT PhD groundwater Hydrogeology student Megan Sebben featured on in December recently to discuss the issues around why there are low number of women taking up STEM study pathways and careers. She is a mentor with Curious Minds, a hands-on extension and mentoring program to ignite girls' passion in science, technology, engineering and mathematics.

Watch the ABC Breakfast News video (published 21 December 2016) at: <http://www.groundwater.com.au/videos/raising-the-profile-of-women-in-stem>

Facebook Page: <https://www.facebook.com/FlindersSTEMWomen/>

# From the Branches

## Australian Capital Territory

### IAH ACT BRANCH

#### 2017 Committee:

<b>Chair</b>	Lucy Lytton	Geoscience Australia
<b>Vice Chair/Secretary</b>	Scott Lawson	Office of Water Science
<b>Treasurer</b>	Tim Evans	Geoscience Australia
<b>Student Coordinator</b>	Sharon Gray	Research School of Earth Sciences, ANU
<b>Communications Champion</b>	Stephen Hostetler	Hostetler Hydrogeology
<b>Membership Champion</b>	Laura Gow	Geoscience Australia
<b>Events Coordinating Committee</b>	Tim Evans	Geoscience Australia
	Chris Harris-Pascal	Geoscience Australia
	Peter Hyde	Murray-Darling Basin Authority

### ***Local News***

#### **Jim Kellett has passed away**

It is with great sorrow we say good bye forever to Jim Kellett.

Since joining BMR in 1972, he has had a tremendous influence on many of the groundwater staff, and actively encouraged younger staff to pursue their dreams and push themselves, particularly in physics and mathematics. He was a formidable scientist, and a well-known straight shooter with a robust academic record.

Jim was a champion for evidence-based science policy development. There are many examples where he enhanced BMR / AGSO / GA outputs through his technical input and review. His many contributions included field investigations to facilitate urban development in Canberra during the 70's, hydrogeological mapping of the Murray Basin, salinity mapping of the Lower Macquarie River, the development of early numerical groundwater models in the Lachlan Fan, radioactive waste site assessment, and understanding the hydrogeology of Great Artesian Basin. His expertise was a significant factor in the success of the GAB Sustainability Initiative. Most recently he made a major contribution to advancing the understanding of the hydrogeology within the Galilee Basin, through his work on the Bioregional Assessment Programme.

