



# 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

### All Change at Zacatecas

The delightful Mexican city of Zacatecas, where colonial splendour, originally financed by silver mining, is now well preserved and deserving of its UNESCO heritage status, was the venue of the XXXIII IAH Congress held jointly with ALHSUD (Asociación Latinoamericana de Hidrología Subterránea para el Desarrollo).

The Congress also marked the end of the term for the IAH Council elected in South Africa and a complete change in the officers of the Association. The new top team are Stephen Foster (UK), the new President, Miran Veselic (Slovenia) - Secretary General and Jack Sharp (USA) - Treasurer.

Retiring from Council are Andrew Skinner (UK), Secretary General since 1989, Christine Colvin (South Africa), Shrikant Limaye (India) and Noel Merrick (Australia) each of whom served for one term.

Also joining the Council are Segun Adelana (Nigeria but currently on a sabbatical in South Africa), Shivendra Nath Rai (India), Ian Acworth (Australia) and Jiri Kransy (Czech Republic). Jiri takes on the role of Scientific Programme Member of Council with particular responsibility for coordinating the scientific work done by the Association through its Commissions. Further details of the election results are on page 8.



*The three senior officers of the new Council on the conference field trip. From left to right Miran Veselic (Slovenia), Jack Sharp (USA) and Stephen Foster (UK)*

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**Congratulations to Joel Carrillo and the Mexican Congress team** for putting together an excellent meeting in Zacatecas, a city few had heard of prior to its selection for the IAH XXXIII Congress, but which the attendees very much enjoyed the chance to visit. The Congress, held jointly with ALHSUD, attracted nearly 400 attendees with high standard papers on many aspects of the congress theme "Understanding Groundwater Flow - from local to regional scale".

A CD-Rom of abstracts of papers is available and there will be follow-up publication of key papers in the IAH book series. The Congress included a good social programme and a number of other events including the IAH elections, an IAH Council meeting and a special roundtable in preparation for the 4th World Water Forum, all of which are reported in this issue. Many more pictures can be found at:

<http://indy2.igeograf.unam.mx/aih/zac04/index.html>



**Top left:** Alan MacDonald, Joel Carrillo, Shrikant Limaye, Han Zaisheng, Christine Colvin and Peter Dillon at the Council meeting.

**Top right:** Sandra Martinez, a key figure of the organising secretariat presenting a congress memento to retiring Secretary General, Andrew Skinner.

**Left:** Some of the newly elected Council after their first meeting, (left to right) Ian Acworth, Stephen Foster, Emilio Custodio, Florian Zamfirescu, Jack Sharp, Miran Veselic, Willi Struckmeier, Segun Adelana. Missing from the picture Ken Howard, Jiri Krasny, Emilia Bocanegra, Shivendra Nath Rai and Ahmed Khatar.

**Bottom left:** Juan Grima issuing an invitation to the IAH Spanish Group meeting in Alicante in October 2005.

**Bottom right:** Following the General Assembly the congress participants joined a Callejoneada, a procession led by a band through the alleyways of Zacatecas, interspersed with drinking of tequila and dancing in the squares.



# Vulnerability and Risk Protection in Carbonate (Karst) Aquifers - A report from the European COST 620 programme by Francios Zwahlen and Nico

Goldscheider (Switzerland)

Carbonate terrains, most of which are karstified, comprise one third of the land surface of Europe. Karst aquifers hold important groundwater resources, supplying up to 50% of drinking water in some European countries. The European COST Action 620 (Cooperation in Science and Technology), including delegates from 16 countries, worked from 1997 to 2002 to develop a pan-European approach to vulnerability, hazard and risk mapping, which takes into consideration the particular characteristics of carbonate (karst) aquifers, but which can, how-ever, also be used for other aquifer types.

The approach comprises methods of intrinsic and specific vulnerability mapping, hazard and risk mapping and validation. The approach can be used for both groundwater resource and source protection. It is based on an origin-pathway-target model. The origin is the point of release of a potential contaminant, mostly the land surface. The target may be the groundwater table (resource protection) or a spring/well (source protection). The pathway comprises all compartments between the origin and the target. If a contamination occurs somewhere inside a catchment, there are three questions that a water user will ask: When will the contamination reach the target (source or resource), at which concentration, and how long will the target be contaminated?

