



# IAHS Newsletter

NL98 December 2010



## **IAHS at the IUGG2011 Assembly in Melbourne** [www.IUGG2011.com](http://www.IUGG2011.com)

A summary of the events of interest to IAHS members is given on pages 3 and 4.

The final abstract deadline for workshops and other events is: 17 January 2011. Please submit abstracts via the website.

## **Groundwater Abstraction and Land Subsidence**

In recent years considerable multidisciplinary research effort has been expended in attempts to describe the complex nature of the phenomena related to land subsidence, which is caused either naturally or anthropogenically. The multidisciplinary focus on these processes is critically needed and will play an important role in the development of resource management strategies addressing the impacts of climatic change and the means to achieve sustainable urban environments and optimal use of the land and water resources. Although the problem is global in the sense that it affects major urban centres and engineering facilities (mining, water distribution and storage, railroads and ports, among others) worldwide, the mitigation and solution for each case demands knowledge of the local geological, hydrogeological, mechanical, and morphological characteristics of the areas affected. The new advances in these multidisciplinary studies show the growing need to incorporate new views in planning of urban development, in legal frameworks, the related social problems and environmental damage, monuments heritage, and urban risk analysis.

See page 7 for a description of the Red Book (IAHS Publ. 339) published for the Eighth International Symposium on Land Subsidence, EISOLS, held in October, in Mexico.



A fracture which opened on 1 June 2010 in Chalco, Mexico, as a result of groundwater pumping

### **ICGW LinkedIn Discussion Group**

A new ICGW group has been recently formed using the internet facility LinkedIn. See page 6 for details.

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### **The Right to Water and Water Rights in a Changing World**

In the face of global changes, what role can law play in safeguarding basic needs and rights, including that to water? Can law be more effectively mobilized to protect vulnerable communities better against droughts, floods and other climate related disasters? In so doing, to what extent can it contribute to world peace? As laws tend to be rigid, how can they play a more progressive role in a rapidly changing world? Currently water management is stepping away from the idea of stationarity – but what about legal issues? Are they set in stone? See page 8.

### **The Water Quality Challenge – Prevention, Wise Use and Abatement**

The discharge of industrial and domestic sewage is not only polluting surface waters but has a direct impact on groundwater quality. Better cooperation between surface and groundwater hydrologists and experts, and common policies to improve water management in general, and water quality issues in particular, were suggested after lively discussion at the seminar at WWW in Stockholm organised jointly by ICWQ, UNESCO-IHP, BGR, IAH, AGW-Net and the Swedish-IHP. The communication gap between surface and groundwater networks needs to be closed. See page 5.

## Message from the President

[gordonyoung\\_wwap@yahoo.com](mailto:gordonyoung_wwap@yahoo.com)

From time to time we mourn the passing of one of our friends. This year we have been particularly sad in noting the passing of several of our highly respected colleagues. In March, Vit Klemeš, and in August, Jim Dooge passed away; both were giants in the world of hydrology and both had been Presidents of IAHS. The summer also saw the passing of Igor Shiklomanov, long time Director of the State Hydrological Institute and a Past Vice President of ICSW, and of Genady Golubev, Past President of ICWRS and twice Vice President of IAHS. In August, Alfred Becker of the Potsdam Institute for Climate Impact Research and in October, Jaromir (Jerry) Němec, of WMO, both great colleagues and friends of IAHS also passed away. We remember their great contributions to hydrology and their support of our Association and we respectfully give our condolences to their families.

At the General Assembly of IUGG in Melbourne next summer IAHS will be looking to the future activities of the Association; we will be setting in motion the activities leading to the IAHS Scientific Assembly in Gothenburg, Sweden, in 2013, which will be held jointly with our sister Associations, the International Association for the Physical Sciences of the Ocean (IAPSO) and the International Association of Seismology and Physics of the Earth's Interior (IASPEI).

We will also be considering the future of our major Working Groups and Networks including the working group on Prediction in Ungauged Basins (PUB) and the network on Flow Regimes from International Experimental and Network Data (FRIEND) that is lead by UNESCO with strong collaboration from IAHS. PUB will be entering its last biennium in 2011 so we may be considering a major PUB event in 2012 to coincide with the 90th birthday of IAHS. FRIEND, founded in 1985, has expanded from its original European focus to have chapters in many regions around the world; it has hosted six major symposia (the latest being in Fez, Morocco, in October) and it has no termination date. It is interesting to note that PUB has a strong focus on a particular topic, but relies on a rather informal network to carry out its mandate, while FRIEND has developed a very strong series of regional networks, but considers a wide range of hydrological issues. We will be considering whether to extend the mandate of PUB beyond its 10-year life span and how we might build on the success of the FRIEND network. We will be discussing the possible continuation of our other Working Groups and the need for additional activities.

*Your advice and ideas on the future of our Working Groups and Networks, and on many other issues affecting the*

*Association, would be very welcome – so come and join the discussions in Melbourne!*

Before the end of 2010 we have important deadlines:

- Nominations for all officer positions within IAHS and its Commissions must be received by 31st December. It should be noted that nominations can ONLY be submitted by National Representatives (NRs), members of the IAHS Bureau and Commissions. It should also be noted that an individual may be nominated for more than one post, the post of President of the Association excepted, but may be elected to only one; elections from the slates of nominees will take place at our IAHS Plenary session in Melbourne – only NRs have the right to vote. The Plenary session is open to all individual members of IAHS, so do make sure to attend.
- Nominations for the International Hydrological Prize and the Tison Award for young scientists are also due by the end of December; again it should be remembered that individuals may be nominated more than once – and this is encouraged as we always have several nominees of high standing.

Preparations for the Melbourne Assembly are proceeding as planned. As of late-November we have received more than 300 abstracts for the six major symposia. The deadline for submissions to the Workshops is:

**17 January 2011.**

During the Assembly we will also be holding a meeting of the National Hydrological Societies, scheduled to be held at the University of Melbourne on 30th June. This will be an opportunity for members of National Societies and Associations to discuss common interests.

I look forward to meeting with all of you in Melbourne.

Gordon Young

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Edited by Cate Gardner

The Newsletter is provided free of charge to members of IAHS. This Newsletter and previous issues may be downloaded from: [www.iahs.info](http://www.iahs.info)

Articles from IAHS members on all aspects of hydrology and related topics are welcomed for publication in the Newsletter. They should be sent to the IAHS Secretary General, Pierre Hubert, preferably to: [pjh.hubert@free.fr](mailto:pjh.hubert@free.fr), or to:

IAHS, UMR Sisyphe, Université Pierre & Marie Curie,  
Case 105, 4 Place Jussieu, 75252 Paris Cedex 05, France

Advertisements may be placed in the Newsletter, at the discretion of the IAHS Secretary General. Contact: [cate@iahs.demon.co.uk](mailto:cate@iahs.demon.co.uk)

The next Newsletter will be published in March/April 2011; copy deadline: 1 March 2011.

