



NEWS AND INFORMATION

International Association of Hydrogeologists

The international groundwater organisation

Since 1956 a world-wide forum on the management of groundwater
for the benefit of mankind and the environment

New Look for the Annual Report

In the same issue of the Hydrogeology Journal as this newsletter, you will be receiving the IAH annual summary report on the Association's activities in 2008. As well as describing the work and management of IAH, we have tried to highlight our global coverage and international strengths, and we hope you will find this of interest.



The map in the report clearly shows the global extent of our membership. It also shows there remain some important countries where groundwater is a key component of national water resources, where we have members but which should really have an IAH national group. In some of these, we are exploring openings for the formation of IAH groups or for closer links with existing national associations. We all need to work together to encourage the development of new national chapters, and the Secretariat is able to provide guidance on the formalities of setting up a chapter and support and encouragement to members who would like to embark on this. We hope to hear from you.

Turning briefly to financial issues, you will see that

the overall operating surplus for the Association in 2008 was £15,662 and the closing balance at the end of the year was £257,446, although we had set a deficit budget for 2008. Moreover, despite the Executive again setting a rather cautious deficit budget for 2009 to reflect the uncertain financial times, our membership income is holding up well. As a charitable professional association, we need to be prudent with our members' money and maintain the security of having some reserves, but we should not let our funds build up too much.

In view of this, and to increase the capacity for IAH to meet its educational and charitable objectives, provision has been made for a Sponsored Membership Fund to strengthen this component of our activities and an Educational and Development Fund to support new activities in the fields of educational, scientific, travel and study grants. We are, therefore, able to support significantly more sponsored members to augment the existing efforts of individuals and national chapters. We will also be planning how to use the educational fund to best effect.

Your suggestions with respect to the new funds are welcomed, as is general feedback regarding the new style of the report.

John Chilton and Kellie Nicholson

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To join IAH please visit the web site and either join on-line or download the membership application form

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President's Column

Good news about groundwater?

Groundwater awareness is on the rise, although much is still to be done. The important role of groundwater in the water cycle and as a buffer against the impacts of climatic change is becoming more widely recognised both in science and at a political level. However, at the same time there are many bad news stories about groundwater in the media which should be of great concern to the community of hydrogeologists. The growing awareness and public exposure of groundwater issues certainly brings great opportunities for hydrogeologists worldwide, but too many negative headlines may become detrimental to our profession and we have to make sure that groundwater stories are told in a balanced way. We must send out more coherent and convincing news about groundwater, and we must explain our knowledge in a way that can be readily used in political and environmental planning processes. The discussion about climate change could offer new opportunities for telling the good stories about groundwater.

In recent years groundwater was all too often perceived by public opinion and in the media as a problem, since outcries about water shortages and expanding desertification and salinisation, falling water levels, as well as toxic substances contaminating groundwater are all stories which sell. In reality and in most cases, groundwater presents a potential solution to acute or persistent water shortages. But where are the good news stories about well-managed groundwater schemes that supply millions of people safely with high quality, clean drinking water? These schemes have clearly demonstrated, sometimes for decades or centuries, that they present very economical, secure, reliable and sustainable solutions for water supply, since they are properly managed. However difficult it is to spread the good news of these groundwater based solutions, we must try!

An international non-governmental organisation like IAH should, first and foremost, make its collective groundwater wisdom available for all sorts of applications in science, policies, society and for development. This wisdom encompasses both data and expert knowledge. There will only be demand for our wisdom if we make it readily available for use. Some progress is being made by including groundwater resources concepts and groundwater management in Integrated Water Resource Management (IWRM) strategies. This begins to address groundwater more adequately in water

management practices. To secure the groundwater resource base in the long run and to protect groundwater resources in quantity and quality for all sorts of societal and environmental benefits, we must get hold of better data and information about groundwater systems. We should also take land management and socio-economic aspects fully into consideration.

