



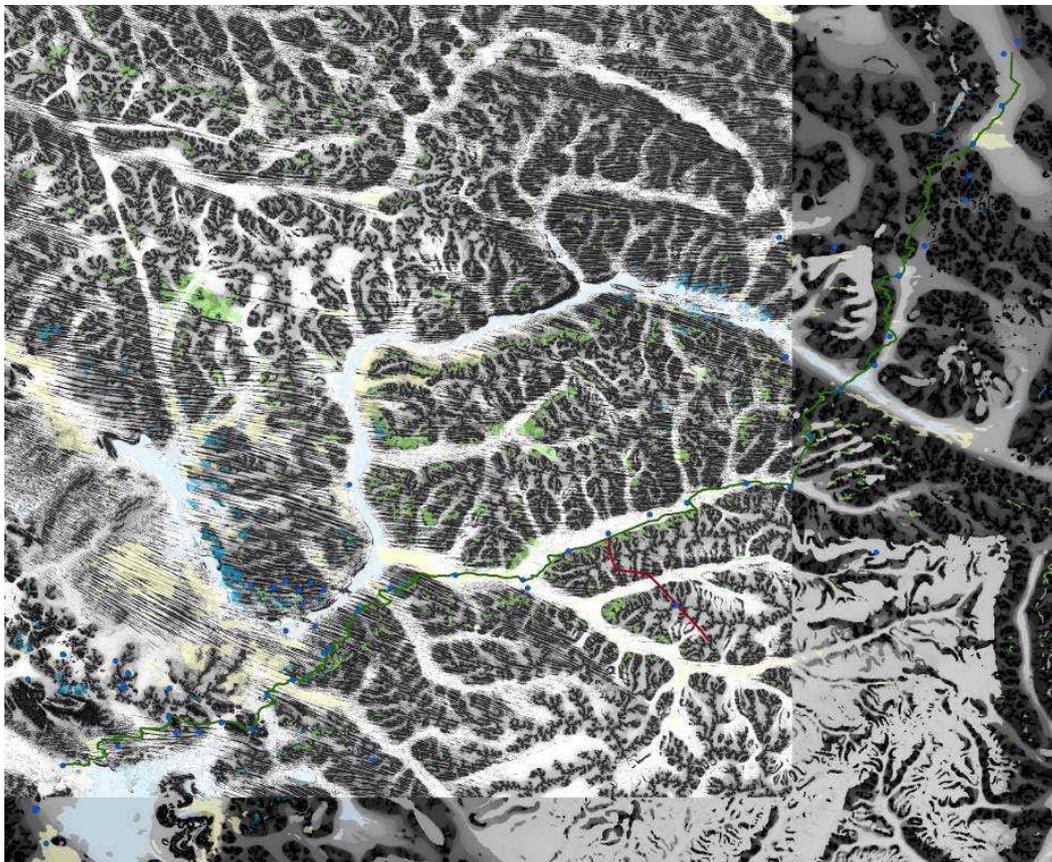
IAH Australia



iah news

Newsletter of the Australian Chapter
International Association of Hydrogeologists

January to March 2014
Volume 30, No. 1



On the cover (from the Seven Wonder of the Hydrogeological World – in Australia):

The Canning Basin

The Canning Basin of Western Australia is a magnificent hydrogeological entity, representing Australia's second largest sedimentary basin (after the Great Artesian Basin) and containing a fascinating ensemble of extensive aquifers and doubtlessly large volumes of groundwater beneath the Great Sandy Desert. The underexplored, pericratonic Early Ordovician to Early Cretaceous Canning Basin occupies about 506,000 km², of which 430,000 km² are onshore. It has a maximum sediment thickness of over 15,000 metres concentrated in two NW trending depocentres. The northernmost of these is the Fitzroy Trough-Gregory Sub-basin complex, while the southernmost is the Willara Sub-basin-Kidson Sub-basin complex.

The Canning Basin is also exceptional because of the unique cultural history and significance to remote desert dwellers and early settlers. The latter is well-represented along the Canning Stock Route where an unusual variety of aquifers supply natural wells and watering points.

The cover photo presents a palaeovalley network in the central Canning Basin, along part of the Canning Stock Route, revealed beneath dense dunes of the Great Sandy Desert.

In this issue:

- ***Update on IAH Membership and Website Maintenance***
- ***The Economic Value of Groundwater***
- ***State Branch Activity***
- ***Events and Resources:***
 - ***Australian Earth Sciences Convention***
 - ***Bureau of Meteorology Groundwater Products***
 - ***Geosyntec Bioremediation Webinar***

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 20th 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. This national Newsletter is published quarterly.

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 2009 (see www.iah.org.au) are:

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

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

The Barnaby Aquifer

What will it take to get our politicians interested in groundwater? We are all very aware that politicians like to have monuments to themselves, or at least to open a dam before an election – hence, for example the Hinze Dam. So why not rename all our major aquifers after politicians? The Great Artesian Basin would become the Barnaby Aquifer, the Beenyup MAR Scheme would become the Abbot Injection Bore and so on. The opportunities are almost endless. The State IAH Branches could organise official openings (discoveries) and what politician would turn down something named after them! Alas the media would finally have something to do with groundwater to report.

Seriously, however, the profile of hydrogeology is low and we all need to think how do we raise the awareness of the fundamental importance of groundwater (and groundwater related processes) to the future of Australia. The NCGRT is doing a great job in regularly releasing media articles. But we need to do much more. This is no more currently obvious than in the debate about the future water resource options for Australia. The official water policy is “100 dams”. The federal Water Minister (Simon Birmingham), thankfully, has recently acknowledged that for Northern Australia “aquifers” and MAR also have a role. I would go one big step forward and say that with the high evaporation rates in Northern Australia, dams will be many times more expensive and far less efficient than well sited and designed MAR schemes, in the context of well-planned conjunctive use of groundwater and surface water. So let us have a simple message and turn the “100 dams” policy into “100 storages” (of which many will be groundwater, and maybe some might be named after politicians!).

IAH Australia Direction

Rest assured that the tough employment situation for hydrogeologists in many parts of Australia is on the mind of the IAH National Executive. This has taken a hit in terms of our membership renewals. We are very aware that the current temporary arrangement for renewals is not helping. Nonetheless may I encourage you to make sure that your membership is up to date and to also encourage your hydrogeological colleagues to join the IAH. We are a fantastic science and management passed organisation with a real purpose and mission. Ensuring our ongoing strength is in all our hands.