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The **IAHS Scientific Assembly at Melbourne will run from Sunday 3 July to Thursday 10 July 2011, inclusive**, but IUGG will begin on 28 June. In addition to the IAHS Lead and IAHS symposia and workshops, there will be many events of interest run by other IUGG associations.

There is still time to prepare and submit abstracts for the 18 IAHS-organized workshops; the abstract submission deadline for the IAHS workshops and other associations' events at IUGG is **17 January 2011** (the deadline for submission to IAHS symposia has passed).

A summary only of the main events of interest to IAHS members is given here; full details of all events are provided at: [www.IUGG2011.com](http://www.IUGG2011.com). Abstracts should be submitted via that website.

Code	Symposia/Workshop	Lead convenor
<b>IAHS-LEAD WORKSHOPS</b> (organized with another IUGG association)		
J-HW01	Integrated flood management <i>IAHS (ICSW, ICWRS), IAMAS, WMO, BOM Australia</i>	Bruce Stewart
J-HW02	Interaction between freshwater and ecosystem in the coastal zone <i>IAHS (ICGW, ICWQ), IAPSO</i>	Makoto Taniguchi
J-HW03	Impacts of changing climate, snow and ice on mountain hydrology <i>IAHS (ICSIH, ICLAS, ICRS, ICGW, ICSW, PUB), IAMAS, IACS</i>	Danny Marks
J-HW04	Subglacial water: properties, processes and role in ice-mass dynamics <i>IAHS (ICSIH), IACS</i>	Bryn Hubbard
<b>IAHS WORKSHOPS</b>		
HW01	Tracer applications in sediment research <i>ICCE, ICT, ICWQ, PUB</i>	Valentin Golosov
HW02	Understanding and quantifying physical and geochemical processes during artificial recharge of groundwater <i>ICGW, ICWQ</i>	Henning Prommer
HW03	Regional groundwater modelling: approaches, challenges and future directions <i>ICGW, ICT</i>	Howard Reeves
HW04	Snow and ice hydrology: principles, processes and prediction <i>ICSIH, ICGW, ICSW</i>	Tim Link
HW05	Revisiting paired catchment experiments in forest hydrology <i>ICSW, ICRS</i>	Vazken Andréassian
HW06	Expert judgement <i>versus</i> statistical goodness-of-fit for hydrological model evaluation <i>ICSW, ICWRS, STAHY</i>	Charles Perrin
HW07	Hydro-geomorphology <i>ICSW, ICCE</i>	Christophe Cudennec
HW08	Tracer hydrology as a tool for estimating flow parameters, groundwater dynamics, pollution transport and bioremediation processes in heterogeneous systems <i>ICT, ICGW</i>	Gian Maria Zuppi
HW09	Revaluing system knowledge in water resources management <i>ICWRS, ICWQ</i>	Nick van de Giesen
HW10	Water quality and sediment prediction in ungauged basins <i>ICWQ, ICCE</i>	Berit Arheimer
HW11	Water supply and water quality in large metropolitan areas and megacities <i>ICWQ, ICWRS</i>	Valentina Krysanova
HW12	Quality and quantity aspects of green and blue water: Impact on agriculture, environment, energy and industry <i>ICWQ, ICWRS</i>	Uttam Sharma
HW13	Recent development of statistical tools for hydrological application <i>STAHY, ICSW, ICWRS</i>	Salvatore Grimaldi
HW14	Education in the hydrological sciences <i>EDU</i>	Arthur Askew

Code	Symposia/Workshop	Lead convenor
<b>IAHS-LEAD SYMPOSIA and IAHS SYMPOSIA</b> (abstract submission for these six symposia has closed)		
J-H01	GRACE, other remote sensing platforms and ground-based methods for estimating multi-scale surface water budgets, groundwater system characterization and hydrological processes <i>IAHS (ICRS, ICSW, ICGW, ICWRS, PUB, GRACE), IAG, IAMAS</i>	Moshin Hafeez
J-H02	Hydro-climatology: variability and change <i>IAHS (ICCLAS, ICSW, HYDROMET), IAMAS</i>	Stewart Franks
H01	Conceptual and modelling studies of integrated groundwater, surface water, and ecological systems	Gunnar Nützmann
H02	Cold regions hydrology in a changing climate <i>ICSIH, PUB</i>	Daqing Yang
H03	Risk in water resources management	Günter Blöschl
H04	Assessment of water quality under changing climate conditions	Jake Peters
<b>OTHER EVENTS OF INTEREST</b>		
U-06	Geoengineering: what are the potentials for climate intervention, carbon scrubbing, and other approaches to moderate climate change and its impacts? <i>IAMAS and IAHS, IAPSO, IASPEI</i>	Michael MacCracken Alan Robock
U-09	Do we really know the hydrological cycle? <i>IAHS</i>	Pierre Hubert
U-11	Earth and Space Science in Africa <i>IAGA – as part of IUGG Geoscience in Africa initiative and the eGY-Africa programme, with IAG, IAHS, IAMAS, IAPSO, IASPEI, IAVCEI, African Geospace Society (AGS), Association of African Universities (AAU), Africa Earth Observing Network (AEON), AfricaArray; ICSU Regional Office for Africa, CODATA, International Network for the Availability of Scientific Publications (INASP), UN Global Alliance for Information and Communication Technologies and Development (UN-GAID), US InterAcademy Panel on International Issues (IAP); European Enabling Grid for e-Science (EGEE); Geoscience Information in Africa (GIRAF); and the Abdus Salam International Centre for Theoretical Physics in Trieste (ICTP).</i>	Charles Barton
U-12	Early Career Scientists <i>IUGG and IACS, IAG, IAGA, IAHS, IAMAS, IAPSO, IASPEI, IAVCEI</i>	Harsh Gupta Laszlo Szarka
J-C03	Snow–atmosphere interactions in mountains <i>IACS, and IAMAS, IAHS(ICSIH)</i>	Michael Lehning Marc Parlange Pierre Etchevers Eric Brun
J-M02	Data assimilation and ensemble forecasting for weather and climate <i>IAMAS (ICDM, ICMA), IAPSO, IAHS, IAGA, IACS</i>	William Lahoz
J-M06	High-impact weather and extreme climate events <i>IAMAS (ICCL, ICDM), IAHS</i>	Xuebin Zhang Richard Swinbank Ronald Stewart
J-M10	Monsoons, tropical cyclones and tropical dynamics <i>IAMAS (ICCL, ICDM), IAPSO, IACS, IAHS, GEWEX, CLIVAR</i>	Jianping Li John McBride
J-M13	Precipitation measurements; instrumentation and statistics at all scales <i>AMAS(ICCP), IAHS</i>	Daniel Schertzer

**All abstracts should be submitted via the IUGG2011 website by 17 January 2011**

**Applications for funding should be made via the IUGG2011 website before 17 January 2011**

Please note that ALL Presenting Authors are required to register and pay to attend IUGG2011 by the Early Bird deadline, 11 April 2011. If you do not register by this date, your work will be removed from the programme.