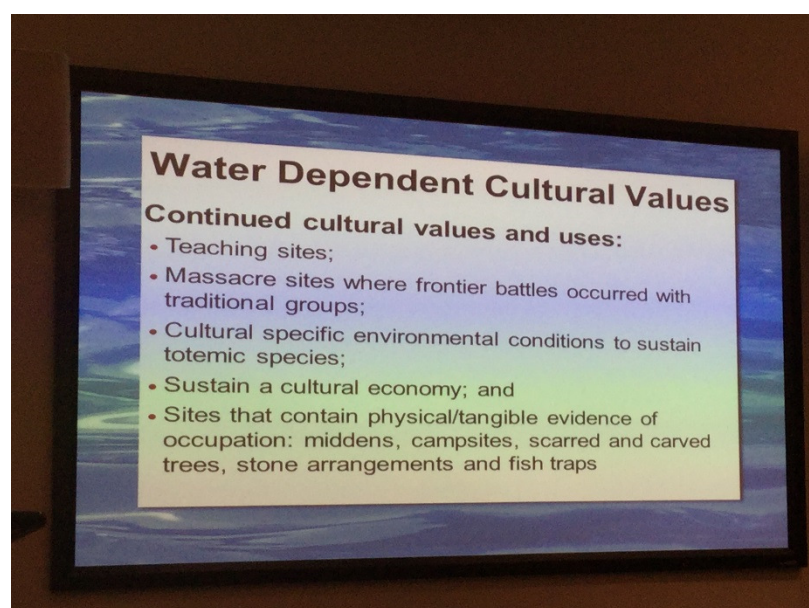
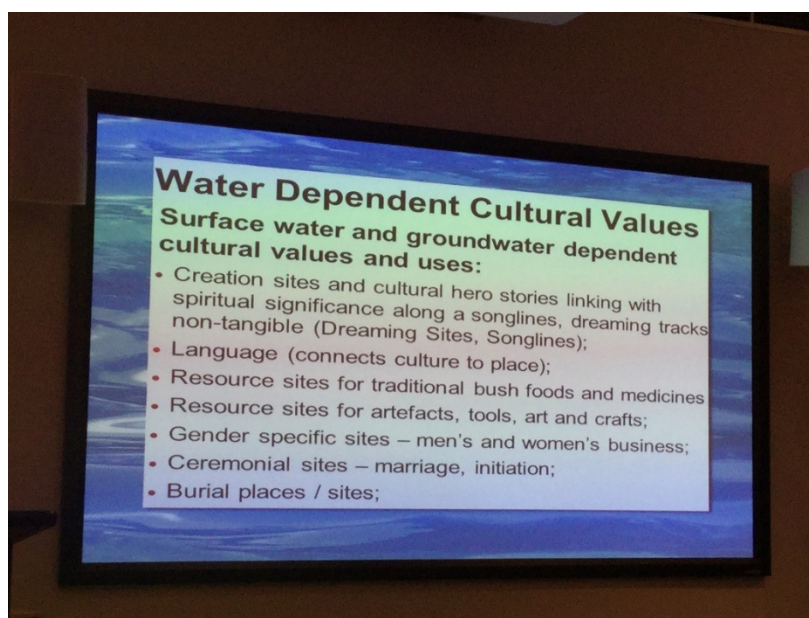
In his later years, Jim was warmly regarded and highly respected throughout the Australian hydrogeological community as a wise holder of national groundwater knowledge and a supportive, generous mentor of many. We will certainly miss his frank and fearless personal style.

[Original Article courtesy of Geoscience Australia]

## ***Recent Events***

### **18 November 2016 – Aboriginal Community Engagement and Groundwater in NSW– Brad Moggridge**

Following our AGM, IAH ACT member Brad Moggridge gave an engaging talk on the history of groundwater management in Australia by Aboriginal people and the importance of incorporating indigenous knowledge and cultural values into groundwater management.



## Abstract

Australia is the driest inhabited continent on earth, yet it has been the traditional lands of its original inhabitants for thousands of generations because of their knowledge of water in the landscape. Australia's First Peoples its Aboriginal people rely on surface water and especially groundwater, this has been the case for generations primarily to ensure their survival in a dry landscape. Aboriginal people place protecting water landscapes as a high priority as it is a cultural obligation to do so. The challenge ahead for Australia's First Peoples is to ensure their value and relationship with water is not diminished by modern day water planning. For a people in a dry landscape, traditional knowledge of finding, re-finding and protecting water sites has been integral to their survival for so long. Aboriginal water dependent cultural values include tangible and non-tangible aspects, these are being reviewed to include cultural and Spiritual values for water quality and the NSW Governments Aboriginal water unit is changing the landscape on ways Aboriginal water values and uses are being considered and protected.

### **10 November 2016 – Regulating the cumulative impacts of groundwater withdrawals: Australia and further afield– Dr Rebecca Nelson**

As part of the IAH/NCGRT Distinguished Lecture Series, IAH ACT Branch was pleased to host Rebecca at the Murray-Darling Basin Authority.

The regulation of groundwater extraction has shifted dramatically through an intense era of intense water reforms spanning three decades. A key outstanding issue is controlling withdrawals with an eye to their cumulative impacts on groundwater resources and dependent systems. Such control is complicated not just by the incremental additive effects of many small withdrawals, but also by interactive and synergistic effects. This complexity is intensified further by data paucity, potentially significant time lags, and simultaneous background changes to natural systems, such as those caused by climate change.