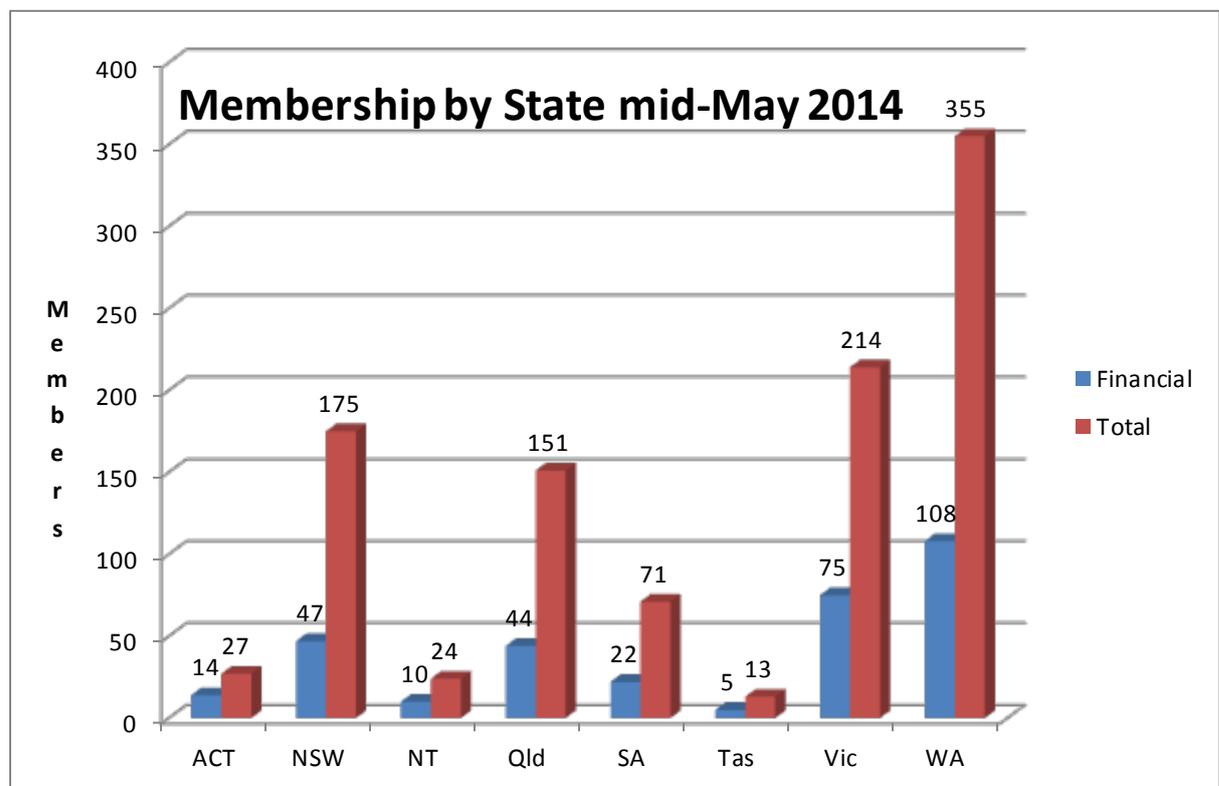
The National Executive is currently debating the wisdom of a regular (possibly annual) conference. This would possibly be rotated around the States (and Territories). It would consciously be a low key event and hopefully not a burden on the State committee. Some of the State Branches effectively do this already, albeit it has a clear State focus. I think the idea has great merit and would provide a fantastic forum to promote hydrogeology. Please express your thoughts to your State committee. This idea will only fly with your support.

Richard Evans
President, IAH Australia

MEMBERSHIP UPDATE

2014 Membership Update

2014 is proving to be another challenging membership year for IAH Australia, with the number of financial members falling from a peak of 770 in 2012 to 325 in mid-May 2014. The accompanying graph shows that financial members are a minority in each State - and naturally we all would like to see the opposite. For clarity, *financial* members are those who have joined or renewed their memberships in 2014, and *non-financial* members have been paid members within the past two years but have not yet renewed in 2014 (and therefore do not receive member benefits).



How did we get there from 2012? Employment prospects for hydrogeologists have diminished and memberships may have lapsed as members look for other jobs in their State or move interstate. Additionally, some have gone overseas. The website has been another source of frustration for renewals and new memberships.

Our mobile membership means that state and national databases are continually changing. State member champions can work through their individual committees to contact members and persuade them to renew their membership. However, we strongly encourage members whose contact details may have changed in the past couple years to review and update their details directly, using this [link](#) on the IAH Australia website. Another vital aspect is to recruit new members. In both of these respects campaign monitor can be a useful tool.

Shane Trott's efforts in setting up and running the webinar for state member champions on how to use campaign monitor are greatly appreciated. This event took place on 23rd May and campaign monitor will gradually be adopted and used along with the existing spreadsheets for our membership tasks.

We can't do anything about hydrogeological employment but we can fix the website and move ahead with the job of rebuilding our membership base towards the 2012 peak and beyond.

Bill Milne-Home
National Member Champion

Website Update

As some of you may be aware, the IAH National Committee has appointed a "website working committee", whose primary focus is to define, procure and manage the services required to improve the membership-related functions of the IAH Australia website: namely to develop an easy and reliable membership payment facility, and better integration of the membership database with the website.

The committee consists of volunteer IAH members from across Australia. The committee has solicited quotes from a range of web designers, and has recently provided the National Committee with a recommended web designer for the task.

While the initial focus of the work is repairing the membership aspects of the website, a number of other suggestions have been provided by members to improve other aspects of the website (for example, having a dedicated location for the new and archived newsletters!). We are aware of these requests and will attend to them in due course.

We thank you for your patience this year, including the interim membership renewal method, while we work to establish a reliable and easy to use website payment system for the future.

FEATURE ARTICLE

The Economic Value of Groundwater

There has been an increasing research focus on the environmental and social values of groundwater resources in the past decade; however there has been relatively little reporting of the overarching economic value of groundwater and groundwater-supported productivity. This is surprising, considering that the economic value is perhaps the most “tangible” of groundwater-related values in terms of establishing government management and funding priorities, identifying future growth opportunities, and assessing the positive and negative impacts associated with the development of groundwater resources and groundwater-supported industries.

In October 2013 the National Centre for Groundwater Research and Training (NCGRT) issued a report entitled: *The Economic Value of Groundwater in Australia*. The report was prepared by Deloitte Access Economics on behalf of the NCGRT, and attempted to quantify the economic value of groundwater to the Australian economy by considering how productivity would change if groundwater was not available.

Groundwater value was initially considered in terms of the “economic use” value, or direct consumptive uses of groundwater, by estimating total annual groundwater use across the major usage categories, and applying a derived unit value for each category. The results were expressed in terms of direct economic value add, with a median value estimate of approximately \$4.1 bil./annum, and a median gross domestic product value of \$6.8 bil./annum that accounted for “flow on effects” to other industries.