What can IAH - indeed what can we all do - to provide groundwater data, information and expertise in such a way that it is much better used in public discussion? I think it would strengthen the role of IAH as the largest and most important international NGO for groundwater if we could provide really consolidated data and information about hydrogeology. We could then better respond to the types of questions that aware and interested people are asking:

- How much groundwater is available (globally/on each continent/in regions/in countries)?
- How much groundwater is renewable and can be used sustainably in the long run?
- How much groundwater is in stock? Where are the biggest groundwater stores?
- Which groundwater resources must be protected from degradation? Where and how?
- Where are the hot spots from the point of view of groundwater, such as large drawdowns or groundwater mining?
- How much groundwater is used (globally/on continents)? For which sectors?
- How much groundwater is supporting river runoff or wetlands? Where?
- Where is groundwater dangerous/not fit for consumption?
- What will be the effects of climate change on groundwater?
- How can groundwater help in climate change adaptation?

No doubt there are many more questions which are asked, and reliable answers expected. My hope is that we face these challenging questions and seize any opportunities at all levels to spread our groundwater news. We can make a concerted effort to promote groundwater solutions if we stand together and add a common focus to our wisdom. I hope we will make progress in this respect at our forthcoming meetings in Hyderabad.

Willi Struckmeier

DHI-WASY Sign up as First IAH Corporate Sponsor

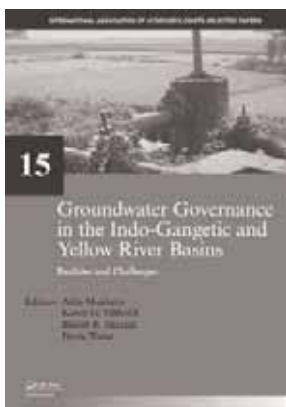
We are pleased to report that DHI-WASY has just signed up as the Association's first corporate sponsor. DHI-WASY as a member of the DHI group (www.dhigroup.com) provides software, user-specific IT solutions and consulting services in the fields of water management, groundwater simulation, hydrology, and GIS. While mostly known as the developers of the state-of-the-art groundwater simulation system FEFLOW, DHI-WASY's expertise also covers related disciplines such as coupled groundwater-surface water modelling, geothermal

energy, underground gas storage, mine water, and industrial porous media. For FEFLOW users, DHI-WASY offers a broad range of services, including customized and open-enrollment training, user support, project assistance and review. The company has been an IAH corporate member since 1999. We hope this is the first of many.



John Chilton

Latest IAH Publication - 60% Discount to IAH Members



Groundwater Governance in the Indo-Gangetic and Yellow River Basins: Realities and Challenges

Aditi Mukherji, Karen G. Villholth, Bharat R. Sharma and Jinxia Wang

IAH - Selected Papers on Hydrogeology no 15

June 2009: 246x174: 328 pp: HB: ISBN: 978-0-415-46580-9

Price: GBP 59.00//US\$ 109.95

One of the key features of agricultural development in the last five decades has been the growth of intensive groundwater use in the Indo-Gangetic Basin (Pakistan, India, Nepal and Bangladesh) and in the Yellow River Basin (China). Groundwater irrigates almost 60% of the net irrigated area in South Asia and 70% in the north China plains. Groundwater use for agriculture is still increasing. Despite the growing significance of groundwater to agricultural growth, food security and rural livelihoods globally, and at the same time significant signs of limitations and constraints for further use, knowledge of this subject has remained limited. The subject includes the wider issues of socioeconomic impacts, political economy, groundwater institutions, access to other resources like energy and land, approaches to resource governance and management and integrating evidence-based science into management decisions.

This book addresses these information shortfalls and provides a consolidated and cross-disciplinary source of information and documentation of realities and challenges of contemporary agricultural groundwater use and management in poverty-prone areas of Asia. It draws on primary data collected in the course of an innovative, coordinated and inter-disciplinary fieldwork programme, covering those regions in Asia that significantly depend on groundwater for agricultural livelihoods. This work is essential reading for hydrogeologists, socio-economists, agro-economists and water managers working in poor countries. Donors and implementers, both government and NGO, will also learn from the experiences described in this book.