Much of the attention to regulating cumulative impacts has focused on ensuring that traditionally unregulated types of groundwater withdrawals are controlled or at least monitored, and on special-purpose regulation of clusters of withdrawal activities, as in coal seam gas extraction. This talk suggests that a broader view is necessary and possible, inspired by national, state and interstate water law and policy, as well as comparative overseas experience. This broader view would encompass a wide and diverse set of regulatory and non-regulatory mechanisms for dealing with cumulative impacts, where those impacts are understood to include a broad scope of impacting activities and complex, interconnected receptor systems.

# New South Wales

## IAH NEW SOUTH WALES BRANCH

### 2017 Committee:

<b>Chair</b>	Katarina David	(UNSW)
<b>Presentations Secretary and External Communications</b>	Graham Hawkes	(AECOM)
<b>Treasurer</b>	Tingting Liu	(Hydrosimulations)
<b>Secretary</b>	Sean Cassidy	(EMM)
<b>Student and Young Professional Coordinator</b>	Dr Anna Greve	(Eco Logical Australia)
<b>Meeting Facilitator and Internal Communications</b>	Sean Daykin	(WSP Parsons Brinckerhoff)
<b>Newsletter Champion</b>	Dr Ben Rotter	(Mott MacDonald)
<b>NSW Sponsorship Champion</b>	Jason Carr	(Jacobs)
<b>Web Champion</b>	Doug Anderson	(Water Research Laboratory, UNSW)
<b>International Sponsorship Champion</b>	Dr Jay Punthakey	(Ecoseal)
<b>University Liaison</b>	Dr Bill Milne-Home	(UTS)
<b>Members Champion</b>	Ellen Kwantes	(WSP Parsons Brinckerhoff)
<b>National President</b>	Dr Lange Jorstad	(Geosyntec)
<b>International Vice President - Australasia</b>	Dr Wendy Timms	(UNSW)
<b>Committee Support</b>	Mark Peterson	(ANSTO)

### ***Local News***

Our regular branch meetings continue to be held at the office of WSP Parsons Brinckerhoff (WSP) located in the Sydney CBD. Thank you to WSP for supplying the convenient central venue, first class facilities, and food and drinks.

IAH NSW branch provides events that span all stages of a career in hydrogeology. Our Student Night event provides a platform for students, and our Young Professional Award recognises young professionals. For mid to late career hydrogeologists, a forum is provided for technical presentations. Highly experienced professionals join our panel during Elders Night, with esteemed NSW hydrogeologists recognised by the receiving of the Woolley Award at or near retirement.

## ***NSW Sponsors***

IAH NSW gratefully acknowledges the contributions of its 2015/16 sponsors. Details of sponsors can be found on the website at <http://www.iah.org.au/about/new-south-wales/nsw/-branch-sponsors>.

Our Gold Sponsors are AECOM, Coffey, Eco Logical Australia, EMM Consulting Pty Limited, Earth Science Information Systems, Geosyntec, Jacobs, NSW Department of Primary Industries Water, NSW Environment Protection Authority, Parsons Brinckerhoff, WSP, and University of NSW Water Research Laboratory.

Our Silver Sponsors are Douglas Partners, C. M. Jewell & Associates, Ecoseal, Kalf and Associates, and Hydrosimulations.

## ***Recent Events***

### **6 December 2016 – Trivia Night**

Trivia Night was a fun night of trivia questions with a hydrogeological orientation. The night saw Dr Noel Merrick acting as quiz master and five teams battling it out.

The prizes were given to winning team, most outrageous answer and the losing team, and it was a fun night for all.



Trivia teams in action. Photo by Cassie Murphy

### **10 November 2016 – NCGRT Distinguished Lecturer: Regulating the cumulative impacts of groundwater withdrawals - Australia and further afield – Dr Rebecca Nelson**

The regulation of groundwater extraction has shifted dramatically through an intense era of intense water reforms spanning three decades. A key outstanding issue is controlling withdrawals with an eye to their cumulative impacts on groundwater resources and

dependent systems. Such control is complicated not just by the incremental additive effects of many small withdrawals, but also by interactive and synergistic effects. This complexity is intensified further by data paucity, potentially significant time lags, and simultaneous background changes to natural systems, such as those caused by climate change.