An IAHS Red Book will be published for each of symposia J-H01, J-H02, H01, H02, H03 and H04. Participants can order and pay for their copies with their registration.



## Report from the International Commission on Water Quality

### The Water Quality Challenge – Prevention, Wise Use and Abatement

ICWQ Seminar at the World Water Week in Stockholm in September



This year the Stockholm World Water Week had the theme “Responding to global change – The Water Quality Challenge – prevention, wise use and abatement”. The IAHS International Commission on Water Quality, ICWQ, organised a seminar during the Water Week in cooperation with several other organisations\* under the title: *Water Quality in Capacity Development: Policy Options and Practical Solutions in the National and Transboundary Context*. The ICWQ president Valentina Krysanova chaired the session. The first part started with the opening welcome from Vanessa Vaessen (BGR). Then Francesco Rizzo (UNESCO-IHP) introduced the UN articles on transboundary groundwater management, and Sara Vassolo (BGR) talked about their implementation by the Lake Chad Basin Commission. Richard Owen and Moustapha Diene (both of: AGW-net, African Groundwater Network) then presented their talks on: *Groundwater quality in capacity development in practice*. There were more than 40 people present, and after a short discussion in plenary, the group discussions were conducted. The moderators were: 1. Berit Arheimer (IAHS and IHP), 2. Vanessa Vaessen (BGR), and 3. Friedrich Hetzel (BMZ/BGR). The discussions were very lively. Finally, Francesco Rizzo (UNESCO-IHP) summarized the seminar.

#### Summary of seminar conclusions and recommendations.

The discharge of industrial and domestic sewage is not only polluting surface waters but has a direct impact on groundwater quality. Therefore, a better cooperation between surface and groundwater hydrologists and experts, and common policies to improve water management in general, and water quality issues in particular, were suggested after lively discussion. The communication gap between surface and groundwater networks needs to be closed.

It was stated that groundwater is often neglected in River Basin Management plans. This may be due to the fact that groundwater is often considered as an endless resource, which is not visible, and is difficult to handle. Transboundary rivers often have Commissions to promote better policies but transboundary groundwater aquifers do not. Closer cooperation between existing surface and groundwater networks is essential for sustainable use of water resources, especially in developing countries.

Groundwater experts need to be working together with surface water experts to start managing and protecting overall water resources as part of an Integrated Water Resources Management (IWRM) in the hydrological cycle. Thus, river basin and lake basin organisations need to integrate groundwater issues into their daily work to manage water resources, regarding not only the quantity, but also quality issues.

It was stated that in many regions water scarcity is mainly a matter of miserable management. However, climate change will aggravate the situation. Therefore, both surface and

groundwater networks should be used to find common solutions and opportunities of adaptation.

It became quite obvious during the discussions that capacity development is a must on all levels and we need all stakeholder groups to be involved. Therefore, stakeholder analysis is of utmost importance, but the approach has to be differentiated between, and well adapted for, the various stakeholder groups. The bottom billion play an important role in that context, and without including them in training, institution building, education and awareness raising, as well as setting incentives to protect water resources, nothing will happen. Therefore, the framework has to be set up, regulations have to take a pro-poor approach into account, and ambassadors (VIPs) for disseminating the message of protecting water resources as part of Integrated Water Resource Management should become more active.

In addition, the following strategy was suggested by the seminar participants to initiate a better cooperation between groundwater and surface water hydrologists:

- include groundwater hydrologists in existing networks,
- initiate cooperation between river basin networks and groundwater hydrologists,
- use simple models for communication of the whole water cycle issues for capacity building, starting with inclusion of shallow groundwater,
- use climate change as a driver for emphasising water issues,
- include groundwater data in international databases.

*Berit Arheimer, ICWQ Vice-president*

\***Convenors** United Nations Educational, Scientific and Cultural Organization – International Hydrological Programme (UNESCO-IHP), Federal Institute for Geosciences and Natural Resources, Germany (BGR), International Association of Hydrogeologists (IAH), African Groundwater Network (AGW-net), International Association of Hydrological Sciences (IAHS) and Swedish International Hydrological Programme (Swedish IHP)



*The seminar in progress at World Water Week*

## Report from the International Commission on Groundwater

### ICGW MEMBERSHIP

Between 2005 and 2008, the number of IAHS members expressing an interest in ICGW has increased from 1212 to 2464. Current ICGW enrolment is 2660.

### ICGW LinkedIn DISCUSSION GROUP

A new ICGW group has been formed recently using the internet facility LinkedIn. The purpose of the group is as follows:

- to encourage communication amongst ICGW members as well as with other interested parties in the international groundwater science community
- to support geographically isolated scientists and junior scientists who have questions about specific technical/scientific problems
- to provide a forum for the discussion of relevant (groundwater-related) topics.

The ICGW discussion forum on LinkedIn is now in full swing with active discussions on current groundwater issues (e.g. ground source heat regulations) and a steadily growing membership. It is a great resource for exchanging knowledge and information as well as for seeking experts' advice. We want to invite all members and interested parties to use this resource by posting questions or views, or by participating in ongoing debates. Group membership is open to all IAHS members as well as non-members and currently stands at 108 members. For more information, please contact the group manager Corinna Abesser at [cabe@bgs.ac.uk](mailto:cabe@bgs.ac.uk).

### IAHS RED BOOKS ON GROUNDWATER

Two are in press and will be available early in 2011

#### **Managing Groundwater and the Environment**

IAHS Publ. 341

This new IAHS Red Book includes 43 papers by authors from 17 countries selected from the ModelCARE2009 conference on *Calibration and Reliability in Groundwater Modelling* that was held in Wuhan, China, in September 2009.

The Book covers the following topics:

- 1 Advances in model calibration, model prediction, sensitivity analysis, and uncertainty assessment,
- 2 Parameterizing groundwater models,
- 3 Use of models to address resources and environmental concerns, and
- 4 Modelling of regional groundwater systems and karst.

The book is edited by Yanxin Wang, Shemin Ge, Mary Hill and Chunmiao Zheng. For more information, please contact: [shemin.ge@colorado.edu](mailto:shemin.ge@colorado.edu).

#### **Groundwater Quality Management in a Rapidly Changing World**

IAHS Publ. 342

This book includes 108 selected and peer-reviewed oral and poster papers from the GQ10 – Groundwater Quality 2010 Conference, which was held in Zurich, Switzerland, 13–18 June 2010. The papers were selected for publication by the GQ10 Editorial Board and Scientific Committee from the 270 submitted abstracts. This book is edited by Mario Schirmer, Eduard Hoehn, and Tobias Vogt. For more information, please contact: [mario.schirmer@eawag.ch](mailto:mario.schirmer@eawag.ch).