IAH books are published for IAH by Taylor and Francis pub.NL@tandf.co.uk

IAH members can order books at a discount by using the form at <http://www.iah.org/iahbalkema.htm>

The series editor for IAH is Nick Robins nsro@bgs.ac.uk

Meeting Report

Groundwater Recharge Assessment: are we any closer to an answer?

A two day recharge meeting organised by the Hydrogeology Group of the Geological Society of London took place in May, hosted by the University of East Anglia. The conveners Kevin Hiscock and Daren Gooddy report that it was attended by over 90 delegates representing five, mainly European countries.

The aim was to review recent and ongoing research and to ask whether we are any closer to achieving more accurate estimates of groundwater recharge since the publication of Rushton & Ward's paper 30 years ago (*Journal of Hydrology*, 1979, 41, 345-361) that provided a critique of the Penman-Grindley method of groundwater recharge calculation. Although the basic conceptualisation of groundwater recharge processes, starting with a simple soil moisture balance approach, has not changed greatly, advances have been made in our understanding of detailed flow and solute transport mechanisms in the unsaturated zone and overlying superficial deposits of both intergranular and fissured rocks.

The importance of soil, land use and vegetation

The meeting opened with a session on the effects of soil and land use properties on groundwater recharge with a presentation by the UK Meteorological Office of its land surface models based on the energy-water cycle. A Darcian flow model for the coupled soil layer simulates free drainage and this determines phase changes in the soil's thermal properties. The soil moisture is also governed by a plant-soil model that simulates plant physics in which roots affect soil moisture, and leaf stomata allow atmospheric exchange of water vapour. These models are applied from global to national scales and prove the sensitivity of soil moisture-precipitation coupling, especially in arid continental areas. A presentation by Mott MacDonald Ltd highlighted the need for soil moisture models to take account of the upward flux of capillary water, especially in late summer when upflow, typically in fine-grained media, can offset the build-up of a soil moisture deficit. Other processes affecting soil water infiltration stem from changing farming practices in the last 50 years. Research by Cranfield University has shown that the creation of finer seed beds, increased stocking densities and the employment of contractors working on fixed dates, regardless of soil conditions, has led to soil capping, plough pans and puddling, all of which change the physical nature of the soil, especially on clay soils, leading to a decrease in groundwater recharge.

Improvements in soil condition, for example chisel ploughing, could potentially increase recharge. Another illustration of how recharge can be affected by land management is the increasing demand for bioenergy crops such as the tall grass *Miscanthus* and short-rotation coppice (SRC) willow. Field trials by the UK Centre for Ecology and Hydrology has found that deep-rooted *Miscanthus*, in particular, leads to less potential recharge and this could be a problem for water resources if bioenergy crops are grown intensively in an area.

Investigation and modelling techniques

The following sessions provided a review of investigation techniques and modelling applications in a number of different geological settings. Research at the University of East Anglia and Entec UK Ltd and University College London demonstrated the application of noble gases and stable isotopes in tracing water table fluctuations and the mixing of water in the unsaturated zone of fractured, karstic aquifers. In the latter case, and from measurement of the reducing amplitude of the deuterium signature in soil water, cave drip water and groundwater, calculated mean groundwater residence times of the order of hundreds of days can be expected, depending on the thickness of the karst unsaturated zone. The rapid movement of recharge through fissured, namely Chalk limestone in Britain was the subject of several presentations and provided insight into observed increases in groundwater-fed river flows as a result of high intensity, short-lived rainfall events. Research at Imperial College London has shown, based on data for two notable rainfall events in May and July 2007, that fissure flow is more likely to occur if the surface few tens of centimetres of the Chalk have a high antecedent moisture content.