Much of the attention to regulating cumulative impacts has focused on ensuring that traditionally unregulated types of groundwater withdrawals are controlled or at least monitored, and on special-purpose regulation of clusters of withdrawal activities, as in coal seam gas extraction. This talk suggests that a broader view is necessary and possible, inspired by national, state and interstate water law and policy, as well as comparative overseas experience. This broader view would encompass a wide and diverse set of regulatory and non-regulatory mechanisms for dealing with cumulative impacts, where those impacts are understood to include a broad scope of impacting activities and complex, interconnected receptor systems.

Dr Nelson is a Senior Lecturer, Melbourne Law School, University of Melbourne, Fellow (Non-Resident) of the Woods Institute for the Environment at Stanford University, and practising lawyer and policy consultant.

## **2 November 2016 – Regional IAH NSW meeting**

The regional meeting was held in Albury and included the following three presentations:

### **Conceptual model of risks to shallow waters associated with underground mining through geological fault structures – Dr Wendy Timms**

Dr Timms' presentation discussed the water-related risks associated with mining through geological faults. Different conceptual models were covered, each showing the likelihood of fault impacts on shallow waters. Lessons for risk-based adaptive management were also discussed. The presentation was based on research at the University of New South Wales.

Dr Timms is the director of postgraduate coursework and senior lecturer at UNSW Australia.

### **HydroSight – A toolbox for data-driven hydrogeological insights – Dr Tim Peterson**

Australia's groundwater monitoring network comprises over 15,000 monitoring bores, and has an annual operating budget of \$29 million and an asset replacement value of \$136 million. The HydroSight software package was developed to increase the value and insights derived from the nation's groundwater data. This presentation outlined the HydroSight algorithms and their limitations. The user interface and various applications of the software were discussed.

Dr Peterson is based in the Department of Infrastructure Engineering at the University of Melbourne.

### **Potential and actual effects of underground mining on groundwater flow – Katarina David**

Underground (longwall) coal mining can impact on groundwater and surface water systems and related ecosystems. Most of the predictions related to impacts of future coal extractions on groundwater are obtained by calibration of numerical models to groundwater heads and mine water inflows. Recent studies in NSW have examined changes in hydraulic conductivity during the progress of mining that are related to fracturing and mine inflow. This presentation discussed the basics of the theory, the importance of specific

storage and how it can be determined for strata, and the predictive errors in modelling groundwater flow.

Ms David is a PhD candidate at the University of New South Wales.

## **25 October 2016 – Careers Night**

This event featured presentations and casual networking for students. The event was well attended by students from University of New South Wales, University of Sydney, University of Technology Sydney and University of Wollongong.

Six representatives spoke at the event, including:

**Ngaio Spencer, HR Talent Acquisition Specialist at WSP Parsons Brinckerhoff**

**Brett Nathan, Recruitment Advisor Director at ALRA**

**Nicola Fry, Associate Hydrogeologist at EMM Consulting**

**Alistair Stewart, Hydrogeologist at Eco Logical Australia**

**Serena Yeung, Graduate Environmental Scientist at the University of Sydney**

**Chris Doran, Graduate Geologist at the University of Wollongong**



**Presenters at Careers Night (left to right): Nicola Fry, Ngaio Spencer, Brett Nathan, Alistair Stewart, Serena Yeung and Chris Doran**

## 11 October 2016 – Student Night

This event featured presentations from four PhD students. The following students discussed their research on the following topics:

- Chris Doran, University of Wollongong

*Land use and its relationship to riparian zone organic carbon storage on the Upper Hunter River*

- Fazina Kater, University of Sydney

*Towards a numerical approach to identify Hydrogeological Landscape Units*

- Sinxay Vongphachanh, University of Technology Sydney

*Surface water and groundwater interactions in Southern Laos*

- Serena Yeung, University of Sydney

*Submarine landslides offshore Yamba, Australia: An analysis of their timing velocities and possible causes*



The NSW IAH Young Professional Award was awarded to Antony Orton on the night. The award recognises technical achievement and broader professional development achieved by a professional with up to five years post graduate experience in groundwater related work.