The direct use value assessment was expanded upon to consider the total value of productivity that is supported by groundwater (GDE = Groundwater Dependent Economy!). This was estimated by considering the relative percentage of the total productivity value of major water-dependant industries that was attributable to groundwater availability. The estimated value, \$33.8 bil./annum, was significantly higher than the direct user value of groundwater, and was dominated by the groundwater contribution to metal ore mining in arid climates where nearly 100% of water demand is satisfied by groundwater.

Noted exclusions from this study included non-extractive and “option” values of groundwater. The groundwater value to forestry was provided as an example of a non-extractive groundwater value – forested trees drawing on groundwater to support growth. The example provided of an option value of groundwater was its availability as a backup water supply for irrigation, which acts as security to underpin agricultural investment and hence generates value indirectly even in years when groundwater is not used.

Out of interest, the results of this study were compared to similar estimates prepared for the US economy by the National Ground Water Association (NGWA). A NGWA fact sheet was released based on 2010 groundwater use and

productivity figures. While it was beyond the scope of this article to rigorously assess the comparability of the underlying assumptions of both studies, there appeared to be enough overlap to offer some useful comparisons. The immediate, and obvious, difference is the magnitude of groundwater use, which, as expected, is substantially higher in the US. When the usage volumes are normalised based on population, there is a higher per capita groundwater use for irrigation, municipal and household supply in the US, and higher per capita groundwater use for industrial and mining purposes in Australia.

With regard to the relative economic value of groundwater across the various use categories, there are some interesting results:

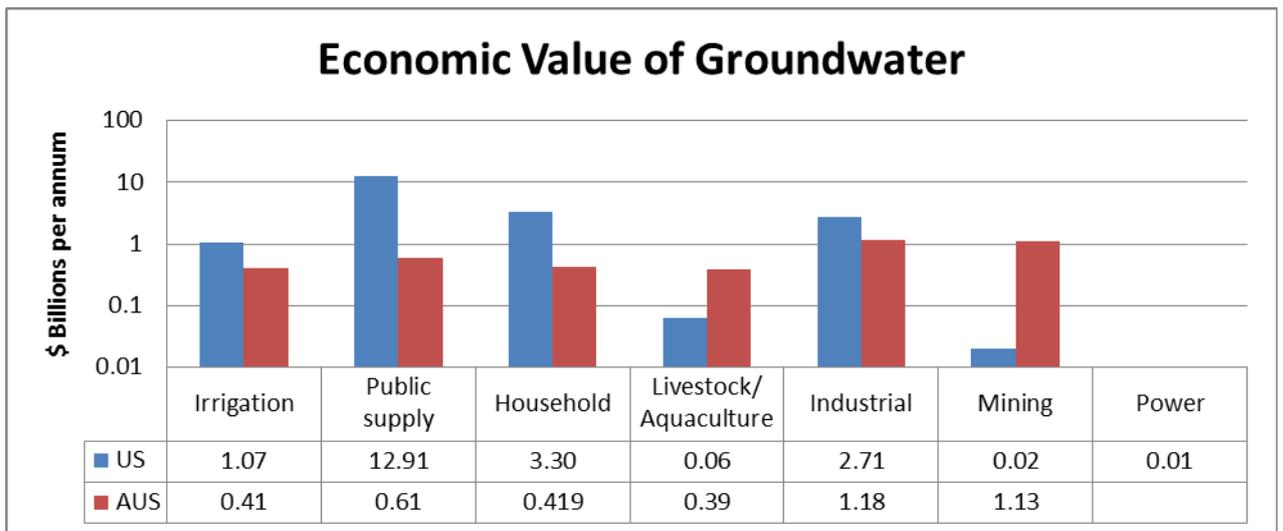
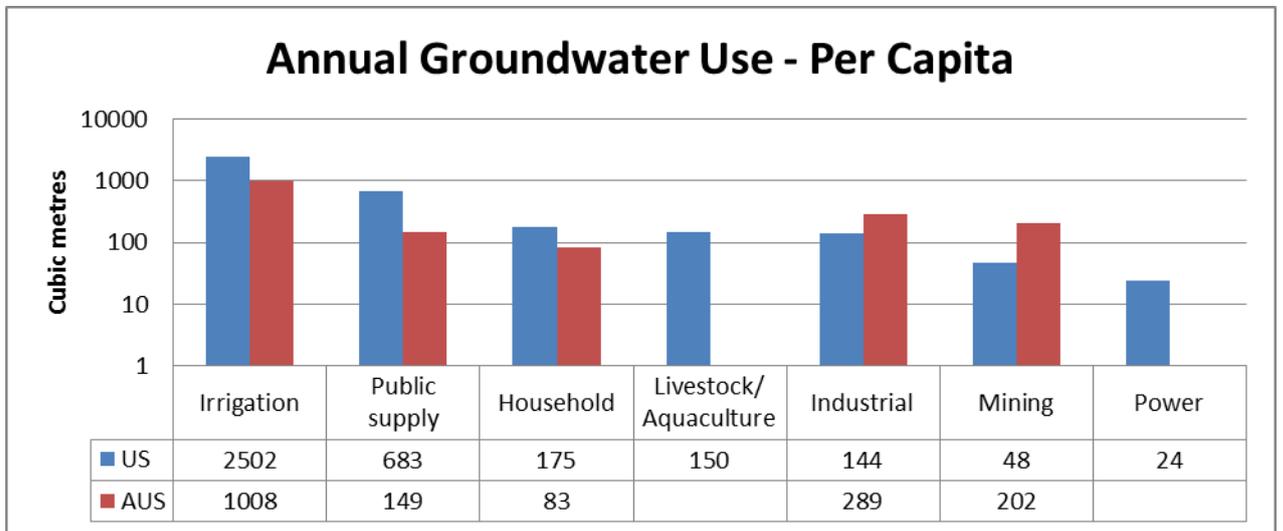
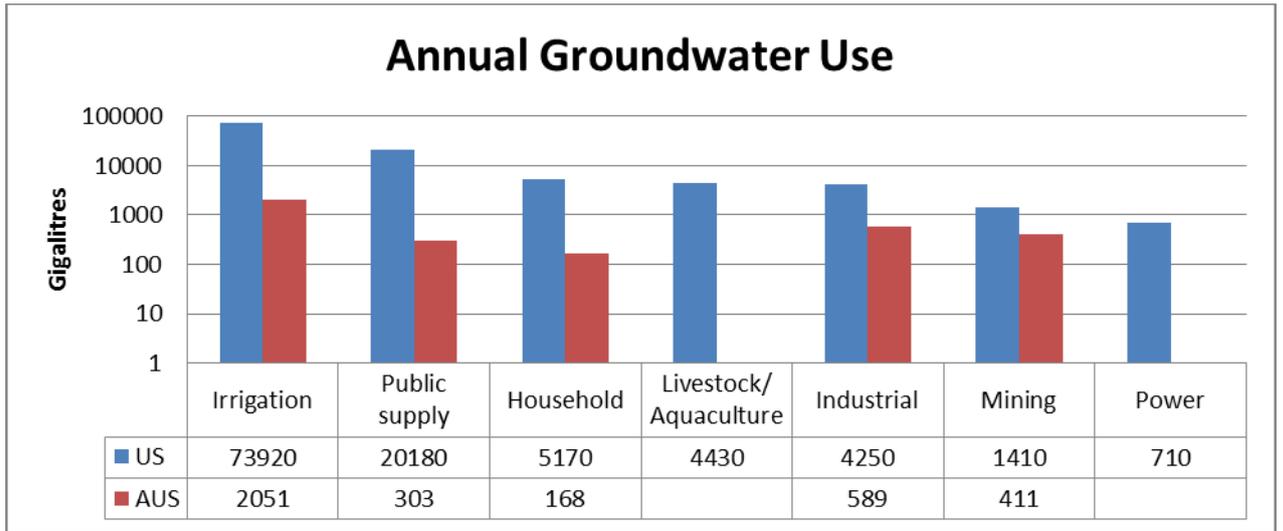
- The value of groundwater to irrigation in the US is just over twice the value in Australia. Given the vastly larger agricultural production in the US, this suggests that the majority is supported by surface water and that the difference in the amount supported by groundwater is relatively small;
- The value of groundwater to both public (municipal) and private domestic water supply in the US is significantly larger than in Australia, which appears to be a direct reflection of the difference in population;
- It is interesting to note that the economic value of groundwater to the livestock/aquaculture and mining industries is much larger in Australia than in the US. This may be influenced by differences in the underlying value assumptions in the calculation, or perhaps the greater dependency of these industries on groundwater supply to meet water demands in Australia, whereas surface water may satisfy a greater proportion of demand in the US.