Recharge through fissures in clay-rich glacial till in central England has been investigated by researchers at the University of Birmingham. Interestingly, water table fluctuations in the till can be modelled without the need for matrix water movement, except in the summer when water movement, probably induced by evaporative loss from vegetation, is invoked to occur. The difficulty in modelling this example prompts the need for further assessment of the relationship between actual and potential evapotranspiration leading to more robust assessment of land surface-atmospheric water exchange. Further evidence for recharge movement through fissures in lodgement till was presented by the British Geological Survey from

the east of England in which chemical tracers such as nitrate and chlorofluorocarbons proved modern water in fissured till samples and also in the Chalk aquifer below weathered till deposits, with an estimated recharge rate of 15-20 mm per annum. The theme of bypass flow was also addressed by research at the University of Sheffield but in the context of urban hydrogeology with the demonstration that recharge post-urbanisation is often the same or increased as a result of the numerous pathways for storm water runoff, the problem of leaking water mains and sewers, and the large quantities of water imported into urban areas. The urban paved and concreted surface should, therefore, be viewed as being sealed but not impermeable.

Recharge in other environments

The next sessions turned attention to recharge processes in semi-arid, arid and humid environments with a demonstration by the University of Oxford of the chloride budget method for unravelling long-term recharge histories of between 10 and 1000 years from chloride profiles measured in unsaturated sand deposits. Data from the Badain Jaran desert in north-west China proved a mean recharge rate of 1.33 mm per annum with the record correlated to the intensity of the monsoon. In contrast to this study, research at University College London is investigating recharge processes in the humid tropics in Uganda where slow chemical weathering has led to the development of the crystalline saprolite-saprock aquifer. Calculations based on sparsely available data indicate recharge rates of 50-80 mm per annum but with substantial inter-annual variability, such that it is important to report both the mean and standard deviation of groundwater recharge in this type of environment. Similarly, soil moisture balance models relate better to the number of heavy rainfall events than to a simple approach based on mean annual rainfall, and are also highly dependent on the often poorly constrained values for potential evapotranspiration. The groundwater level observation network in areas such as Uganda is improving, although information on which layer is being monitored is not always available and so it is advisable to use an aggregated water table response as an indicator of groundwater recharge.

And under other climatic scenarios

The final presentations addressed the role of climate change in affecting groundwater recharge. Research

at the University of East Anglia based on the application of UK climate impact scenario data and applied to a simple soil moisture budget model suggests a loss of 20-40% of potential recharge in the east and south of England by the end of this century under a high greenhouse gas emissions scenario. Such processes will, therefore, profoundly influence how we manage groundwater resources in adapting to climate change. However, the effects of climate change on groundwater recharge must be considered carefully with respect to other influences. For example, research at the British Geological Survey based on groundwater modelling of a chalk catchment in southern England and driven by a recharge model perturbed by climate change output from 13 different global circulation models demonstrated that 10 of these scenarios showed a decrease in recharge of up to 10%, with significant reductions in April and October. However, part of the variation in recharge can be explained by differences in land use: for example, trees transpire more than short-rooted grass over thin chalk soils. Hence, soil and vegetation characteristics must be carefully considered when analysing the uncertainties surrounding climate change predictions on groundwater recharge.

Overall, in referring to the question posed at the start of the meeting as to whether we are any closer to an answer in our assessment of groundwater recharge, then the answer is 'yes' in the relative sense of improved methods and models for the investigation of recharge processes in different hydrogeological situations at various scales, but 'no' in absolute terms given existing uncertainties, for example land surface-atmospheric water exchange, land use changes and the future effects of climate change. So, even though we have learnt much in the past 30 years, there is still much to do in quantifying groundwater recharge assessment, ultimately enabling us to manage global groundwater resources.