Graham Hawkes (left) presenting Antony Orton with NSW IAH Young Professional Award

## ***Upcoming Events***

### **14 February – Geological Survey Research Update – Dr Chris Yeats**

Dr Chris Yeats, Executive Director from the Geological Survey of NSW is going to provide an update of the surveys latest research, publications and applications and how this can be of assistance to hydrogeologists. One recent application to be discussed is the maps for mobiles app where the most recent geological map can be downloaded to your phone and pin point which formation you are standing on.

## ***Other News***

### **Student Sponsorship**

NSW IAH is jointly sponsoring two MSc students from Nepal, **Jinita Shakya** and **Rasila Koirala**, with National IAH for the duration of their MSc theses.

The students are based in the Central Department of Geology at Tribhuvan University, Kirtipur, Kathmandu, Nepal.

**Jinita's** study is focussed on the groundwater quality, recharge and discharge in the Sankhu area. Groundwater conditions vary according to the topography and soil type of the area. In the Sankhu area, a single groundwater well typically provides a potable water source for four or five families. Groundwater quality is therefore of importance to human health.

Janita is also interested in the recharge and discharge mechanisms of the Salinadi River, a famous river of the Sankhu area. Due to poor historical management, the river has depleted as a water resource. Janita intends to work with the local community to improve the maintenance of the river.

**Rasila** has a keen interest in rainwater recharge potential in the northern Kathmandu area.

The Kathmandu Valley is located on the sediments of a lake that once filled the valley. These sediments serve as relatively productive aquifers. The upper, unconfined section of the aquifer, although it has become increasingly polluted in some locations, serves as a primary source of water for many local shallow wells. This water is used mostly for non-consumptive uses such as bathing, washing and gardening. The water in nearly all wells shows high counts of faecal coliform bacteria, especially during the monsoon season. The city's leaky sewer system combined with the presence of numerous areas that are not served by any sewer system and the absence of effective treatment plants contributes to the pollution.

Rainfall is a principal source of groundwater recharge - shallow, unconfined aquifers are recharged every monsoon, although deeper aquifers are not. To develop groundwater resources for the long term, the relative rate of recharge for different aquifers needs to be understood.

The goal of Rasila's work is to better understand these aquifer systems, and the potential for them to provide sustainable and clean water supply.

In addition, IAH NSW is jointly sponsoring with IAH Australia one refugee undergraduate student, in association with University of Parma.

**Arif Khan** is a refugee from the Bajaur agency which is in the tribal area of Northern Pakistan (Federally Administered Tribal Area). He arrived in Italy in late 2015 and spent

his first period in Trieste. He is now enrolled in University of Parma in geoscience degree and during the first semester studied mathematics, chemistry, geology and physical geography and Italian. He is jointly sponsored for his study by IAH NSW, IAH Australia, Ecoseal, alumni of University of Parma and private donations.

### **IAH NSW on LinkedIn**

IAH NSW has gained a presence on professional social media site, LinkedIn.

The page provides events newsletters and advertisements for hydrogeology positions in the industry.

# Victoria

## IAH VICTORIAN BRANCH

### 2017 Committee:

<b>Chair</b>	Alan Wade	(Aquade)
<b>Vice-Chair</b>	Ben Hall	(Eartheon)
<b>Secretary</b>	Tara Smith	(Jacobs)
<b>Treasurer</b>	Anthony Brinkley	(Jacobs)
<b>Events Committee</b>	Katy Kijek	(Senversa)
<b>Communications Champion</b>	Heath Pawley	(Golder Associates)
<b>Membership Champion</b>	Alexis Valenza	(Valenza Engineering)
<b>General Committee</b>	Matt Currell	RMIT
	Anne Northway	EPA
	Riki Gresswell	GHD
	Ben Moore	CFA
	Lynton Bourne	Noel Arnold & Associates
	Mike Hoban	DELWP

### ***Local News***

Our regular branch meetings continue to be held alternatively at the Melbourne RMIT City Campus and at Jacobs Melbourne Branch. Thank you to RMIT and Jacobs for supplying the convenient central venues and first class facilities.