The intrinsic vulnerability of groundwater to contamination takes into account the hydro-geological properties of the system but is, by definition, independent of the nature of specific contaminants. The COST 620 approach to intrinsic vulnerability mapping uses four factors: O - overlying layers; C - concentration of flow; P - precipitation regime; and K - karst network development. The O factor describes the protectiveness of the layers overlying groundwater (topsoil, subsoil, non karst rock, unsaturated karst rock) dependent on their thickness and hydraulic properties. The C factor takes into account that those layers may be bypassed by surface or subsurface flow that enters the karst aquifer at another point, i.e. via a swallow hole (point recharge). The P factor considers the total annual precipitation and the intensity of precipitation. High intensities will accelerate contaminant transport and thus increase vulnerability. The K factor describes the karstification of the aquifer; there is all kinds of transition between only fissured aquifers and extremely developed conduit systems. Specific vulnerability mapping additionally takes into account the characteristics of the different

contaminants or groups of contaminants and their interaction with the hydrogeological systems. Three main groups of contaminants were identified: organics, inorganics and particles. The most relevant processes of contaminant attenuation are: absorption, filtration, bio-degradation, reduction, precipitation, volatilisation, decay and die off.

Hazards are defined as potential sources of groundwater contamination resulting from human activities. There are three types of hazards: point hazards (e.g. septic tanks, farm houses), line hazards (roads, pipelines) and diffuse hazards (agriculture). Hazards are classified on the basis of three criteria: type and toxicity of the contaminant (quality); potential contaminant load (quantity); likelihood of contamination (accidental or permanent).

The risk is generally defined as the probability of an event, multiplied by the resulting potential damage. The risk of groundwater contamination depends the following aspects: the hazard, the intrinsic or specific vulnerability of the groundwater resource or source, and, as an optional third aspect, the economic or ecologic value of the groundwater. A risk map can be used as a tool for land-use planning. COST 620 proposes an approach to risk assessment, risk mapping and risk management. Risk maps are to be created by overlaying vulnerability and hazard maps.

COST 620 also proposed different techniques to validating vulnerability maps, including tracer tests, hydrograph and chemograph analyses, and modelling. The different aspects of the proposed methodology were successfully applied in 12 test sites all over Europe, comprising a wide range of geological, hydrogeological and climatic settings.

The main advantages of the proposed approach are:

- Based on sound hydrogeological principles;
- Applicable for all types of aquifers but takes into account the special nature of karst;
- Sufficiently flexible to be applied in different hydrogeological settings and different data availability;
- Not a stand-alone method but comprises all elements of groundwater protection - intrinsic and specific vulnerability, source and resource protection, hazard assessment and risk mapping and management.

Further information from:

[http://capella.unine.ch/chyn/php/publica\\_intro.php](http://capella.unine.ch/chyn/php/publica_intro.php)

<http://www.geomac.ulg.ac.be/recherche/igih/costweb/site/>

## Aqua Torino

A report on EU sponsored seminar by Frank Smits (The Netherlands)

From 9th to 13th of June 2004 the French-Italian University, the French-Netherlands University Network and the University of Turin organised the seminar 'Aqua' in Turin. The European Union sponsored this seminar within the framework of the Jean Monnet Program, which is meant to stimulate the European integration on an academic level.

More than thirty young scientists from different European countries, particularly Italy, France and the Netherlands, came together to exchange their ideas about the subject of water. Not only civil engineers and hydrologists were invited, but scientists from other disciplines, including economists, historians, medical specialists, lawyers, biologists and specialists in public administration.

The subjects for discussion were 'water and life', 'dangerous water', 'water and law' and 'water and economy'. Each day before lunch, four professors or senior-researchers introduced the subject of that particular day and in the afternoon several workshops were held. The lunches were exceptional and always varied. If there is a heaven, I'm sure an Italian company will do the catering.

Most introductions were well prepared, understandable and inspiring for the discussions later on. Some lectures were hard to understand (maybe due to the simultaneous translation) via headphones and some, at least according to Dutch standards, too far from the topic. Some subjects of the introductions I found a bit beyond my own perception as a hydrologist; for instance a talk about groups of schizophrenic patients that were treated with water from thermal springs, or about water in several Italian plays. However, you cannot find everything interesting and those stories were amply compensated by, for example, an elegant historical overview of hydrological scientists and their thoughts by professor André van der Beken of the Vrije Universiteit Brussels or the introduction of Arjen Hoekstra of the IHE about

the globalisation of water. Another fine lecture was given about oceanography by Jacques Verron, of Grenoble. He told that more or less three thousand fully automatic measuring instruments are floating around in the oceans. These instruments, a kind of steel cigar, determine and decide by themselves at which vertical depth they will float. After a certain period they will emerge to the surface to transmit via a satellite connection their measurements, about for instance the direction and distance in time they were taken by the currents. As groundwater hydrologists we are not yet that sophisticated with our pressure transducers in observation wells.