The GQ conferences are held every three years and recently returned to Europe after being held in Waterloo, Canada, in 2004 and Fremantle, Australia, in 2007. The GQ10 Committee received over 230 abstracts from 37 countries around the world, and 220 delegates from 28 countries participated in the conference. An exciting programme of 83 oral and 96 poster presentations was arranged that fostered extensive discussions among researchers, regulators and industry participants. The conference concluded with an open forum of discussions on “The future issues of groundwater quality research and outreach to society”.

The full GQ2010 programme is available at:

[http://www.eawag.ch/medien/veranstaltungen/events/gq2010/programme/gq10\\_programm.pdf](http://www.eawag.ch/medien/veranstaltungen/events/gq2010/programme/gq10_programm.pdf)

### CONFERENCES

ICGW organizes two long-term conference series, the ModelCARE and GQ series (see above for an account of GQ10). It has recently added two new conference series, HydroPredict and HydroEco (both initiated and organized by ICGW VP Karel Kovar), and has become much more active in IAHS Scientific Assemblies and IUGG General Assemblies.

#### **Conference report**

*HydroPredict: Predictions for Hydrology, Ecology, and Water Resources Management*

**HydroPredict 2010: Changes and Hazards caused by Direct Human Interventions and Climate Change**

20–23 September 2010, Prague, Czech Republic

The PDF versions of most of the oral presentations are available for download on the HydroPredict2010 web site <http://web.natur.cuni.cz/hydropredict2010/>

About 350 abstracts were received. All abstracts, both for orals and poster presentations, were published in a volume of Abstracts, available at registration. All authors (oral and poster) were given the opportunity to submit a full-extent paper for the CD-ROM, also available at registration. Arrangements have been made with IAHS to post-publish a peer-reviewed selection of papers in a special issue of *Hydrological Sciences Journal*, which will be guest-edited by Hans-Peter Nachtnebel and Karel Kovar.

The total number of oral presentations was 67, out of which 15 were keynote presentations. The total number of posters on display was about 70. The conference was attended by about 160 participants from 37 countries. The countries with most participants were: Germany (24), Czech Republic (16), Italy (11), Japan (11), Australia (8), Slovakia (8), The Netherlands (8), Canada (7), United Kingdom (7), Denmark (5), and Belgium (5).

The conference convenors were: Faculty of Science, Charles University, Prague, Czech Republic; IAHS; Universität für Bodenkultur Wien (BOKU), University of Natural Resources and Applied Life Sciences; Institute of Water Management, Hydrology and Hydraulic Engineering, Vienna, Austria; Czech University of Life Sciences Prague (Ěeská zemědělská univerzita v Praze, ČZU), Prague; and T.G. Masaryk Water Research Institute (VÚV), Prague, Czech Republic.

**ICGW EVENTS IN 2011**

ICGW is organising several symposia and workshops with other commissions for the IAHS Assembly at IUGG2011 in Melbourne (see pages 3 and 4, and for full details go to the scientific programme at [www.iugg2011.com](http://www.iugg2011.com)). In addition, ICGW is part of the organization of:

**HydroEco: International Multidisciplinary Conference on Hydrology and Ecology**  
**HydroEco 2011: Ecosystems, Groundwater and Surface Water – Pressures and Options**

Vienna, Austria, 2–5 May 2011

<http://web.natur.cuni.cz/hydroeco2011>

Organizing Committee:

- [Hans-Peter Nachtnebel](#) Universität für Bodenkultur Wien (BOKU), University of Natural Resources and Applied Life Sciences, Vienna, Austria
- [Karel Kovar](#) PBL Netherlands Environmental Assessment Agency (and ICGW), Bilthoven, The Netherlands
- [Zbyněk Hrkal](#) Charles University, Institute of Hydrogeology, Prague, Czech Republic

**ModelCARE: Model Calibration and Reliability in Groundwater Modelling**

**ModelCARE 2011: Repositories of Knowledge**

Leipzig, Germany, 18–22 September 2011

<http://www.modelcare2011.org>

1. Parameter estimation and model calibration
  2. Assessment of uncertainty in model predictions
  3. Scientific visualization
  4. Numerical and computational methods
  5. Stochastic and multi-scale models
  6. Coupled processes in the subsurface
  7. Reactive transport and bioremediation
  8. Groundwater flow and climate
- plus possibly one session on cross-cutting topics

Organizer: Sascha Oswald, Leipzig, Germany

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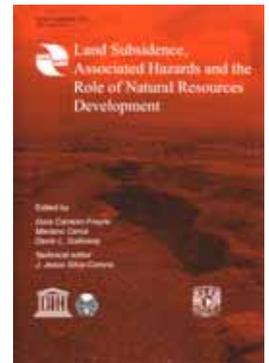


# Land Subsidence, Associated Hazards and the Role of Natural Resources Development

**Editors Dora Carreón-Freyre, Mariano Cerca & Devin I. Galloway**

**Technical editor J. Jesús Silva-Corona**

IAHS Publ. 339 (October 2010) ISBN 978-1-907161-12-4, 522 + xvi pp. Price £97.00



Continued from page 1

This volume comprises over 90 papers that were presented at the EISOLS symposium in Mexico in October 2010, which are divided among six sections. Section 1 examines the **mechanisms of earth fissuring and fracturing induced by groundwater pumping**. Different methodologies for characterization and monitoring of fracturing are presented with case studies. The improvement of numerical methods, including nonlinear analysis, thermo-poro-elastic criteria, and analytical solutions considering poro-elastic media, are presented in Section 2, which evaluates **models of land subsidence** caused by groundwater extraction in Italy, USA, China, Mexico, The Netherlands, Japan and Poland, and one contribution examines the thermo-mechanical effects of seawater injection for reversing subsidence. Recent progress in modelling and simulation of geological system deformation caused by fluid depletion and the associated hazards, allows the specialists to couple geomechanical and hydraulic behaviour, and to consider subsoil heterogeneities. In Section 3, **geological and geomechanical processes** associated with land subsidence are addressed. Many of these contributions are from Mexico, but case studies from The Netherlands, Spain and Iran are included, and the geomechanical behaviour of clayey materials from Paris and Mexico City are discussed, and geotechnical aspects of mining and construction in China. The papers in Section 4 document notable advances in techniques for **measuring and monitoring**

ground displacements using remote sensing (InSAR) and new methods for processing satellite data to improve temporal and spatial resolution (DInSAR, PSI, PInSAR). The reported case studies include the Venice, Bologna, Emilia Romagna and Crotona regions in Italy; California, USA; Mexico City, Mexicali, Baja California and Morelia in Mexico, Catalonia, Spain; Java, Indonesia; the Canto Basin and Kujukuri plain in Japan; Iran, India and China. *In situ* GPS and extensometer monitoring strongly support certain studies, and alarm systems are being developed at some sites. Section 5 provides a set of papers discussing the **social and economic impacts** of land subsidence and the need to incorporate a legal framework into public policies and resources management. Specialists from The Netherlands, Italy, USA and China document examples of subsidence management, and works from Mexico establish the need to consider the legal implications of environmental and urban damage caused by land subsidence and fracturing associated with excessive groundwater exploitation. Specific studies of strategic techniques for the assessment of urban risk in Mexico and Poland also are included. The papers in Section 6 deal with the problems of fluid withdrawal and provides **simulations of subsidence** for different extraction scenarios. The implications of climate change are presented by scientists from Canada, USA, China and Mexico.