Our last VIC Chapter IAH 2016 committee meeting was held on the 24<sup>th</sup> November 2016 at the Melbourne RMIT City Campus. The first committee meeting of 2017 will be held on the 19 January 2017 at RMIT.

### ***Recent Events***

#### **Tuesday 8th November 2016 - The Hydrogeology of Lake Tutchewop - A Case Study in Conceptualizations and Methodologies - Dr Phil Macumber**

Lake Tutchewop is a terminal lake on the Avoca River. It has been utilized as an important evaporating basin since 1968, storing saline water diverted from the Barr Creek and protecting the Murray River from one of its main salt sources. However, there are serious issues around the extent to which Lake Tutchewop leaks with widely divergent professional opinions among eminent scientific organisations and researchers over the last 20+ years. These opinions range from virtually no leakage at all (leading to its filling with salt eventually destroying the disposal scheme) to not accumulating salt at all (and thereby a threat to the surrounding countryside and farmland). Both views involve modelling, the

former using sophisticated Sutra and Realm models, and the latter by the simplistic Lake /Groundwater Interaction Conceptualization Model of Macumber, (2006) which shows the lake has not accumulated salt since at least 1993. This model is explained with a figure and caption. The different interpretations have clear and important management implications.

The widely opposing opinions about the same lake gives an insight into the nature of the discipline of hydrogeology, and the question arises as to when does the Science hold water? – a question posed by the 2006 MDB Workshop in Canberra, but controversially not answered. How such disparate strongly held views have arisen, and the conceptualizations and methodologies underpinning their validity is discussed. For explanations, we need to examine the nature of Hydrogeology as an inductive science (J. Hoover Mackin, in *The Fabric of Geology*, 1963). In the case of Lake Tutchewop one answer is provided which details the wider nature of lake-groundwater interactions. As Einstein (*Saturday Evening Post*, 1929) said "Imagination is more important than knowledge".

Dr Phil Macumber is a foundation member and past president of IAH Victorian Branch. He has worked on the hydrogeology and geomorphology of northern Victoria since 1964, where he did his PhD. He is a graduate of Melbourne University with BSc majors in Geology and Advanced Geomorphology, and has a BA in Philosophy of Science (H1 in final year) and M.E. Studies (final year - Mediaeval Islamic Studies). All streams, which in the latter instance covered alchemy and mysticism, have varyingly contributed to his present understanding of Lake Tutchewop. For the last 7 years when not engaged with Lake Tutchewop, he has worked with the Dept of Archaeology of Copenhagen University on the roles of (ground) water and landscape in the occupation of Qatar, concentrating on eustatic and climatic change.

## **Tuesday 6th December 2016 - Groundwater Misadventures - Dr. Richard Evans**

Dr Richard Evans will be giving a light-hearted overview of geotechnical and hydrogeological misadventures that he has observed during his career as a hydrogeologist. Rick will describe several instances where the role of the hydrogeologist was critical to the success (or failure!) of the project. Please join us for the final IAH event for 2016.

Dr Richard Evans is Principal Hydrogeologist with Jacobs. Rick has 35 years' experience in all aspects of hydrogeology, groundwater resource management and groundwater engineering. He has worked on numerous water resource projects throughout Australia and Asia. He has specialised in groundwater management, surface water groundwater interaction, unconventional gas and assessing the impacts of groundwater developments.

## ***Upcoming Events***

### **Tuesday 7th February– "What can the Bureau offer you?" Useful climate and water products for groundwater specialists – Dr Paul Feikema, Eloise Nation**

Dr Paul Feikema, Manager Seasonal Streamflow Forecasting in the Extended Hydrologic Prediction section, will present an overview of recent conditions, the climate and water

outlook for the season ahead, and the Bureau's Australian Water Resources Assessment (AWRA) Model.