For further information, meeting abstracts can be found at:
<http://www.geolsoc.org.uk/gsl/groups/specialist/hydro/page4938.html>

*Kevin Hiscock (IAH)
and Daren Goody (Geol Soc)*

2009 Meinzer Award Goes to Mike Edmunds

Professor Mike Edmunds, long a member of IAH, has been nominated for this year's Meinzer Award, the highest award of the Hydrogeology Division of the Geological Society of America. The award's namesake, Oscar Edward Meinzer (1876-1948), has been called the "father of modern groundwater hydrology". He served as Chief of the Ground Water Division of the U.S. Geological Survey from 1912 to 1946.



The Meinzer Award recognizes the author or authors of a publication or body of publications that have significantly advanced the science of hydrogeology or a closely related field. Mike is the first British and the second European person to receive this (Ghislain de Marsily was the other). The Award will be made at the GSA meeting in Portland, Oregon in October this year, coinciding with the 50th Anniversary of the Hydrogeology Division of GSA.

Following degrees in Geology and Geochemistry from Liverpool University, Mike joined the British Geological Survey in 1966 and for over 35 years carried out basic research in hydrogeochemical processes, trace elements in groundwater, isotope hydrology, palaeohydrology, the origin of mineral and thermal waters, groundwater acidification, and of groundwater recharge in arid and semi-arid regions. This work helped to establish hydrogeochemistry as an academic research discipline with wide application in water resources assessment, protection and management. He has investigated many of the classic aquifers and large sedimentary basins in the UK, Europe and globally to define controls on water quality evolution, and especially the origin and migration of palaeowaters. Mike investigated recharge rates in the unsaturated zones of arid and semi-arid regions including Cyprus, Tunisia, Chad, Egypt, and Libya. He was the first to resolve recharge histories in semi-arid regions over the past 2000 years using isotopic profiling and chloride mass balance, with application to groundwater resources assessment and to climate change. The results have had profound implications for the recognition of the limits of renewable groundwater in semi-arid regions and are well known to the broader hydrogeological community. Mike retired from his career in the Groundwater Programme of the British Geological Survey in 2001 and joined the School of Geography and the Environment at Oxford University as Visiting

Professor of Hydrogeology. There he helped establish the Oxford Centre for Water Research, became its Research Director and set up a new MSc course in Water Science, Policy and Management. Here he promotes water issues and develops links between science and policy and his current research focuses on groundwater quality and arid zone hydrogeology, especially in China. IAH warmly congratulates Mike on receiving this award.

John Chilton

IAH Swiss National Chapter co-convenes conference on groundwater and floods

On 8-9 May the Société Suisse d'Hydrogéologie (SSH) and the Swiss IAH Chapter together organised a conference on high groundwater conditions and the role that groundwater plays in flooding events in different hydrological contexts. Over one hundred scientists, engineers and decision makers took part, both from the hydrogeology and hydrology families.

The subject is of particular interest because hydrogeologists have suspected for a long time that many floods were not just epi-phenomena (rainfall-surface runoff), but rather the result of a superposition of various factors that come from the entire water cycle and from the imprint they leave in the soils and in the subsurface environment. These factors include the water content in the soils and in the unsaturated zone, pressure in the unsaturated zone, and groundwater levels in the period preceding the very heavy rainfall event which triggers the flooding.

Groundwater may indeed play a major role in floods occurring in valleys (river floods), but also on plateau areas, as demonstrated in the basin of the Somme River in France in 2001. The conference encouraged learning from past experience, high water/flood forecasting and prevention, and protection against floods. Several examples from Switzerland, Germany and France were discussed, including the Rhône, the Elbe and the Somme valleys.

The conference was followed by the annual meeting of the SSH and of the Swiss IAH Chapter in which a discussion about IAH activity took place. A summary of this discussion, which was facilitated by Didier Pennequin the IAH VP for Europe will be posted on the SSH web site (www.hydrogeo.ch).