*Precis of the Preface to the volume*

## The Right to Water and Water Rights in a Changing World

Report from the Colloquium on *The Right to Water and Water Rights in a Changing World*, 22 September 2010, UNESCO-IHE Institute for Water Education, Delft, The Netherlands

*In the face of global changes, what role can law play in safeguarding basic needs and rights, including that to water? Can law be more effectively mobilized to protect vulnerable communities better against droughts, floods and other climate related disasters? In so doing, to what extent can it contribute to world peace? As laws tend to be rigid, how can they play a more progressive role in a rapidly changing world? Currently water management is stepping away from the idea of stationarity – but what about legal issues? Are they set in stone?*

Water is essential to life. However, 884 million people still lack access to good drinking water, and 2.6 billion do not have access to improved sanitation. In the coming decades the world population is expected to expand to 9 billion human beings, with more than 5 billion in Asia in 40 years. This will increase competition between users over this scarce resource and may lead to conflicts. As Mr Boutros Boutros-Ghali, then Secretary General of the United Nations, warned in 1985 “*the next war in the Middle East will be fought over water, not politics*”. Climate change and variability have impacts on water resources, and thus on the implementation of the right to water and sanitation. As pointed out by Dr András Szöllösi-Nagy, Rector of UNESCO-IHE, in order to adapt to climate change and achieve all the Millennium Development Goals (MDGs), the answer is water.

As emphasized by the Mayor of Delft, Mr Bas Verkerk, the traditional approaches to cope with these kinds of problems are diplomacy, politics, economics and, unfortunately, military means. However, technical, scientific work and good dialogue would be much more efficient and could help the world with better solutions than the traditional ones. This is a good reason to enhance the work of professionals and institutions such as UNESCO-IHE, which is serving developing countries as well as students. To this end many other initiatives have started with the aim of turning conflict into peace and using water as an agent of change, such as the University for Peace and UNESCO’s programme “From Potential Conflict to Cooperation Potential (PCCP)”.

When looking at water from a legal perspective, the year 1997 can be seen as a turning point as the first UN global legal instrument was voted, namely the Convention on the Law of the Non-navigational Uses of International Watercourses (1997 Convention), although it is not yet in force. Another important step forward was the adoption of the Resolution A/RES/63/124 on the Law of Transboundary Aquifers by the United Nations General Assembly on 11 December 2008. On 28 July 2010 it adopted Resolution A/RES/64/292 in which it recognizes the right to safe and clean drinking water and sanitation as a human right that is essential for the full enjoyment of life and all human rights, and on 30 September the Human Rights Council adopted a resolution affirming that the human right to safe drinking water and sanitation is derived from the right to an adequate standard of living. It is hoped that we will be able to make things happen so that this human right can be translated into action.

To this aim, as Ms Laurence Boisson de Chazournes, professor at the Faculty of Law, University of Geneva (CH),

stressed, multilateral environmental agreements (MEAs) on environmental protection are important, especially when considered together with the 1997 Convention. Indeed the approaches of these conventions have to be integrated, and in order to provide clean access to water in the future, environmental protection is a necessity. The destruction of wetlands and deforestation, for example, can be the cause of landslides and other natural disasters, and threaten natural water runoff and groundwater recharge. Although MEAs are not perfect instruments and states do not always enforce or comply with them, they are important instruments of guidance for states and for changing behaviours. Although it is a regional convention, the 1998 Aarhus Convention is a reference instrument with regard to access to information, public participation in decision-making, and access to justice on environmental matters. It aims, *inter alia*, to be used as an instrument to make governments responsible for access to water. Professor Boisson de Chazournes underlined that we have to focus on the relationship between conventions and MEAs, ensuring mutual support in the framework of environmental protection and of human rights, and that we should focus on a global perspective and a multi-level approach concerning water and climate change. Finally, she emphasized the necessity of a legal notion of the social, environmental, economic, development pillar, and that environment needs to be the core issue.



András Szöllösi-Nagy, Rector of the UNESCO-IHE Institute for Water Education

### *Absence of conflicts can mean injustice*

According to Ms Thea Hilhorst, professor in Humanitarian Aid and Reconstruction at Wageningen University (NL), the absence of conflicts can mean injustice; some people do not have the knowledge or the chance to fight for access to water. Using the case of Mozambique as an example, she tried to answer the questions of how to integrate law at the local level and how to involve local people in water management, and noted that one of the reasons that people in Mozambique cannot deal with the flooding there is the lack of local knowledge – which is highly important for water management – due to displacements caused by conflict situations. Another challenge is the protection against and politicization of climate change, to find a way to live with floods in the

long term and not to view them as a crisis only. Lack of trust of people towards their governments has also to be taken into account. The implementation of climate-change adaptation programmes needs to be placed in the context of the local people's livelihoods and involve local communities for the full realization of people's rights and entitlements. Solutions could be the creation of new institutions and new laws, the development of multi-stakeholder initiatives, as well as monitoring these initiatives. Likewise, schemes such as weather insurances should be followed closely in the light of sustainability.



Professor Joyeeta Gupta, UNESCO-IHE Institute for Water Education and VU University Amsterdam

As the UN General Assembly adopted Resolution A/RES/64/292 in July 2010, recognizing the human right to water and sanitation, Ms Joyeeta Gupta reminded participants that it is however a very fragile consensus, and urged for a consensus at international level. Ms Gupta is professor of Climate Change Law and Policy at VU University Amsterdam and of Water Law and Policy at the UNESCO-IHE Institute for Water Education in Delft (NL). She emphasized the inequality in access to safe drinking water and sanitation, stating that water-carriers are often excluded from education, and the fact that women are often raped on their way to the non-existing toilets. Water is present in the law arena, however access to water and sanitation are not brought up as a key issue. Ms Gupta mentioned three phases of recognition of the human right to water: implicit recognition, such as through the right to life and health, explicit recognition, and independent recognition. In recognizing this right, the General Assembly turned it into a global responsibility, which explains why countries, especially developed countries, remain reluctant in recognizing it. She remarked that 25 UN agencies dealing with water all have their own perspective, and each state reacts in its own way on this issue. With their role becoming more important, private and non-state actors have a different ideology as well, and tend to focus on water as an economic good. Charging for water could be positive in the long term, but not in the short term as not all people are currently in a position to pay for water. Also, private companies are only accountable towards their shareholders and not towards the poor. As for adjudication cases, arbitration courts still tend more to recognize the rights of private companies, although they now start to refer to the human right to water.