The US study also includes estimates of economic productivity in businesses closely linked to groundwater (approximately \$16 bil./annum for environmental consulting, remediation services and well construction services), as well as the annual value of groundwater-related infrastructure sales (approximately \$74 bil./annum for well and pump infrastructure for municipal, domestic and irrigation supply).

While the underlying value assumptions may be open to interpretation, the overarching message is that the economic value of groundwater is substantial, both in direct value to the user, and indirect value from supported productivity in industry, services and sales related to groundwater. Expressing the value of groundwater in economic terms may provide government with an improved context in which to make policy and funding decisions for the protection, regulation and sustainable economic development of our groundwater resources.

The NCGRT report can be accessed here:
<http://www.groundwater.com.au/publications>

The NGWA fact sheet can be accessed here:
www.ngwa.org/Documents/Awareness/usfactsheet.pdf



FROM THE BRANCHES

NEW SOUTH WALES

IAH NEW SOUTH WALES BRANCH

2014 Committee:

Chair	Katarina David	(UNSW)
Presentations Secretary and External Communications	Graham Hawkes	(AECOM)
Treasurer	Sara Mehrabi	(UTS)
Secretary	John Fennel	(RPS AQUATERRA)
Sponsorship Champion	Mark Peterson	(ANSTO)
Meeting Facilitator and Internal Communications	Ellen Kwantes	(Parsons Brinckerhoff)
Awards Secretary	Dr Anna Grieve	(Xstrata Copper)
Newsletter Champion	Dr Ben Rotter	(Coffey)
Web Champion	Doug Anderson	(Water Research Laboratory, UNSW)
International Sponsorship Champion	Dr Jay Punthakey	(Ecoseal)
University Liaison and National Member Champion	Dr Bill Milne-Home	(UTS)
Members Champion	Andrew McCallum	(Office of the NSW Chief Scientist and Engineer)
National Secretary	Dr Lange Jorstad	(Geosyntec)
International Vice President - Australasia	Dr Wendy Timms	(UNSW)

Local News

Our regular branch meetings continue to be held at the office of Parsons Brinckerhoff (PB) located in the Sydney CBD. Thank you to PB for supplying the convenient central venue, first class facilities, and food and drinks. Thank you also to AECOM for hosting this year's Darcy Lecture in their central Sydney CBD office and providing 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 platform 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 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 include AECOM, CDM Smith, Coffey, GHD, Hydrosimulations, Parsons Brinkerhoff, RPS Aquaterra, and UNSW.

Our Silver Sponsors include C. M. Jewell & Associates Pty Ltd, EcoSeal, EMM, Environmental Strategies, Frans Kalf and Associates Pty Ltd, NSW EPA, and NSW Office of Water (NOW).

Recent Meetings

February 2014, George Mathews – Data-Centric Groundwater Modelling: Quantifying Uncertainty in Groundwater Predictions

George Mathews is a senior researcher at the Control and Signal Processing Research Group within Australia's Information and Communications Technology Research Centre of Excellence (NICTA).

The presentation will discuss the quantification of uncertainty in predictions made for groundwater systems, and NICTA's Data-Centric Groundwater Modelling research project will be introduced. Techniques currently under development to quantify predictive uncertainty will be presented, highlighting where new techniques differ from existing approaches. Preliminary results from application of these new techniques will be discussed for various scenarios.

March 2014, Dr Sarah Bennett – The Impact of Climate Change on Deep Drainage in Space and Time Including Uncertainty: A Case Study from Northern NSW

Dr Sarah Bennett, a researcher at the University of Sydney, presented a stochastic modelling approach for estimating spatial-temporal deep drainage. Deep drainage is considered the main cause of secondary salinity in Australia. The modelling method was applied to the Cox's Creek catchment in northern NSW, Australia. Climate sequences were developed based on the SRES A2 scenario for a climate period 2041-2060 from the outputs of 20 Global Climate Models. The results indicate that future deep drainage would increase significantly with average annual rainfall changes of only 6.7 % after comparison to a current climate (1982-2001). Deep drainage under dry land crops was predicted to increase significantly. For native vegetation, monthly average deep drainage was simulated to decrease due to high temperatures, resulting in high evapotranspiration. The results show the potential for climate change to increase deep drainage risk significantly. This may require associated policy responses, particularly in the agricultural sector. Further integrated research of the climate change impact on deep drainage is needed. Future climate change will result in increased extreme temperatures, which could cause crops to suffer heat stress.

Upcoming Events

April 2014, Mr Mahdi Zoorabadi – Hydraulic Conductivity of Jointed Rocks: New Estimation Approach and New Insights into Field Tests

On 8 April 2014, Dr Mahdi Zoorabadi, a researcher at the University of New South Wales, will present a new approach to estimating the hydraulic conductivity of jointed rocks.