The leadership of the workshops revealed some differences in culture. In the workshop about whether the water supply has to be privatised, which was enthusiastically led by Robert Lawick van Pabst and Arjen Frenz of the VEWIN, the discussion was filled with emotions. A Roman Citizen told that at his home pure sparkling mineral water was coming out of the shower. In the same discussion we concluded that the Dutch participants didn't want the European Union to gain much more power regarding water management, while the Italians hoped on the contrary, because they didn't have a good feeling about the policy of their own government. The French were with their opinion in between those two.

I found the meeting in Turin was very useful, especially to exchange thoughts with other young scientists. That was not only difficult because of problems of the different languages, but particularly by differences in culture. In the Netherlands everything is planned in minute detail and everyone starts to be nervous if plans deviates a little bit, while the Italians are true masters of improvising all together with no plan at all. We can learn from that. Cooperation in Europe in water management, among other things, is a good and useful challenge. In Turin we started learning this in a pleasant and informal way.

### WATER4ALL PROGRAMME

Water4all is a programme on sustainable groundwater management being undertaken by four European countries under the European Union Interreg - North Sea Basin Programme. The countries involved are Germany, Belgium, Germany and the UK. The web site for the programme is <http://www.water4all.com/> which provides details of the four components and the four partner agencies. Water4all held a trans-national seminar in Cambridge, UK on 9 September on controlling diffuse pollution. Stephen Foster, IAH President comments on programmes in Denmark and Germany that are tackling the issue of farming impacts on groundwater at <http://www.iah.org/News/2004/045.html>

## Report of a Study of the Alta Piura Basin in Northern Peru

by Victor Heilweil (reproduced from the IAH USNC newsletter)

The Alta Piura groundwater system, near the Pacific Coast of northern Peru, is one of seven ongoing regional groundwater studies funded by the International Atomic Energy Association's (IAEA) Isotope Hydrology Section. As part of the IAEA technical assistance program, I recently spent a week in Piura, learning about the groundwater system and assisting with the development of a conceptual model of groundwater flow.



Well in the Alta Piura study area being used for drinking water.

The primary aquifer in the Alta Piura basin consists of unconsolidated alluvial and fluvial sediments, juxtaposed between metamorphic and igneous rocks (foothills of the Andes) to the northeast and aeolian sands and silts to the southwest. On the edge of the Sechura Desert, the lower part of the basin receives less than 200 mm of precipitation annually. However, much more rainfall occurs both during El Niño years and in the upper parts of the basin, where altitudes exceed 3,000 meters. The combination of a severe multiple-year drought and extensive irrigation has recently resulted in extended periods when the Piura River, once perennial, goes dry. Thus, the duelling forces of nature and recent increase in extractions have shown the limits of this precious resource, leaving little water for natural ecosystems. Also, the vulnerability of this unconfined aquifer to surface contamination from both human waste and agricultural chemicals is indicated by locally high

concentrations of nitrates in groundwater - up to 70 mg/L.

In addition to the difficulties often encountered in regional groundwater studies in the U.S., such as defining hydrologic boundaries, properties, and flows, the Alta Piura study faces an additional set of challenges common to many developing nations. One important difference is the lack of available information on well-completion depths, lithologic logs, and quantities of well withdrawals. Unlike state requirements in the U.S., private, industrial, and municipal well owners in Peru are not required to report this information. Since most of the pumps in the Alta Piura basin are diesel, well discharge cannot even be estimated with electrical power records. Other data deficiencies include historical water-level information, continuous stream discharge and differential (seepage) measurements, irrigation diversions, and long-term precipitation measurements. This makes it difficult for the study team to accurately determine a detailed groundwater budget (water balance) and to evaluate long-term changes in groundwater storage.

Nonetheless, data acquisition and interpretation efforts during the current study include water-level data, aquifer testing, surface geophysics, along with the hydrochemical and isotopic analysis of precipitation, surface-water, and groundwater. Combining this information with GIS techniques and groundwater flow modelling, the study team has been able to identify important hydrogeologic structures, boundary conditions, groundwater flow directions, recharge areas, rough water budget estimates, and areas of recent surface contamination, resulting in a better understanding of the groundwater system. It has also raised local awareness of and interest in groundwater/surface-water interaction and the need for protecting both groundwater and ecological resources. While the study will be completed by the end of the year, it is hopefully only the first of several quantitative regional groundwater investigations in northern Peru.

### THE UK GROUNDWATER FORUM

The UK Groundwater Forum, a group bringing together British groundwater professionals and stakeholders with the objective of raising awareness of groundwater and the role it plays in supporting the environment and in water supply, has recently launched its newly developed web site. The new site includes a range of information on groundwater, from introductory text to articles on topical groundwater issues. It also includes answers to frequently asked questions, careers information, educational links and a calendar of meetings and events. The address is <http://www.groundwateruk.org/>

## The IAH Burdon Commission and the Millennium Goals for Water

Alan MacDonald, a UK IAH member, who has been working on the review of the work of the IAH Burdon Commission, describes the current status of the project.