### *Is the UN General Assembly Resolution on the human right to water and sanitation a good thing?*

Responsibility and competition between international institutions are two important considerations when looking at the right to water. The Ambassador of Bolivia, H. E. Mr Roberto Calzadilla Sarmiento, whose country took leadership on this issue, expressed his surprise to have seen states abstaining from voting on Resolution A/RES/64/292. Professor Gupta said that global responsibility and liability for damages to water supply due to climate change is an explanation for the fear of developed countries to take more responsibility, which led to their abstention from voting in favour of the Resolution. To the opinion of the Netherlands, represented by H. E. Mr Barend ter Haar, Ambassador of the Netherlands to UNESCO, the text of the Resolution raises two main issues:

- (1) that global responsibility was mentioned in the text while the primary responsibility to ensure the full realization of all human rights belongs to governments, and therefore responsibility at both levels should be taken into account; and
- (2) that the initiative was not helping the efforts of the Independent Expert of the Human Rights Council on this issue.

According to Mr Gregory Hobbs, a Justice on the Colorado Supreme Court (USA), adaptation is essential. Water resources need to be shared in equitable proportions and not be monopolized by the upstream state. In the same way, hallmarks of law can be listed as follows: security, reliability, and flexibility, since being able to evolve is essential as we are confronted with "wetter wets and drier dries". Mr Hobbs then focused his intervention on the example of the Colorado River Basin (shared between the USA and Mexico). The Basin's resources are owned by both the governments and users through their rights.



Judge Gregory Hobbs

Recalling that much of the thinking of scientists is based on randomness or probability in hydrology, Dr Andras Szöllösi-Nagy asked how law could be reconciled with randomness. The concept of stationarity is no longer acceptable, due to climate change. The problem for the USA

and Mexico (regarding the Colorado River Basin) in setting exact storage obligations, due to climate change, is an example, as is the River Nile for which agreements remain stationary, although the discharge regime has changed.

#### *Law needs to be guided by scientists*

Dr Juan Amaya-Castro, post-doc researcher at the Faculty of Law at VU University Amsterdam (NL) and assistant professor at the Department of International Law and Human Rights, United Nations mandated University for Peace (Costa Rica), based his intervention on the “legalization project of water”. If international law can be considered as weak, legalizing these claims might then be better achieved through domestic law. Stability and reliability are necessary, but also flexibility, and randomness in law exists through the functions and work of institutions and judges. Proper financing is necessary as well as the involvement of engineers and the guidance they can provide to lawyers and lawmakers. It is in giving or limiting the access to water that law makes water a scarce commodity. If the legalization process exists, it is not sufficient, and declaring the right to access to water and sanitation is a step forward, but too small a step. The law needs to be guided by engineers and scientists.

The first water war took place in Mesopotamia 3000 years ago and ended with the first water agreement allowing for sharing of the resource. Law should be considered as a commodity that facilitates cooperation, playing an essential role in preventing water conflicts and respecting people’s

water rights. Although legislation and conventions are numerous, they are not sufficiently operational and adapted to local livelihoods. The nexus between water and climate change, which concerns access to clean water and sanitation as well as natural disasters, has to be more closely looked at. The social effects of programmes, and cultural, social and economic issues, all have to be considered in order to respect lives, rights and entitlements. Peaceful access to clean water and sanitation needs legislation at all levels. Financing also needs mentioning. Infrastructures cost money, and some would say that water flows towards money, which means that the poor have less water available. Academia has to join forces and work on practical solutions to answer these key issues. Civil society has an important role as well, especially when institutions and legislation do not ensure them. Water governance is the key to solutions. Lawyers and scientists therefore need to work together and help each other, and help politicians in recognizing and implementing the rights.

The colloquium was organized by the Netherlands National Committee IHP-HWRP, the Co-operative Programme on Water and Climate (CPWC), the Foundation for UPEACE, the UNESCO-IHE Institute for Water Education and the Netherlands National Commission for UNESCO.

*Charlotte Herman  
Marguerite de Chaisemartin  
Michael van der Valk*

## ***Availability of IAHS Publications in Developing Countries***

IAHS has long had a commitment to facilitating access by all hydrological scientists to its own publications. To this end the so-called *Task Force for Developing Countries* (TFDC) has for many years distributed copies of books and provided *Hydrological Sciences Journal* free-of-charge to addresses in poorer countries.

The main principle underlying the distribution of these publications is that they should be made available to as many interested individuals as possible: hydrologists and other scientists, engineers and other practitioners, students and teachers, whether members of the receiving organization or visitors to it.

The principles of the distribution of free publications were revised and formalized at a meeting of the IAHS Bureau (Paris, September 2004) and are summarized here:

#### ***General Principles for Distribution of Publications by IAHS-TFDC***

1. Publications should only be distributed to recognized publicly-funded organizations (e.g. universities, research institutes), and the recipient organization should make publications available to **all staff and students, and also to visitors**.
2. If an organization’s application is successful, IAHS-TFDC will supply *HSJ* plus all other publications for a period of three years. At the end of the three years, the application will be subject to review.
3. Each developing country that applies for TFDC support should have at least one organization that receives IAHS-TFDC publications. Big developing countries with several

geographically-separated educational organizations, such as India or China, could have more support from IAHS-TFDC. The maximum number of organizations per country, however, should usually be limited to three or four.

4. IAHS-TFDC will distribute publications to the first organization in a country that applies, if the IAHS National Representative supports the application.
5. If IAHS receives more applications for TFDC support from the same developing country, the IAHS National Representative will be required to provide advice. Then, the VP of IAHS responsible for TFDC will make a final decision.

The TFDC address list has been reviewed in 2010 and brought into line with the IAHS definition of poorer countries which is now based on annual per capita GNI figures as used by the UN Development Programme, and OARE (Open Access to Research on the Environment) supported by the UN Environment Programme. Accordingly, countries such as Brazil and Poland have been removed from the list but this has allowed introduction of, for example, more African recipients.

Also, addresses from which there was no communication regarding the provision of books have been dropped from the list. IAHS needs to know that the intended recipients do receive the books – otherwise they could be disappearing into a black hole for all we know.

To date it has been agreed that 48 organizations should (continue to) receive publications, and in 2011 they will receive:

- a subscription (print and electronic) to *Hydrological Sciences Journal*;
- copies of all new books published by IAHS in the Proceedings and Reports, Special Publication, and Benchmark series, i.e. the Red and Blue books and Benchmark volumes.

The normal retail value of this package of publications will be about US\$1000 per year or more and, thus, IAHS is very concerned to ensure that everyone at each organization, and the wider hydrological community in the region/country, has full opportunity to make use of them.