Rock discontinuities play a significant role in the circulation of water through jointed rocks, while the geometrical characteristics of joints control the magnitude and orientation of the hydraulic conductivity tensor. This presentation will include a new approach to estimate the hydraulic conductivity of jointed rocks on the basis of the geometrical properties of rock discontinuities. This framework provides the capability to estimate the 3D tensor of hydraulic conductivity and assess the variation average hydraulic conductivity with depth. A combination of analytical methods and 3D numerical modelling (FLAC 3D) was used to interpret the results of interference tests.

May 2014, Prof Derek Eamus – Groundwater Dependent Ecosystems: Key Questions, New Methods and a Response Curve

On Wednesday 7 May, NCGRT distinguished lecturer Professor Derek Eamus will present on Groundwater dependent ecosystems: key questions, new methods and a response curve.

June 2014, Elders Night

The annual Elders Night, to be held on 10 June 2014, will see three senior members from our local groundwater profession offer their collective wisdom. The senior professionals will share memorable experiences from their careers with the audience, provide insight into lessons learnt and challenges overcome, and discuss the changes they have seen in the industry, and the future of hydrogeology and groundwater engineering. There will be opportunity for the audience to ask questions.

Australian Earth Sciences Convention 2014

The Australian Earth Sciences Convention will be hosted by the Australian Geological Society and held in Newcastle between 7 and 10 July 2014 at the Newcastle City Hall. The convention will also include the 39th Symposium on Advances in the Study of the Sydney Basin. Within the Environment stream there will be three themes of interest to hydrogeologists, including:

1. Groundwater, the water within
2. Coal Seam Gas and Groundwater
3. Oxygen and hydrogen isotopes in hydrological systems.

Fourth National Acid Sulfate Soil Conference

The Fourth National Acid Sulfate Soil Conference will be held in Perth on 20-21 May 2014.

The conference program for the Fourth National Acid Sulfate Soil Conference will offer delegates updates on the latest scientific discoveries, new and emerging technologies, overviews of regulatory and policy frameworks and information on the latest assessment techniques.

The conference includes panel sessions with industry experts, offering a live Q&A-style discussion on emerging topics of the day.

AUSTRALIAN CAPITAL TERRITORY

IAH AUSTRALIAN CAPITAL TERRITORY BRANCH

2013/2014 Committee

Chair	Lucy Lytton	(Geoscience Australia)
Vice-Chair	Scott Lawson	(Department of the Environment)
Treasurer	Anne Reisz	(Murray-Darling Basin Authority)
Secretary	Scott Cook	(Geoscience Australia)
Events Sub-Committee	Sarah Marshall	(Geoscience Australia)
	Gabby Yates	(Geoscience Australia)
	Scott Lawson	(Department of the Environment)
	Tim Ransley	(Geoscience Australia)
Website and Newsletter	Kyle Horner	(Geoscience Australia)
Membership Champion	Hashim Carey	(Geoscience Australia)
Sponsorship Coordinator	Peter Hyde	(Murray-Darling Basin Authority)

Local News

Late last year, ACT IAH members were invited by the Hydrological Society of Canberra (HSC) to participate in a visit to the recently completed enlarged Cotter Dam. The visit took place on 3 December 2013 and was followed by a BBQ at the Cotter Reserve.

The event was well attended by members of the HSC, with a small number of IAH members taking up the offer to participate.

Those in attendance were treated to a guided tour of the inner gallery, as well as an overview of the construction and commissioning of the dam by ACTEW's Ray Hezkial, (Project Manager for the Enlarged Cotter Dam Project). Ray was able to provide valuable insight from the perspective of someone who has been involved since the project's inception. The new dam wall was built about 100 m downstream of the old one which is heritage listed and remains in place beneath the new dam waters. Interestingly, the design of the dam incorporated systems to channel a certain amount of leakage through the wall into the inner gallery which is closely monitored. This leakage may increase as the concrete of the dam cools and contracts over several decades.

The new dam was built as a backup resource in response to water shortages experienced between 2000 and 2010. The upstream dams, Bendora and Corin, will be used in preference due to the lower costs associated with transferring water by gravity to the Stromlo Water Treatment Plant as opposed to pumping via the Cotter Pumping Station.



Spillway and dam wall are designed to introduce turbulence during high flows to reduce energy and thus downstream erosion.



Entrance to inner gallery



Dam outlet shut off valve with levered counterweight to prevent water hammer



V-notch weir enabling measurement of volume flow leakage from gallery

VICTORIA

IAH VICTORIA BRANCH

2013 Committee:

Chair	Alan Wade	(Aquade)
Vice-Chair	Ben Hall	(EarthEon)
Secretary	Anne Northway	(VIC EPA)
Events Committee	Ben Hall Katy Kijek	(Eartheon, EES respectively)
Communications Committee	Tim Robson Malcolm Graham Matt Currell	(Kleinfelder, Bluesphere, RMIT respectively)
IAH National Committee Liaison	Chris McAuley	(DEPI)

Local News and Recent Meetings

2013 FIELD TRIP – Lake Connewarre

The IAH VIC and AIG joint hydrogeology and geomorphology field trip ran on Saturday 23rd November, and from the feedback of attendees, a great day out was had by all! There was strong interest in the trip from hydro-geos in industry, government and universities, and the trip had an excellent turn-out of over 30 people.

The field trip toured the Lake Connewarre and Lower Barwon wetlands, southwest of Geelong. Through the day, issues discussed included the geological, geomorphological and hydrological evolution of the area, groundwater/surface water interactions, links between groundwater and ecosystems, and potential impacts of expanding new land development on the internationally protected wetlands' future hydrology.

The tour was guided by Dr Peter Dahlhaus (Federation University) and Dr Matt Currell (RMIT), who together organised the itinerary. Comprehensive field notes were provided for attendees. The day ran smoothly – with some miraculous breaks in the weather coinciding with the stop-off points.



The pub lunch at Barwon Heads Hotel was a highlight of the day – it was a great chance for all involved to share their ideas about hydrogeology and enjoy being out and about. The synergy between members of IAH and AIG was a great strength of the trip – many with different backgrounds were able to contribute their expertise and make the trip all the more enriching. A follow-up 2014 joint IAH-AIG field trip is currently in planning to build on the success of 2013's event (see below).

IAH Submission – Victoria Water Law Review

The Victorian government is undertaking a comprehensive review of Victoria's water laws, with the aim of delivering a streamlined and effective legislative framework for water management and use in Victoria. A new Water Bill Exposure Draft, which brings together the Water Act 1989 and the Water Industry Act 1994 into a single streamlined Water Act, was issued for public comment in February 2014.

IAH Victoria solicited feedback from its members on the draft document and submitted a series of comments to the Victorian Government, based on the responses. Overall, the Victorian IAH review considered the proposed changes to be positive. However, we expressed several concerns and made recommendations regarding the facilitation of Managed Aquifer Recharge, the Precautionary Principle and its potential to unnecessarily lock up water resources, Licensing of Stock and Domestic bores and Forest Plantations, Dewatering, as well as Hydrogeological Definitions.