### The Millennium Development Goals for Water

There are still at least 1100 million people across the world who do not have access to safe, clean drinking water.



Women fetching water from a contaminated pond in rural Nigeria (Photo © NERC 1999)

Many of these people (80%) live in rural areas and are among the poorest and most vulnerable to be found anywhere in the world (UNICEF 2004). Faced with this depressing reality, the international community has set ambitious

Millennium Development Goals (MDGs) for water (UN 2000): by 2015, to reduce by half the proportion of people without access to safe drinking water and sanitation.

### Progress towards meeting the MDGs

The international community is now committed to trying to achieve these goals. But how are we doing? The table below shows when the goals will be reached at current rates of progress and investment. Although there are problems throughout all low-income countries of the world, one region in particular is lagging behind in meeting the MDGs and that is Sub-Saharan Africa.

	2000	2015	2025	2050
Access to water		S Asia L.America & Caribbean		Sub-Saharan Africa
Access to sanitation		E Asia & Pacific S Asia L.America & Caribbean		Reversal S-Saharan Africa

Groundwater is now widely recognised as the only practical way of meeting dispersed rural demand for

clean water. However, successfully developing sustainable and cost effective groundwater resources on the scale required to help achieve the MDGs is not trivial. The challenge is more than just providing extra drilling rigs to the worst affected countries: water supplies must be appropriate to the groundwater resources and also to the wishes and socio-economic conditions of communities.

Many challenges face those tasked with developing groundwater resources for community water supplies, not least the fact that many of the areas without water supplies are in areas of complex hydrogeology where groundwater is hard to find. The situation is made worse by the isolation of many hydrogeologists and engineers - there are few opportunities for groundwater specialists to share experiences and learn lessons from other projects in the region.

### A New Start for the Burdon Commission

Against this background, the IAH plans to reconstitute and reinvigorate the work of its Burdon Commission. The commission was set up in memory of David Burdon, an Irish hydrogeologist who pioneered much of the work on groundwater in the UN Agencies and through his work fostered links between hydrogeologists throughout the world. Two years of consultation, led by contributions from the IAH Groups in Spain and Ireland, resulted in the current proposal for the Burdon Commission being presented to the Council at the recent IAH Congress in Zacatecas, Mexico.

The commission will focus on providing support to those involved in helping to implement the Millennium Development Goals. Sub-Saharan Africa will be one of the areas of initial focus, because of the internationally recognised need.

1 The commission will work closely with the regional vice-president to:

- increase IAH membership across sub-Saharan Africa;
- provide the framework to enable experience sharing and lesson learning (e.g. a web site and African groundwater newsletter);
- promote regional and country meetings of groundwater specialists.

2 In addition, mindful of the success of WHYMAP, and of the work of IGRAC and links to UNESCO, the commission will consider ways of providing a gateway

for sharing existing experience and literature on hydrogeology in low-income countries.

The Burdon Commission will also help to support the IAH Executive and Council in promoting the message that sound knowledge of the groundwater resources is fundamental to the successful achievement of the MDGs for water.

#### Further information

United Nations 2000. The Millennium Development Goals. <http://www.un.org/millenniumgoals/>

UNICEF/WHO 2004. Meeting the MDG drinking water and sanitation target, <http://www.unicef.org/wes/mdgreport/>

## International Conference and Exhibition on Groundwater in Ethiopia - Report by Pat Tucci reproduced from the IAH USNC newsletter

Over 70 percent of Ethiopia's drinking water comes from groundwater sources, and the situation is similar in a number of other African countries. Yet, groundwater management is not adequately developed in Ethiopia. To address these issues, an international conference and exhibition on groundwater in Ethiopia was held May 25-27, 2004 at the UNECA Conference Center in Addis Ababa, Ethiopia. The organizing partners for the conference included UNICEF, the Economic Commission for Africa, UN Water Africa, the Ethiopian Ministry of Water Resources, the Geological Survey of Ethiopia, and others. The conference objectives were to:

- Share ideas, experiences, new developments, and practices for groundwater management among sector practitioners;
- Highlight the importance of groundwater in socio-economic development to governments, the general public, the private sector, External Support Agencies, NGO's;
- Identify, address and discuss the problems associated with sustainable groundwater management;
- Familiarize all concerned stakeholders on latest technologies and products;
- Promote the formation of coordination mechanisms for groundwater management at national, regional and global levels;
- Promote future information exchange and continued discussions on groundwater management, through amongst others, networking and utilizing the opportunities of the remarkable advances in digital and communications technology.