In deciding which organizations are included in the list, some preference has been given to university libraries, because their remit is to provide a service to researchers, staff and students, and to make their collections widely available.

We are still trying to contact certain organizations and/or national representatives to get information that will permit

decisions to be made on another ~20 organizations. We hope that process will be complete in a couple of months. We shall distribute the back copies to these organizations when we have their full details.

### Organizations receiving IAHS publications 2011–2014

Forty-eight organizations are listed below; a further list will be published when details are finalized.

In the absence of a contact name below, please contact the librarian/head of the library/organization. In any communication with IAHS, please give the TFDC reference number.

New applications for TFDC support should be referred to the IAHS Vice-president for Developing Countries:

Denis Hughes [d.hughes@ru.ac.za](mailto:d.hughes@ru.ac.za).

Other enquiries may be addressed to [jilly@iahs.demon.co.uk](mailto:jilly@iahs.demon.co.uk)

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# Global Change:

## Facing Risks and Threats to Water Resources

Edited by *Eric Servat, Siegfried Demuth, Alain Dezetter & Trevor Daniell*

Co-edited by *Ennio Ferrari, Mustapha Ijjaali, Raouf Jabrane, Henny Van Lanen & Yan Huang*

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Substantial contributions address: Hydro-hazards, Adaptation Strategies, Human Pressure on Limited Resources, Environmental Information and Monitoring Systems, and Large Scale Hydroclimatic Variability and Impact; these are the edited proceedings of the 6th World FRIEND Conference. FRIEND (Flow Regimes from International Experimental and Network Data) is an international research programme that helps to set up regional networks for analysing hydrological data, and aims to improve the understanding of hydrological variability and similarity across time and space through a mutual exchange of data, knowledge and techniques at the regional level.

Abstracts of the papers in this volume can be seen at:

[www.iahs.info](http://www.iahs.info)





## The Sixth World FRIEND Conference: Focusing on the Mediterranean Basin

Jointly organized by the Faculty of Science and Techniques of the University Sidi Mohamed Ben Abdellah of Fez (Morocco) and the Laboratory "HydroSciences Montpellier" (France), the 6th World FRIEND Conference took place in the Palais des Congrès of Fez, 25–29 October 2010. Since 1984, FRIEND (Flow Regimes from International Experimental and Network Data) has aimed at developing and strengthening the exchanges between researchers in the field of hydrology. Coming from 36 countries, more than 150 participants brought together their knowledge about *Global Change: Facing Risks and Threats to Water Resources*.

In order to reach a better assessment of the risks linked to global change, five topics were considered during the Conference. And so, over four days (only four because Wednesday October 27 was left free to allow participants to visit the many nice places in Fez and nearby), two parallel sessions gave the opportunity to authors to present their work and results regarding:

1. Hydro-hazards,
2. Adaptation strategies,
3. Anthropogenic pressure on limited water resources,
4. Environmental information and monitoring systems,
5. Large scale hydroclimatic variability and impact.

During the week, Steering Committee meetings of various FRIEND groups were held, as well as the FIGCC one (FRIEND Inter Group Coordination Committee). Prof. Henny Van Lanen (Netherlands) took over from Prof. Trevor Daniell (Australia) as new FIGCC Chairman for the next four years. It was also decided that the next World FRIEND Conference would take place in Asia in 2014.

The IAHS Red Book *Global Change: Facing Risks and Threats to Water Resources*, pre-published for the FRIEND Conference (IAHS Publ. 340) includes 87 papers. Prof. Gordon Young, IAHS President, was among the participants.

The Conference, being held in Morocco, was a good opportunity to have a focus on the Mediterranean Basin. Actually, it is the most visited area in the world. But if, on one hand, it has to address a strong population increase, on the other hand, it also has to deal with poor, unequal and overexploited water resources. Furthermore, climatic scenarios are not fair when considering the next decades: the anticipated decline of precipitation and increase of the temperatures are expected to worsen the hydrological situation. This very specific context had been taken into account in deciding to organize this FRIEND Conference in a Mediterranean country.

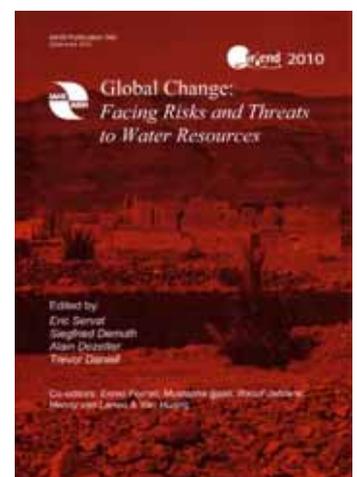
The goal was reached as the conference was a perfect occasion to underline the extreme fragility of water resources in the arid and semi-arid Mediterranean areas in connection with both the climate worsening and the overexploitation of the resources. In order to mitigate such consequences, several major issues were emphasized during the Conference: increasing study of underground waters (particularly karstic aquifers, which are very common all around the Mediterranean); improving analysis of the impacts of anthropogenic activities on both the quality and quantity of water resources; or, more, coupling climatic scenarios with models taking into account water uses, etc. These issues are regarded as priority fields of research for Mediterranean hydrologists, but there are others. The conference also emphasized interface areas such as coastal environments. Indeed these are places of many and heavy socio-economic stakes and they have to deal with an increasing exploitation for tourism purposes.

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The inaugural session of the 6th World FRIEND conference



IAHS Publ. 340, pre-published for the meeting, see p. 12 for details

## International Graduate Conference on Climate Change and People

15–19 November 2010, Kathmandu, Nepal

The first *International Graduate Conference on Climate Change and People* was held in Nepal from 15 to 19 November 2010. The conference was organized by The Small Earth Nepal (SEN) and Consortium for Capacity Building (CCB), University of Colorado, USA, with the base funding from the Asia Pacific Network for Global Change Research (APN). IAHS was one of the co-sponsors of the Conference. Gordon Young, IAHS President, presented a keynote speech entitled “The Challenges of Global Water Management in 2020: Focus on the Himalayan Region”.

Seventeen experts from various fields, such as biodiversity, water resources, climate change science, natural hazards, policy, equity and ethics, shared their experiences and opinions among 150 delegates representing 17 countries from Greater South Asia (Kyrgyzstan to Bangladesh) and beyond. The conference was focused on multidisciplinary capacity building of graduate students who participated in the lecture sessions and in interaction with experts, group discussions, panel discussions and in forming networks for advocating climate change affairs. The conference was concluded with the message of uniting together instead of blaming each other to mitigate climate change impacts and continue to work together through the Eco Generation Network. The conference also prepared a message to the delegates at the Conference of Parties (COP-16) of UNFCCC to be held in Mexico this year. The major issues raised there were fulfilling a data gap through intensive research, youth networking for communicating climate change, economic support to affected people, fair and equitable distribution of resources and climate funds, developing alternative livelihood options for vulnerable communities, introducing and promoting indigenous knowledge, etc. The conference also recognized women, children and marginalized people as the most vulnerable group and demanded that special provision and mechanisms for their adaptation be made. At

the end of the conference, the Eco Generation Network was initiated among the delegates and beyond to share information regarding research findings related to climate change and society. A key attraction among the participants was the *Eco Generation Newsletter* published each day of the conference.