The document submitted by IAH Victoria can be accessed through the following link: <http://www.iah.org.au/wp-content/uploads/2014/03/IAH-response-letter-to-Water-Bill-Exposure-Draft.pdf>

IAH Victoria arrives on Facebook

For a quick way to get up to speed with all the latest news from IAH Victoria, including upcoming presentations and field trips, you can now join the “IAH Victoria” group on Facebook.

Recent Meetings

Hydrogeological constraints on remediation of contaminants

Jeff Paul, Golder Associates

February 2014

Jeff’s talk described practical approaches for the assessment and cleanup of heavily contaminated sites, with a particular focus on NAPL remediation and the significance of secondary porosity. The talk was very well attended and led to lively discussions regarding hydrogeological controls on contaminant transport.

What can Australia learn from western US groundwater law and policy

Rebecca Nelson, leader – Comparative Groundwater Law and Policy Program

April 2014

Rebecca highlighted some of the key lessons Australia can learn from groundwater law and policy in the western US, where policy makers have pursued different approaches to similar groundwater sustainability challenges. In particular, Rebecca focussed on innovative approaches to managing the impacts of groundwater pumping on connected streams and dependent ecosystems, including the use of “offset” systems for managing river depletion, managed aquifer recharge and agency-NGO partnerships. Rebecca has consulted a wide range of stakeholders across the US and gave us a fascinating insight into her unique research methodology.

Upcoming Events

A brief summary of upcoming presentations and other events is given below. Updates can be accessed through the IAH Victoria website at:

<http://www.iah.org.au/2013-victorian-chapter-technical-presentations/>

2014 FIELD TRIP – Ballarat

The 2014 field trip will be held in Ballarat in November (check out some photos on the IAH Facebook page) and primarily presented by Paul Kinghorn. The field trip will most likely be held over two days on a Friday and Saturday (pending interest) and there will be the option of attending both, or one of the days. Areas likely to be visited include CGT Ballarat Gold Project, Imery’s Mine, Lal Lal Falls, Mt

Buninyong lookout, Randan wetlands, Black Hill Lookout, road cuttings, urban water retention basins, and a number of urban water supply/management features. Issues and topics will include groundwater and mining, tailings management, urban storm water management and other hydro-geo topics.

Expressions of interest for attendance will be requested soon. Stay tuned!

Presentation - ASR projects in the Melbourne area

Attila Gaal, City West Water

3 June 2014, URS offices, Southbank

Attila will be presenting on City West Water's recent ASR work in the west of Melbourne, including their extensive drilling and aquifer characterisation programs in key urban growth areas. He will also be discussing some of the main challenges involved in the commissioning of ASR systems.

Presentation – Groundwater resources in the Murray-Darling Basin

Michael Mozina, GHD

1 July 2014, GHD offices, Melbourne

The July presentation will examine various approaches to achieving sustainable use of groundwater resources in the Murray-Darling Basin, using rules and resource condition limits. Further details of this talk will be provided over the coming weeks via the IAH Victoria website and our Facebook page.

WESTERN AUSTRALIA

IAH WESTERN AUSTRALIA BRANCH

2014 Committee:

Position	Officer	Position	Officer
Chairperson - State Liaison	Grant Bolton	Presenter & Seminar Co-ordinator	Geoff Pettifer
Vice – Chairperson	Ian Brandes de Roos	Presenter & Seminar Assistant	Pauline Amez-Droz
Secretary	Mariajose Romero-Segura	Sponsorship Champion	Bradley van Blomestein
Treasurer	Peter de Broekert	Newsletter Champion	Keith Brown
Meetings Secretary	Todd Hodgkin	Newsletter Assistant	Melissa Nyga
Ministerial Liaison	Keith Brown	Web Champion	Eduardo de Sousa
Education Representative	Ryan Vogwill	Web Assistants	John Enkelmann Lyn Reid
Media Liaison	Robin Smith	State Liaison	Philip Commander
Membership Champion	Geneviève Marchand	Student Champion	Gemma Bloomfield
ECHN Champion	Rachel Wroe		

2014 Local News

It only seemed like yesterday we were welcoming in 2014 and next thing you know we're writing our first quarterly catch up for the year!

Firstly, we hope everyone has settled in and is enjoying the New Year! Secondly, as you are aware we have many great professional and social events planned including the popular IAH seminar, monthly technical meetings, and Early Career Hydrogeologists' Network (ECHN) events. Please keep an eye out on our website for details!

Website

As a reminder some links and pages on the website are experiencing issues, including the memberships page. As a result, the PayPal payment system is currently unavailable for use. Anyone wishing to join the IAH or renew an existing membership will need to make their payment directly into the IAH national branch bank account. Once payment has been received a receipt of confirmation will be issued to you.

Recent Meetings

WA chapter monthly talk: Airborne EM for Hydrogeology in the Perth Basin

19th February 2014

On Wednesday 19th of February the first monthly talk on Airborne EM for hydrogeology in the Perth Basin was presented by Nathan Tabian at the Melbourne Hotel.

IAH WA Chapter: Second Committee Meeting

10th March 2014

The WA branch committee held its second meeting of the year. Topics covered included the successful outcome of the IAH Congress held last September, planning discussions for upcoming events including the seminar, technical meetings, lectures and the ECHN, as well as administrative issues relating to the website and memberships. The next committee meeting is planned for the 5th May, 2014.

Early Career Hydrogeologists' Network (ECHN) BBQ

Dates: 20th February 2014

The ECHN Perth Branch held the Great ECHN BBQ at Matilda Bay on the 20th of February. The popular event gathered just over 30 early career hydrogeologists who socialised around a few drinks, salads and a BBQ. It was great to see many current and newly added members mingling amongst each other. The event was centred around two presentations from ECO Environmental and JSW Drilling. Both presenters gave a short speech detailing their companies objectives and scope within the hydrogeological industry. Attendees were invited to ask questions and chat casually with members from both organisations. The ECHN would like to thank everyone who attended for their support, in particular ECO Environmental and JSW Drilling for sponsoring the event.



WA chapter monthly talk: CSIRO Pawsey groundwater cooling system – from groundwater to the stars

19th March 2014

On Wednesday 19th of March the second monthly talk on the CSIRO Pawsey groundwater cooling system was presented by Mike Trefry from the CSIRO at the Melbourne Hotel.

Upcoming Events

2014 NCGRT Distinguished Lecturer Series

Groundwater-dependent ecosystems: key questions, new methods and a response curve

Wednesday 30 April 2014

5:00 socialising, 5:45 pm program start

The Melbourne Hotel, [corner of Hay and Milligan Streets](#)

The Western Australian Chapter is proud to announce the 2014 NCGRT Distinguished Lecturer Series, by Professor Derek Eamus.