The Conference addressed several thematic issues including:

- Assessment, inventory and mapping of groundwater resource potentials and development activities in Ethiopia;
- Networking and information exchange on new groundwater development technologies and best practices;
- Sustainable groundwater management and being

prepared to respond to regional droughts;

- Implementation and monitoring guidelines and standards for the development of groundwater resources;
- Environmental and socioeconomic considerations in developing groundwater resources vis-à-vis increasing access to water supply;
- Institutional and legal aspects of groundwater management and administration;
- Participatory management of groundwater resources in Ethiopia;
- The economics of groundwater development and management;
- Capacity building in groundwater development and management.

The conference was well-attended, with about 700 registered participants. Twenty-nine exhibitors, including private companies and NGO's, were featured in the exhibition area. Although the focus of the conference was Ethiopia, representatives from several African and other countries also attended. Several of these countries presented talks on their experiences with groundwater. More than 70 presentations were made over the first two days of the conference. Among the topics addressed during the conference were the need for a national groundwater assessment and a supporting groundwater database for Ethiopia, the high cost of drilling wells relative to more developed countries, the large failure rate for the drilling of water wells, and meeting of Millennium Development Goals. On the final day of the conference, group discussions were held on issues dealing with enabling environments, stakeholders, technology, socio-economics and capacity building. Additionally, discussions were held on the formation of an African groundwater association. The final topic of the conference was the presentation of the "Addis Ababa Declaration on Groundwater".

A conference proceedings volume is planned, but is not yet available. Additional information on the conference can be found at:

<http://www.uneca.org/groundwater/>

## IAH News

### Election results

At the General Meeting held in Zacatecas, Mexico on 12 October, 2004 the following were elected to serve on the IAH Council until October 2008.

President	Stephen FOSTER	United Kingdom
Secretary General	Miran VESELIC	Slovenia
Treasurer	Jack SHARP	United States of America
Scientific Programme Member	Jiri KRASNY	Czech Republic
VP Australasia and the Pacific	Ian ACWORTH	Australia
VP Asia	Shivendra Nath RAI	India
VP Eastern Europe	Florian ZAMFIRESCU	Romania
VP Western Europe	Wilhelm STRUCKMEIER	Germany
VP Middle East & North Africa	Ahmed KHATER	Egypt
VP Sub-Saharan Africa	Segun ADELANA	Nigeria
VP North America	Ken HOWARD	Canada
VP Latin America & Caribbean	Emilia BOCANEGRA	Argentina

Further details of the voting results can be found at <http://www.iah.org/election04/results.htm>  
Contact details for all Council members can be found at <http://www.iah.org/council.htm>

### Notes from IAH Council

IAH Council met twice in Zacatecas, the final meeting of the retiring Council (pictured below) on 10 October and the inaugural meeting of the new Council on 15 October.



The key decisions taken were:

- Agreement, subject to detailed discussion by the Executive, on the review of the work of the Burdon Commission;
- Approval to increase membership fees by 3 Euros for members in developed countries, 2 Euros for developing countries and other membership classes pro rata;
- Support for the recommendations of Jaroslav Vrba and Stephen Foster, who had attended important international water policy meetings

during September, regarding the role of groundwater;

- Approval of a scheme to develop a PowerPoint library of member presentations to improve quality and consistency of groundwater advocacy;
- Approval for future IAH Congresses in Portugal (2007) and Japan (2008);
- Approval for the 2005 Annual meeting and Council meeting to be held in Belgrade as part of the 2005 Karst Symposium to be organised by the IAH National Committee for Serbia and Montenegro.

### 2004 IAH President's Award

The IAH President's Award is presented annually to a senior hydrogeologist who has made outstanding international contributions toward the advancement of hydrogeology.



*Stephen Foster receiving the President's Award from retiring President Emilio Custodio*

The President's Award was initiated by Past Presidents of IAH, John E Moore and Philip E LaMoreaux. It was the final duty of retiring President Emilio Custodio to present the 2004 award at the General Assembly in Zacatecas to Stephen Foster. The citation for the Award recognised Stephen's significant contribution to UK National, European and International water policy by articulating from a strong scientific base the role and significance of groundwater.

#### IAH Canadian National Chapter

The Canadian NC held their annual groundwater conference in association with the Canadian Geotechnical Society in Montreal in October.



Members of the IAH Canadian National Chapter meeting in Montreal in October. From left to right Garth van der Kamp, Bob Betcher (Vice President), David van Everdingen, Laura Olmsted (Secretary-Treasurer), Chris Neville, Joanne Thompson (Communications Officer), Mark King, Harm Maathuis, Richard Martel.