*Didier Pennequin (IAH)
and Ronald Kozel (SSH)*

Sad News from our Mexican Colleagues

The community of Mexican hydrogeologists regrets to report the sad news of the death of Dr Adolfo Chávez Rodríguez, a well-known colleague whose contributions to groundwater science extended beyond the borders of his State and of Mexico. Adolfo was an academic and consultant hydrogeologist, with degrees from the National Autonomous University of Mexico (UNAM) in 1980 and the University of Arizona in 1987. He was a researcher at the Institute of Geophysics at UNAM, and from 1987 was professor of the masters' programme in underground hydrology in the Faculty of Engineering of the Autonomous University of Chihuahua.

Professionally, he collaborated with and advised many government institutions and mining companies in his capacity as university professor and as a consultant in the private company Estudios y Proyectos en Agua Subterránea S.A. Since 1998 Adolfo supervised for the State of Guanajuato the construction of hydrodynamic models for their fifteen main aquifers. With more than 30 years experience in earth sciences, Adolfo Chavez published several book chapters and scientific articles in international journals.

From his positions of academic and consultant he widely promoted the use of computer models in Mexico for the management of groundwater resources. His always critical position and disposition to have a discussion on the theoretical and applied aspects of groundwater modeling leave a deep track in the hydrogeological community of Mexico. Recently he had the opportunity to collaborate in a World Bank project in Guanajuato where once again he demonstrated his human qualities, chivalry and professional dedication. *Oscar Escobero*

[... having collaborated in my BGS life with Adolfo and Oscar and others in the mid 1990s on the management of wastewater reuse, I can testify to his modeling abilities and critical thinking, which are indeed a sad loss to the profession in Mexico....JC]

József Tóth's Time Capsule Interview now online

Craig Simmons and Philippe Renard report that the latest Time Capsule video to go online is that of pioneering father of hydrogeology, József Tóth. His biggest breakthrough is a mathematical formula used to explain how groundwater moves under the influence of gravity. It is used to predict the location of drinking water, the migration of hydrocarbons, the generation of various ore deposits, and to understand the distribution of vegetation and the origin of soil salinity.

The video was made in October 2007 and in it József talks with Ben Rostron about his major contributions to hydrogeology, his career as a professor and teacher, and the way in which he came to make his breakthrough in the early 1960's concerning gravity-driven groundwater flow. He discusses the theoretical developments, its practical applications and the impact it has had in the hydrogeology community. József talks about his PhD and early career, and being the recipient of the first O.E. Meinzer Award by the Geological Society of America and the development of early hydrogeology courses at University of Alberta. József reflects on his successful career spanning some 50 years and offers some important thoughts on the future of hydrogeology.

Please check out the latest video at <http://timecapsule.ecodev.ch/>. Other tapes online now include those of Jacob Bear, Paul Witherspoon and C.V. Theis. If you have any suggestions for tapes that could be made, or would like to be involved with and support the Time Capsule project in anyway, please contact the founders and coordinators, Craig Simmons (craig.simmons@flinders.edu.au) or Philippe Renard (Philippe.Renard@unine.ch).

Craig Simmons and Philippe Renard

Annual General Meeting 2009

Notice is given that the 2009 Annual Meeting of the International Association of Hydrogeologists will be held at the National Geophysical Research Institute, Hyderabad, India on Wednesday 9th September at 16.00 hours. All members of the Association who have fully paid their subscriptions for the current year are entitled to attend and participate in the proceedings. Guests are welcome.



Conference Listing

Summary details of conferences with e-mail or web addresses are given below. For a fuller list of conferences and more details, including links to web sites visit www.iah.org/confs/

We are happy to accept information concerning upcoming groundwater events from organisers - email knicholson@iah.org with full details.