Groundwater-dependent ecosystems (GDEs) are a valuable resource, having economic, biological, conservation, ecosystem services and aesthetic values. However, global-change type droughts and associated woodland and forest mortality represents a new threat to both groundwater resources and GDEs. Three challenges are faced by resource managers tasked with protecting both groundwater supplies and the ecosystems that rely on groundwater. These challenges are: where are GDEs located in a landscape? How much water does a GDEs use? What is the response function of GDEs to groundwater extraction?

This talk will examine trends in global drought and forest mortality and the application of remote sensing techniques to address the first two questions. It will also summarise the results of a recent comparative study of leaf, whole tree and canopy woodland ecophysiology along a pronounced depth-to-groundwater gradient that has generated an ecosystem-scale response function to differences in depth-to-groundwater.

Coming soon

2014 IAH Seminar

Theme: Energy and Water

Date TBA

Planning for the popular IAH seminar is underway! This year's theme is 'Energy and Water'. The main focus will be on the developing unconventional shale gas sector in WA and how it affects and is affected by groundwater. The implications of fracking on surface water systems and both shallow and deep aquifers are

currently in their infancy and will require careful groundwater management now and into the future. Aquifer management in these areas is an up-and-coming field for hydrogeologists and those working in groundwater and the unconventional gas industry. Not to be missed! Keep an eye on the IAH website for upcoming details.

2014 Monthly Technical Meetings @ the Melbourne Hotel

Date: Third Wednesday of every month

Technical meetings are free and will be held every third Wednesday of the month. Check website for details. The title of the first presentation is yet to be confirmed, but will be on the topic of geophysics. Presenters kindly give up their time and knowledge for us, so please come along and show your support!

Early Career Hydrogeologists' Network (ECHN) events

Dates: TBA

The ECHN is a network of the IAH and was established in 2011 as a networking group to support young hydrogeologists in the early years of their careers. It is a great way to create professional networks and to socialise with peers at similar stages in their careers. Join the ECHN LinkedIn group and you will be kept updated with future social and professional events, so keep an eye out for posts on our LinkedIn page! The forum is open to all - posts, questions, and ideas are welcome!

Darcy Lecture

Date: TBA

This year's lecture will be presented by Ms Dorthe Wildenschild. For more information on dates and topics check the website.

SOUTH AUSTRALIA

Local News

Fiscal drought

The general downturn in the resources industry and the tightening of Government spending has reduced the number of hydrogeology positions in all three sectors of employment – agencies, research and consultancies. Unfortunately this will impact on IAH membership numbers which are not especially large in this small State!

Farewell

Part of this downsizing includes the voluntary departure of Principal Modeller Wei Yan after a stress period of 15 years invaluable service to DEWNR (and its predecessors). Wei has made giant contributions to all aspects of groundwater modelling in SA, including salt inflows to the River Murray, the Model Warehouse, mentoring junior modellers and improving the communication between modellers and clients to ensure they get what they really need (even if they don't realize it at first!). She will be greatly missed, but has prepared her colleagues well.

National Centre for Groundwater Research and Training (NCGRT) Update

With strong support from its national university, government and industry partners, the NCGRT has grown successfully through its initial ARC funded phase and will continue its important groundwater research and training activities into the future beyond its initial funding term which ends in June 2014. NCGRT will undertake research designed to target high priority national and international research issues that are at the forefront of government, industry and community needs and concerns. The NCGRT will conduct research in a newly designed suite of major Flagship Programs. These Flagship Programs are:

1. Unconventional gas and groundwater
2. Securing water in the Murray–Darling Basin
3. Mining and mine site hydrogeology
4. Water for sustainable and economic development in northern Australia
5. Groundwater in urban water planning

The NCGRT will continue to train Honours and PhD students and to recruit postdoctoral fellows to undertake research in these important Flagship Programs and will advertise for new positions in July this year. The NCGRT industry training program and professional development courses will continue unabated into the future. The Centre is currently undertaking and developing new international projects in countries including China and Africa and will make formal announcements about these and other projects soon.

The Centre recently released Groundwater in Australia, a new report by Nikki Harrington and Peter Cook, which for the first time compiles the current state

of knowledge on groundwater in Australia, and discusses the nation's major groundwater issues.

The Ministerial launch of the Willunga Water Trail will be in late June. The Willunga Water Trail is a trail throughout Willunga Basin in SA which signposts important information about water resources and work undertaken in Willunga Basin as part of the Superscience program, a Federal Government investment in groundwater monitoring and infrastructure. Further information on these and other initiatives can be found at the NCGRT website: www.groundwater.com.au

Recent Meetings

IAH SA has held two joint meetings in recent months. With such a small membership, such joint meetings are the only way to get a worthwhile audience, IAH SA and the NCGRT have joined up to present a series of groundwater modelling forums. This series is an opportunity for Adelaide's groundwater modellers to come together and discuss a host of issues relevant to consultancies, agencies and researchers.

GCM's meet Modflow

Modellers' Forum #3

18 December 2013, Flinders City Campus

Predicting the impacts of climate change on groundwater resources is not a straightforward exercise, given the 'cascade of uncertainty' that occurs when outputs from one model are used as inputs to another which has its own uncertainties and simplifications. The desire for simplicity and 'magic' number answers may result in highly misleading outcomes from such predictions.

Four experts briefly discussed the various modelling processes and associated uncertainties before a open discussion was held about possible best practice methodologies to prevent misunderstandings and distorted predictions of groundwater impacts.

- **Russell Crosbie (CSIRO) - Climate models**
- **Graham Green (DEWNR) - Rainfall/recharge models**
- **Craig Simmons (NCGRT) - Groundwater models**
- **Hugh Middlemis (RPS) - Groundwater modelling guidelines**

The Analytic Element for Solving Groundwater Problems

Modellers' Forum #4

10 March 2014, Flinders City Campus

Professor Otto Strack

The analytic element method is a numerical method used to solve partial differential equations, which has been used worldwide over many years specifically for modelling regional flow, although it is not commonly used in Australia. There is a range of advantages and limitations to using this approach compared to MODFLOW, and this forum delved into when it can be most successfully applied.

Professor Strack focussed on the use of elementary analytic solutions and models created with the analytic element method for solving groundwater flow problems. This approach to solving groundwater problems, regardless of their complexity, is greatly enhanced in terms of both insight and efficiency by carrying out preliminary computations. Such computations may consist of relatively simple solutions amenable to implementation, either in interactive computer programs such as MATLAB®, or in dedicated analytic element computer programs such as SLAEM or MLAEM.