#### US National Chapter

The US National Chapter met during the GSA meeting in Denver. IAH was a sponsor and co-sponsor of a number of sessions including "Sustainable Management of Water Resources" organized by Bridget Scanlon and Marios Sophocleus, "The Future of Hydrogeology" organized by Cliff Voss, and "Groundwater Depletion and Overexploitation in the Denver Basin Bedrock Aquifers" organized by John Moore and Peter Barkmann. The session on "The Future of Hydrogeology" previewed topics to be addressed in the 2005 theme issue of Hydrogeology Journal with the same title.

At the end of 2004, the current US national committee (Lenny Konikow, John Harsh, Yoram Eckstein, and Colin Booth) steps down after its four-year tenure and the results of the election for the new US committee were declared at the GSA meeting. The new team are Jack Sharp (President), Todd Halihan (Secretary-Treasurer) together with Victor Heilweil, Noel Krothe, and Mike Wireman. Past president Lenny Konikow

and Colin Booth, as newsletter editor are also going to stay in the enlarged team so the only full retirees are John Harsh and Yoram Eckstein who have both provided long and valuable service to the U.S. National Chapter and to IAH.



Members of the IAH US National Chapter meeting in Denver in November. From left to right, (standing) Yoram Eckstein, Jack Sharp, Van Brahana, Noel Krothe, Colin Booth, Vicki Kretsinger, Pat Tucci, (seated) Todd Halihan, Lenny Konikow, Mike Wireman.

#### IAH Commission on Coastal Aquifer Dynamics

The recently formed IAH Commission held a meeting in Cartagena, Spain at the end of May 2004. A note of the meeting and the proposed actions of the Commission, which were endorsed by the IAH Council meeting in October in Mexico, can be found at [www.iah.org/2004/047.html](http://www.iah.org/2004/047.html)

#### Preparation for the 4th World Water Forum

Preparations are now advancing for the 4th World Water Forum to be held in Mexico City from 16-22 March 2006. The lead agency in Mexico, the Commission National del Agua, has now established a forum secretariat that may be contacted via the web page [www.worldwaterforum4.org.mx](http://www.worldwaterforum4.org.mx) IAH, with the mandate of the 4th WWF secretariat and the World Water Council and with financial assistance from UNESCO and IAEA, hosted a Roundtable during the IAH Congress to make a contribution to shaping the agenda for groundwater within the congress themes. More details of this initiative will be given in subsequent issues of Groundwater eNews.

#### Groundwater Resources of the World

The World Hydrogeological map project took a big step forward in August when a "special edition" 1:5 Million scale map was launched at the International Geological Congress in Florence. A limited number of copies of the printed map are available from [whymap@bgr.de](mailto:whymap@bgr.de) You can download a copy of the map reduced to A3 format (PDF 2.1MB) and the explanatory legend (PDF 2.7MB) from <http://tinyurl.com/4lzy4>

### IAH Spanish Group

In October 2003 the IAH Spanish Group held a meeting in Barcelona on Urban Groundwater. A large selection of papers, mostly in Spanish but with some in English, have been compiled from the symposium dealing with examples and problems worldwide. The volume *El agua y la ciudad sostenible: Hidrogeología urbana* is published by IGME, Madrid [www.igme.es](http://www.igme.es); ISBN84-7840-539-9

### IAH Australia

IAH Australia report that there is currently a severe shortage of experienced hydrogeologists in Australia, not only for contaminated site work, but also for resource investigations. The immigration authorities are aware of the situation and have relaxed the normally stringent requirements for employing foreign professionals. You can see what opportunities are available, by looking at the "Employment" page on the IAH Australia website

[http://www.iah.asn.au/bulletin\\_board.html](http://www.iah.asn.au/bulletin_board.html)

There is increasing debate in Australia about the concept of sustainability as applied to groundwater systems and the issues concerning the connectivity between surface water and groundwater. Some of the most experienced hydrogeologists in Australia (who are IAH members) have put together a framework for determining sustainable yield and achieving conjunctive management for the whole water resource. Please have a read. <http://www.iah.asn.au/publications.html> You may also find the Australian Groundwater Modelling guidelines of interest.