Eloise Nation, Senior Hydrogeologist at the Groundwater Unit, will showcase the Bureau's suite of national groundwater products including the National Groundwater Information System, the Australian Groundwater Explorer and the Australian Groundwater Insight. These products are freely available from the Bureau website. Eloise will demonstrate how these products support a range of use cases, such as environmental impact assessments, water planning and management and research. Eloise will also present upcoming groundwater work at the Bureau, including an update to the GDE Atlas.

Dr Paul Feikema manages the seasonal streamflow forecasting service at the Bureau of Meteorology in Melbourne. He and his team are responsible for delivery and communication of the forecasts each month, and also work to further develop the service. Prior to joining the Bureau in 2013, Paul was a senior research fellow at The University of Melbourne. There he undertook research and lectured on topics of catchment and forest hydrology, including the effects of climate change and wildfire on the hydrology of forested catchments.

Eloise Nation is a Senior hydrogeologist and project lead on Groundwater Explorer, National Groundwater Information System and GDE Atlas.

## Western Australia

### IAH WA BRANCH

#### 2017 Committee:

<b>Chairperson</b>	Ian Brandes de Roos
<b>Vice Chairperson</b>	Mal McGivern
<b>Secretary</b>	Sarah Bourke
<b>Treasurer</b>	Sandie McHugh
<b>Events team</b>	Rachel Hamilton
	Adriaan Haasbroek
<b>Communications team</b>	John Enkelmann
	Giovanni Firmani

#### ***WA sponsors***

IAH WA is grateful for the support of Boart Longyear, Gold Sponsor of the IAH Tech Talk Series in 2016.



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## ***Recent Events***

### **31 August – Darcy Lecture – Ty Ferré**

Perth's turn to host the 2016 Darcy lecture saw 50 attendees enjoy Ty's engaging presentation 'Rethinking the Relationship Between Data, Models, and Decision-Making'.



### **14 September – IAH social night**

Tech Source Solutions kindly sponsored the 2016 IAH WA social night at Tiger Lil's Tavern. Raffle ticket sellers were kept busy – the event also served as a fundraising event for Red Cross' humanitarian work. Generous prizes were donated by Tech Source Solutions and about \$300 was raised.





## 27 September – ECHN – Pizza and pint with the experts

Our ECHN representative Adriaan Haasbroek ran an extremely successful experts panel night at the University of Western Australia. A panel of hydrogeologists related their early career experiences, answered questions and provided career advice to students. Thank you panel members: Alexander Renz, Dr Ian Brandes de Roos, Kate Bailue and Dr Lynn Reid.



# South Australia

## IAH SOUTH AUSTRALIA BRANCH

### 2017 Committee:

<b>President</b>	Steve Barnett
<b>Vice President</b>	Neil Power
<b>Membership champion</b>	Tavis Kleinig
<b>Committee member</b>	Russel Martin
<b>Web master/mistress</b>	Fiona Adamson
<b>Modelling Forum</b>	Juliet Wood

### *Recent Events*

#### **2 November 2016 – BoM matters!**

**Darren Ray**, Senior Climatologist for the South Australian Region, presented an overview of recent extreme SA weather experiences including the storm that led to a complete State blackout. This storm, other severe weather events and much higher rainfall experienced during 2016, were the result of Indian Ocean Dipole activity. Climate projections suggest a warmer and drier future despite occasional wet years like 2016. Extreme events are likely to become more frequent because of more moisture in the atmosphere driven by warmer temperatures.

**Elisabetta Carrara and Brendan Dimech** from the BoM Groundwater Unit in Melbourne gave an overview of the Bureau's groundwater team and products. This included;

- Updates to groundwater datasets and web products
- Adding Geoscience Australia hydrochemistry data to the Explorer
- Releasing the updated GDE Atlas
- Quality Control (QC) of groundwater level data and interpolation
- Creating a salinity contour dataset
- Improved aquifer boundary dataset, which links to the National Aquifer Framework

Betty acknowledged the contribution of State agencies in providing the data and expertise need to develop these products, and also the importance of stakeholder engagement.