Groundwater resources beneath Adelaide

Joint meeting with Hydrological Society of SA

27 March 2014, Waite Campus

Steve Barnett (DEWNR) presented an overview of the hydrogeology of the metropolitan area. The thin Quaternary sand aquifers are contained within the thick Hindmarsh Clay which is up to 80m thick. These aquifers supply numerous backyard bores and can be subject to point source contamination in some areas. The deeper confined Tertiary limestone aquifers are the major suppliers of about 12 GL/yr for the beverage industry, golf courses and other industrial uses. Monitoring trends show no alarming trends. Data gaps include the risk of seawater intrusion, how leakage between aquifers occurs and the nature of groundwater flow across faults from fractured rock aquifers of the Mt Lofty Ranges.

Peter Cook (NCGRT) outlined how previous methodologies applied to the Willunga SuperScience Project could be applied to address the above data gaps identified for Adelaide area. These include the coring of aquitards, isotopic dating of groundwater along transects and closed spaced drilling across faults. Peter presented some Carbon-14 results for four transects across the Adelaide Plains which shows increasing groundwater age downgradient from the eastern faulted boundary which confirms the thesis that recharge to the sedimentary aquifers is predominately from the Ranges. The groundwater movement velocity is about 0.5 m/yr.

To check out all the above presentations, please go to;

<http://www.iah.org.au/about/south-australia/>

QUEENSLAND

The 2013 QLD IAH committee is made up of new and existing members who include those shown below.

2013 Committee:

President	Leon Leach
Vice President	Craig Flavel
Secretary	Paul Smith
Treasurer	Sharon Gray
Committee Member	Josh Larson
Committee Member	Tim Armstrong

Local News

Thanks to the 2013 Committee

After five years as IAH President of the Queensland Branch, Professor Malcolm Cox stepped down after leading the Branch through some turbulent years with support from Troy Cook, Mauricio Taulis, Paul Smith and the Committee including the tireless efforts of the post-graduate students to host each meeting. The Committee engaged and hosted a series of high calibre local presenters to support the touring national and international IAH speakers. The Committee are warmly thanked for their efforts, and Mal in particular for his outstanding contribution to building the awareness of the issues surrounding groundwater.

Recent Meetings

First 2014 speaker at IAH Queensland's new venue

After several outstanding years being hosted at the Queensland University of Technology, the new year brought a change in venue for the Queensland IAH Branch to the Dutton Park Ecoscience precinct. After Dr Josh Larsen's excellent presentation on recharge bid farewell to QUT, the first lecture at the venue was an enlightening presentation by Professor Derek Eamus on groundwater-dependent ecosystems. Drawing on his experience in NSW, Queensland and around the nation, he presented the complex relationship within ecosystems and the uncertainties that can be expected during investigations.

2014 McEllhiney Lecture - Groundwater Spreadsheets: Efficient and Practical Resource for Solving Simple and Complex Flow, Pollution, and Environmental Problems

Carlos E. Molano, PE
12 May 2014

[Carlos Molano](#) presented an informative and entertaining 'hands on' presentation for the 2014 McEllhiney Lecture. This comprised a demonstration of the application of groundwater flow equations and the sensitivity of head or particle flow to a change in hydraulic parameters. These classical approaches were very well received by the Queensland membership.

TASMANIA

No update available in this edition.

NORTHERN TERRITORY

No update available in this edition.

NATIONAL CONFERENCES AND EVENTS

Australian Earth Sciences Convention 2014

<http://www.aesc2014.gsa.org.au/>

The Geological Society of Australia invites you to participate in the Australian Earth Sciences Convention 2014 in Newcastle.

AESC 2014 will be held from **7-10 July 2014** in Newcastle, a vibrant port city that is characterised by its working harbour, beautiful surf beaches and proximity to many of Australia's most prestigious wineries. It is the gateway to the Hunter Valley – heart of the Sydney Basin coalfields, centre of power generation for New South Wales, and home of the NSW Institute for Frontier Geoscience, a joint initiative of the University of Newcastle and the NSW Department of Trade and Investment. Combined with the city's focus on energy efficiency via the Federal Government's Smart Grid, Smart City initiative and the CSIRO Energy Centre, Newcastle is an ideal site for our convention – ***Sustainable Australia***.

The convention will be based around the themes of energy, basin geology, geodynamics, resources the environment, the geological record of life, and the role of the Earth Sciences in the community. Dedicated symposia include the 39th Symposium on the Advances in the Study of the Sydney Basin and Comparisons & Contrasts in Circum-Pacific Orogens.

The IAH is supporting this event, and the scientific program includes groundwater-related topics under the Environment and Energy themes. IAH members are strongly encouraged to submit abstracts.

IAH members are eligible for a discount on registration fees. Further details can be found at the conference website above.

Bureau of Meteorology Groundwater Products

The Bureau of Meteorology produces several national groundwater products, such as the National Groundwater Information System and the Groundwater Dependent Ecosystems Atlas, which are freely available from the [Bureau's website](#).

The Bureau is setting up a groundwater mailing list that will be used to send out occasional emails when new and updated groundwater products are released.

You can register to receive these regular updates by completing this [subscription form](#). Once you have subscribed you can [manage your subscription](#) or [unsubscribe](#) at any time. Please refer to the Bureau's [Privacy Statement](#) on how personal information is managed.



Looking for a sustainable, low-cost solution to your contaminated groundwater problem? Bioremediation may be the solution!

WEBINAR: Demystifying Bioremediation

Join us on Wednesday June 18, 2014 for a free webinar introducing the science of bioremediation, when it is an appropriate technology, common pitfalls, and available tools in Australia.

June 18, 2014
11:00 am-12:00 pm AEST

To register please email
Lange Jorstad
ljorstad@geosyntec.com

WHAT IS BIOREMEDIATION?

Bioremediation is a low-cost, sustainable remediation approach that utilises bacteria to destroy contamination *in situ* to innocuous end products. Biodegradation, a naturally occurring process, is enhanced during bioremediation through targeted engineering design. Bioremediation may be applied alone or together with other technologies for complex sites.

WHO IS GEOSYNTEC?

We are scientists, engineers and innovators. We are known for our technology leadership, broad experience, and exceptional client service. We employ leading edge science and sustainability principles in contaminated land investigation and remediation design and implementation. We design for constructability, operability, and sustainability. Our applied research and "first-to-field" deployment of emerging technologies provides us with a differentiated set of tools to use in creating innovative, high-value solutions to challenges involving the environment, natural resources, and geotechnical infrastructure.

WHO IS SIREM?

SIREM provides the tools environmental professionals need to optimise remediation of chlorinated solvents and other recalcitrant chemicals. As an industry leader, SIREM provides a unique range of products and testing services, combined with unparalleled technical support, that save our clients' money, increase remediation effectiveness and provide peace of mind during field implementation.

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Geosyntec is the home for innovation and entrepreneurship for a reason -- **our people**. We are the right career choice for individuals who are passionate about their chosen profession, engaged with their clients and colleagues, and are confidently building a rewarding future.



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 or 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