**200 Years of British Hydrogeology:** Edited by J D Mather. ISBN: 1862391556.

IAH member John Mather is the editor of a new book published by the Geological Society of London. The collection of papers in this volume records the development of hydrogeology in Britain over the past 200 years. Following the application by William Smith of stratigraphic principles to the sinking of wells, Victorian engineers and scientists established groundwater as a major contributor to public water supplies. In the twentieth century, the development of groundwater continued rapidly, controlled by an ever-changing regulatory regime. The 25 papers in this volume review the progress which has been made, and the lives and work of some of those who were intimately involved. The list price is £90/\$150 but substantial discounts are available for members of the Geological Society of London and other societies with which it has discount agreements such as GSA and AAPG. Details from the Geological Society bookshop website - <http://bookshop.geolsoc.org.uk/>

### Investigaciones en Sistemas Kársticos Españoles

This is a new publication by IGME, Spain in its hydrogeology and groundwater series. Edited by Bartolomé Andreo and Juan J Durán it is a record of the Spanish contribution to the IGPC project World Correlation of Karst Ecosystems. The volume (ISBN84-7840-551-8) contains 21 articles on the Spanish karst, in Spanish but with extended abstracts in English, with an introduction by Yuan Daoxian, leader of the IGCP 448 group and Heinz Hötzl, Chairman of the IAH Karst Commission. Contact IGME, Madrid [www.igme.es](http://www.igme.es)

### Journal of Urban Water Re-Launched

The Journal of Urban Water, formerly published by Elsevier, has been re-launched in 2004 with Taylor and Francis as publisher. The Editors in Chief are Cedo Masimovic and David Butler of Imperial College, London. Urban Water Journal aims to provide a forum for the research and professional communities dealing with water-related and water-based systems in the urban environment. Particular emphasis is placed on defining the practical outcomes of sustainable development and on documenting and analysing the mutual interrelationships and interactions between the individual water systems and urban water bodies (including groundwater). The journal encourages the increasing importance of integrated approaches to solve the numerous pressing problems in urban water engineering. Details can be found at <http://www.urbanwater.net/>

### Memoirs of a Hydrogeologist

Lindsay Furness, an Australian hydrogeologist who has worked extensively in east Asia and the Pacific, has published his memoirs. It covers his career from university in South Australia to current projects in China. By his own account it is "not very technical and contains mostly interesting stories of the people I have met and places I have been to during the last quarter of a century. It should appeal to a wide range of people and not just those within the profession." It will be available from University of Queensland bookshop shortly.

### Water Cycle Diagram

The US Geological Survey has just released a new web site about "The Water Cycle." <http://ga.water.usgs.gov/edu/watercycle.html> This USGS site offers a comprehensive discussion of the water cycle. It features a new graphic available in 36 languages. There is also an in-depth web page for each of the 15 topics on the diagram, along with a single page summary of the water cycle.

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# 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/](http://www.iah.org/confs/)

## 2005

February 15-16, Chicago, USA. Straddling the Divide: Water Supply Planning in the Lake Michigan Region. Web: <http://www.nipc.org/environment/slmrwc/conferences/>

March 7-9, 2005, Pretoria, South Africa. Biennial Ground Water Conference. Theme: Ground water - stretching our vision. Web: [www.gwd.org.za](http://www.gwd.org.za) from 1st December 2004.

March 7-11, Nicaragua. Conferencia Internacional - Hidrogeología y Manejo de Recursos Hídricos en Centroamérica: "Caminando Juntos Hacia el Futuro". Web: <http://www.caragua.org/HTML/ConferenceHomeEnglish.htm>;

March 14-15, Tours, France. Clays in Natural and Engineered Barriers for Radioactive Waste Confinement. Web: [www.andra.fr/meeting2005/](http://www.andra.fr/meeting2005/)

March 22, London, UK. Water for Life - the UK Input. Royal Geographical Society with IBG. E-mail: [events@rgs.org](mailto:events@rgs.org)

April 6, 7 y 8, Buenos Aires. V SEMINARIO INTERNACIONAL CYTED-XVII: "Un enfoque integrado para la gestión sustentable del agua. Experiencias en zonas húmedas", a realizarse. Web: <http://www.cytcd.org>

April 24-29, Vienna, Austria. European Geosciences Union, General Assembly. Web: <http://www.copernicus.org/EGU/ga/egu05/index.htm>

May 10-13 Mendoza, Argentina. CONAGUA 2005. XX National Water Congress and III Symposium on Water Resources of the Southern Cone. Web: [www.congresosdelagua.org](http://www.congresosdelagua.org).