2009

7-12 Sep. Hyderabad, INDIA. Sustainable development and management of groundwater resources of hard rock terrains. Joint IAH/AHS International Convention combining 37th IAH Congress and 8th IAHS Scientific Assembly. Email: iahs@ensmp.fr or w.struckmeier@bgr.de Web: <http://www.appliedhydrology.org/iahs/>

14-18 Sep. Berlin, GERMANY. 2nd International FEFLOW User Conference (FEFLOW 2009). Email: feflow2009@dhi-wasy.de Web: <http://feflow2009.dhi-wasy.de>

15-18 Sep. Sao Paulo, BRAZIL. 1st International Congress on Subsurface Environment. Organised by Brazilian Groundwater Association. Web: <http://www.abas.org/cimas>

20-25 Sep. Brisbane, AUSTRALIA. Reuse 09. 7th IWA World Congress on Water Reclamation and Reuse. Web: <http://www.reuse09.org/>

20-23 Sep. Wuhan, CHINA. ModelCARE2009: Managing Groundwater and the Environment. 7th International Conference on Calibration and Reliability in Groundwater Modeling. Organised by International Commission for Groundwater (ICGW) of the International Association of Hydrological Sciences (IAHS). Yiqun Gan and Xinxin Guo. Email: modelcare2009@gmail.com Web: <http://www.modelcare2009.org/>

23-26 Sep. Plitvice Lakes, CROATIA. Sustainability of the Karst Environment - Dinaric Karst and Other Karst Regions. Organised by Centre for Karst. Email: jadranka.pejnovic@gs.t-com.hr

23-26 Sep. Calatayud, SPAIN. Agua y Desarrollo Sostenible. XIII Congreso de la Asociación Española de Teledetección. Web: <http://www.congreso2009aet.es>

18-21 Oct. Portland, USA. From Volcanoes to Vineyards: Living with Dynamic Landscape. GSA Annual Meeting. Web: <http://www.geosociety.org/meetings/2009/>

25-28 Oct. Beijing, CHINA. First World Young Earth Scientists (YES) Congress 2009. Web: <http://www.yescongress2009.org/>

26-31 Oct. Dhaka, BANGLADESH. Geoscience for Global Development. Organised by Association of Geoscientists for International Development (AGID), Bangladesh Geological Society (BGS), Geological Survey of Bangladesh (GSB), International Geoscience Education Organization (IGEO). Email: afia@agni.com or gsb@agni.com

15-18 Nov. Somerset West, SOUTH AFRICA. Groundwater 2009 Conference. Organised by Geological Society of South Africa. Web: <http://www.kruger-associates.com/groundwaterconference2009/home/default.asp>

2010

12-14 Jan. Tampa, USA. North American Environmental Field Conference and Exposition. Organised by Nielsen Environmental Field School. Email: info@envirofieldschool.com Web: <http://www.envirofieldconference.com>

15-17 Mar. Lille, FRANCE. Integrated River Basin Management under the Water Framework Directive (WFD) conference. Web: <http://www.WFDLille2010.org>

22-25 Mar. Muscat, OMAN. Water Sustainability in the GCC Countries. WSTA 9th Gulf Water Conference. Organised by Water Sciences and Technology Association. Web: <http://www.wstagcc.org>

24-26 Mar. Agadir, MOROCCO. Integrated Water Resources Management and Challenges of the Sustainable Development. Organised by IAH Moroccan Chapter. Email: lbouchaou@yahoo.fr Web: <http://www.fsa.ac.ma/gire3d>

27-30 Apr. Malaga, SPAIN. IV International Symposium on Karst. Organised by Centre of Hydrogeology, University of Malaga. Email: aimarin@uma.es Web: <http://www.cehiuma.uma.es>

17-21 May. Tainan, TAIWAN. The Third International Congresses (As 2010) "Arsenic in the Environment". Arsenic in Geosphere and Human Diseases. Organised by Jochen Bundschuh and others. Web: <http://www.As2010tainan.com.tw>

25-29 May. Ohrid, REPUBLIC OF MACEDONIA. Conference on Water Observation and Information System for decision Support. BALWOIS 2010. Email: secretariat@balwois.com Web: <http://www.balwois.com/2010>

12-17 Sep. Krakow, POLAND. Groundwater Quality Sustainability. 38th IAH Congress. Organised by IAH Poland NC. Email: office@iah2010.org Web: <http://www.iah2010.org>