# Northern Territory

## IAH NORTHERN TERRITORY BRANCH

### 2017 Committee:

<b>Chair</b>	Peter Jolly	Jolly Consulting
<b>Treasurer</b>	Quinton Bruwer	DENR
<b>Secretary</b>	Steven Tickell	DENR
<b>Vice Chair</b>	Jo Ellis	Power and Water Corp

### ***Local News***

The Branch's AGM was held in Palmerston on the 9th December with a turnout from the regulars (6 people). The only change to the Branch Committee was the election of Peter Jolly to the position of Chair of the Branch. Branch members would like to thank Melissa Woltmann for the excellent work she did in the time she was chair.

### ***Recent Events***

**1 December 2016 –**

**Regulating the cumulative impacts of groundwater withdrawals: Australia and further afield – NCGRT/IAH Distinguished Lecturer Dr Rebecca Nelson**

**Innovative science to inform groundwater exploration and irrigation development in northern Australia – Dr Ken Lawrie of Geoscience Australia**

On Thursday the 1<sup>st</sup> of December the Branch was treated to two talks on subjects particularly relevant to many of us. Approximately 30 people attended (IAH and non-IAH members) locally and a further 5 people attended via video conference hook up from Alice Springs. Feedback was very positive.

# Queensland

## IAH QUEENSLAND BRANCH

Current Committee:

President	Lucy Reading	(Queensland University of Technology (QUT))
Vice President	Paul Smith	(Pacific Environment)
Treasurer	Dawit Berhane	(Department of Science, Information Technology and Innovation (DSITI))
Technical Representative	Jim Underschultz	(University of Queensland, Centre for Coal Seam Gas)
Director of Communications	Adam King	(Pacific Environment)
Committee Member	Shaun Davidge	(BHP Billiton)
Committee Member	Lindsay Furness	(Freelance consulting)

## Local News

### Sponsors

We are pleased to announce that the Queensland branch now has four corporate sponsors for the 2016/2017 financial year: AGE, Douglas Partners, ESdat and Pacific Environment. Their generous donations provide the funds to support our monthly events.

**Pacific Environment**  
Limited



**Douglas Partners**  
Geotechnics | Environment | Groundwater



**ESdat**  
HELPING YOU DO, WHAT YOU WANT, WITH YOUR DATA

If you or your company would like to sponsor the Queensland branch, please contact the committee!

## Recent Meetings

### Friday 16th September

Elders night: John Hillier (formerly a consulting hydrogeologist), Iain Hair (Douglas Partners), Colin Hazel (formerly a consulting hydrogeologist) and Errol Briesse (AGE) discussed their career highlights and anecdotes. This resulted in a very informative and entertaining evening!

**Friday 21st October**

“Serra Pelada – boom, bust and flooded” - a case study on an international hydrogeology project by Tim Armstrong from AGE. Undertaking international projects is always an exciting adventure for any hydrogeologist. This was certainly the case in 2010 when Tim found himself working at the infamous Serra Pelada Mine located in Brazil. Tim shared a brief but fascinating history of Serra Pelada and the unique challenges involved with its mining, groundwater system, and social setting.

**Tuesday 3rd November**

“Regulating the cumulative impacts of groundwater withdrawals: Australia and further afield” – a presentation by Dr Rebecca Nelson from the University of Melbourne (NCGRT/IAH Distinguished lecture series). The lecture was well attended by a great mix of hydrogeologists and lawyers!

## Tasmania

***No update available in this edition.***



For upcoming courses, see <http://www.groundwater.com.au/events/training>

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# IAH Publications

Discounted IAH publications in the 'International Contributions to Hydrogeology' and the 'Selected Papers' series can be ordered by Australian IAH members directly from Macmillan Publishers Australia in Victoria.

[customer.service@macmillan.com.au](mailto:customer.service@macmillan.com.au) or [orders@macmillan.com.au](mailto:orders@macmillan.com.au)

Remember to quote your IAH Membership Number, which entitles you to a substantial discount. If you don't know your IAH membership number contact the Secretariat at: [secretariat@iah.org.au](mailto:secretariat@iah.org.au)