May 18-21, Evora, Portugal. Second Workshop of the Iberian Regional Working Group of the IAH Commission on Hardrock Hydrogeology. Web: <http://www.eventos.uevora.pt/hardrockhydro/>

May 23-25, Lyon, France. Geoline 2005. International Symposium on Geology and linear infrastructures. E-mail: [coralie.hossenlopp@mci-group.com](mailto:coralie.hossenlopp@mci-group.com)

June 6-9, The Hague, The Netherlands. ModelCARE'2005, International Conference on Calibration and Reliability in Groundwater Modelling: From Uncertainty to Decision Making. Web: <http://modelcare2005.nitg.tno.nl/>

June 12-17, Prague, Czech Republic. 7th International Conference on Acid Deposition "Acid Rain 2005". Web: [www.acidrain2005.cz](http://www.acidrain2005.cz)

June 12-17, Berlin, Germany. ISAR5 - 5th International Symposium on Management of Aquifer Recharge. Web: <http://kompetenz-wasser.de/>

June 20-23, Bergen, Norway. HeadWater 2005: "Hydrology, Ecology and Water Resources in Headwaters". Web: <http://www.nve.no/headwater05/>

August 28-September 2, Lake Bled Slovenia. 10th International Symposium on the Interactions between Sediments and Water. Web: <http://www.iasws.com>

September 1-3, Rhodes Island, Greece. 9th International Conference on Environmental Science and Technology-2005 (9CEST 2005). Web: <http://www.gnest.org/cest>

September 4-8, Ghent, Belgium. International Symposium on Wetland Pollutant Dynamics and Control (WETPOL). Web: <http://biomath.ugent.be/wetpol>

September 7-10, Menton, France. EWRA 2005 - 6th International Conference, European Water Resources

Association. Web: <http://www.cig.ensmp.fr/ewra2005>

September 7-11, Zaragoza, Spain. Sixth international conference on geomorphology with special session on evaporite karst processes and problems. Web: <http://wzar.unizar.es/actos/SEG/index.html>

September 11-16, Freiberg, Germany. Uranium Mining and Hydrogeology IV. Web: <http://www.geo.tu-freiberg.de/umh/index.htm>

September 11-19, Beijing, China. Use of Water and Land for Food and Environmental Sustainability. 19th Congress of ICID. Web: [www.icid.org](http://www.icid.org)

September 14-19, Belgrade, Yugoslavia. International Conference on Environmental (Geocological) Problems in Karst. Organised by the Serbia and Montenegro Committee of IAH. Web: <http://www.cvjic-karst2005.org.yu/>

September 21-23, Parma, Italy. Aquifer Vulnerability and Risk 05. 2nd International Workshop - AVR 05. E-mail: [intercontact@libero.it](mailto:intercontact@libero.it)

October 4-8, Alicante, Spain. International Workshop "From data gathering and groundwater modelling to integrated management". Organised by the The Spanish National Committee of the IAH. Web: <http://www.fcihis.org/PUB/INFO/AIH-GE.HTM>

October 5-6, Athens, Greece. 7th Hellenic Hydrogeological Conference and 2nd MEM Workshop on Fissured Rocks Hydrogeology, organized by the Hellenic National Group of IAH and the Middle and East Mediterranean WG of Hard Rocks Hydrogeology Commission of IAH. Web: [www.iah-hellas.geol.uoa.gr](http://www.iah-hellas.geol.uoa.gr)

22-25 November, New Delhi, India. XII World Water Congress of the International Water Resources Association. [http://www.iwra.siu.edu/conferences/new\\_delhi2005.pdf](http://www.iwra.siu.edu/conferences/new_delhi2005.pdf)

November 28-December 2, Auckland, New Zealand. Joint conference organised by the new Zealand Hydrological Society and the IAH Australian National Chapter. Details shortly on <http://www.hydrologynz.org.nz/society-conferences.html#nzhs05>

## 2006

April 24-28, Malaga, Spain. AQUAinMED International Congress "Ground Water in Mediterranean Countries". INFO: Direccion de Hidrogeología y Aguas Subterráneas, Instituto Geológico y Minero de España, Ríos Rosas, 23, 28003 Madrid, Spain. E-mail: [aquainmed@igme.es](mailto:aquainmed@igme.es). Web: <http://www.igme.es>

May 22-24, Marrakech, Morocco. Integrated Water Resources Management and Challenges of the Sustainable Development. Organised by The Moroccan Committee of the International Association of Hydrogeologists IAH, in Collaboration with the Cadi Ayyad University (Marrakech, Morocco), the Institute of Research for the Development IRD-France, l'Agence du Bassin Hydraulique duTensift de Marrakech. Web: <http://www.lih.rwth-aachen.de>

September 14-17, Nottingham UK. Engineering geology for tomorrow's cities. 10th Congress of the International Association of Engineering Geology. Web: [www.iaeg2006.com](http://www.iaeg2006.com)

9-13 October, Beijing, China. XXXIV Congress of IAH. Details from [nizengshi@tom.com](mailto:nizengshi@tom.com)