*A speaker during the opening session*



### *Professor Young among Hydrologists in Nepal*

On 18 November, Gordon Young also presented his paper in a talk programme at Nepal Academy of Science and Technology organized by Society of Hydrologists and Meteorologists (SOHAM Nepal), IAHS-Nepal, IHP-Nepal and The Small Earth Nepal (SEN). The program was attended by more than 50 experts from Nepal working in hydrology and meteorology. Professor Young shared his experiences and emphasized that water quality, groundwater scarcity and water-related extreme events would be the main challenges facing water management in 2020.

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## Hydrological Sciences Journal

The last of the eight issues in volume 55 of *Hydrological Sciences Journal* is already published and available on the InformaWorld platform. Everyone can read the editorial and abstracts in this issue at: [www.tandf.co.uk/journals/thsj](http://www.tandf.co.uk/journals/thsj) or click on the link at the IAHS website. Library and individual subscribers can see the full papers. The backfile, volumes 1–52, is available open access, as are several other papers in recent issues.

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## Calendar of Meetings Organized/Sponsored by IAHS and Its Commissions

2011	Conference	Contact details
Bern, Switzerland 7-9 February	6th EARSeL Workshop on Remote Sensing of Snow and Glaciers: <i>Cryosphere, Hydrology and Climate Interactions</i>	
Algiers, Algeria 21-23 Février 2011	4ème Colloque International sur les Ressources en Eau et le Développement Durable	Meddi Mohamed, Ecole Nationale Supérieure de l'hydraulique. BP 31, 09000 Blida, Algérie tel: +213 25 39 9447 / 9071; <a href="mailto:CIREDD4@ensh.dz">CIREDD4@ensh.dz</a> or <a href="mailto:CIREDD4@gmail.com">CIREDD4@gmail.com</a>
Vienna, Austria 11-14 April 2011	The Status and Future of the World's Large Rivers	Helmut Habersack, <a href="mailto:helmut.habersack@boku.ac.at">helmut.habersack@boku.ac.at</a> Des Walling, <a href="mailto:d.e.walling@exeter.ac.uk">d.e.walling@exeter.ac.uk</a>
Monaco 27 March-1 April	International Symposium on Isotopes in Hydrology, Marine Ecosystems, and Climate Change Studies	
Exeter, UK 18-21 April	8th International Symposium on Weather Radar and Hydrology	Robert J. Moore, Centre for Ecology & Hydrology, Wallingford, Oxfordshire OX10 8BB, UK tel: +44 1491 692262 ; fax : +44 1491 692424; <a href="mailto:rm@ceh.ac.uk">rm@ceh.ac.uk</a>
Nanjing, China 19-21 April	International Symposium on Climate Change and Water	Dr Guoqing Wang: <a href="mailto:ggwang@nhri.cn">ggwang@nhri.cn</a> or <a href="mailto:jscw2011@yahoo.com.cn">jscw2011@yahoo.com.cn</a> Dr Cuishan Liu: <a href="mailto:cslu@nhri.cn">cslu@nhri.cn</a> ; Dr Ruimin He: <a href="mailto:rmhe@nhri.cn">rmhe@nhri.cn</a>
Vienna, Austria 2-5 May	HydroEco2011: 3rd International Multidisciplinary Conference on Hydrology and Ecology: <i>Ecosystems, Groundwater and Surface Water – Pressures and Options</i>	Hans-Peter Nachtnebel or Karel Kovar, Universität für Bodenkultur Wien (BOKU), University of Natural Resources and Applied Life Sciences, Institute of Water Management, Hydrology and Hydraulic Engineering, Vienna, Austria tel: +43 1 360065501; <a href="mailto:hans_peter.nachtnebel@boku.ac.at">hans_peter.nachtnebel@boku.ac.at</a> or <a href="mailto:karel.kovar@pbl.nl">karel.kovar@pbl.nl</a>
Western Canada 13-14 May	International PUB meeting	John Pomeroy: <a href="mailto:john.pomeroy@usask.ca">john.pomeroy@usask.ca</a>
Golden, Colorado, USA 5-8 June	MODFLOW and More 2011 : Integrated Hydrologic Modeling	Eileen Poeter: <a href="mailto:epoeter@mines.edu">epoeter@mines.edu</a>
Melbourne, Australia 27 June-8 July 2011	XXVth IUGG General Assembly	
Besançon, France 1-3 September 2011	H2Karst, the 9th Conference on Limestone Hydrogeology	Prof. Jacques Mudry: <a href="mailto:h2karst.besancon@gmail.com">h2karst.besancon@gmail.com</a>
Leipziger Kubus, Germany 19-22 September	ModelCare 2011, 8th International Conference on Calibration and Reliability in Groundwater Modelling: <i>Repositories of Knowledge</i>	<a href="mailto:modelcare2011@fu-confirm.de">modelcare2011@fu-confirm.de</a>
Tsukuba, Japan 27-30 September	5th International Conference on Flood Management	PWRI/ICHARM, 1-6 Minamihara, Tsukuba, Ibaraki, 305-8516 Japan tel: +81 29 879 6809; fax: +81 29 879 6709; <a href="mailto:info@ifi-home.info">info@ifi-home.info</a>
Tunis, Tunisia 17-18 October 2011	STAHY Workshop	Salvatore Grimaldi: <a href="mailto:salvatore.grimaldi@unitus.it">salvatore.grimaldi@unitus.it</a>
2012	Conference	Contact details
London, UK 26-29 March	Planet under Pressure : New knowledge towards solution	
Prague, Czech Republic 21-24 May	GFR2012 International Conference on Groundwater in Fractured Rocks Jointly convened by IAH Czech National Chapter, IAH Commission on Hydrogeology of Hard Rocks, and International Commission on Groundwater (ICGW) of IAHS (web page available in February 2011)	Dr Zbynek Hrkal, Charles University, Prague, and T.G. Masaryk Water Research Institute (VUV), Prague, Czech Republic. Also Secretary of Czech National Chapter of IAH; tel: +420 220 197 463; <a href="mailto:zbynek_hrkal@vuv.cz">zbynek_hrkal@vuv.cz</a> Karel Kovar, VP IAHS/ICGW: <a href="mailto:karel.kovar@pbl.nl">karel.kovar@pbl.nl</a>
Niagara Falls, Canada 16-23 September	IAH Congress. Confronting Global Change	
2013	Conference	Contact details
Göteborg, Sweden 22-26 July	Joint IAHS-IAPSO-IASPEI Scientific Assembly	



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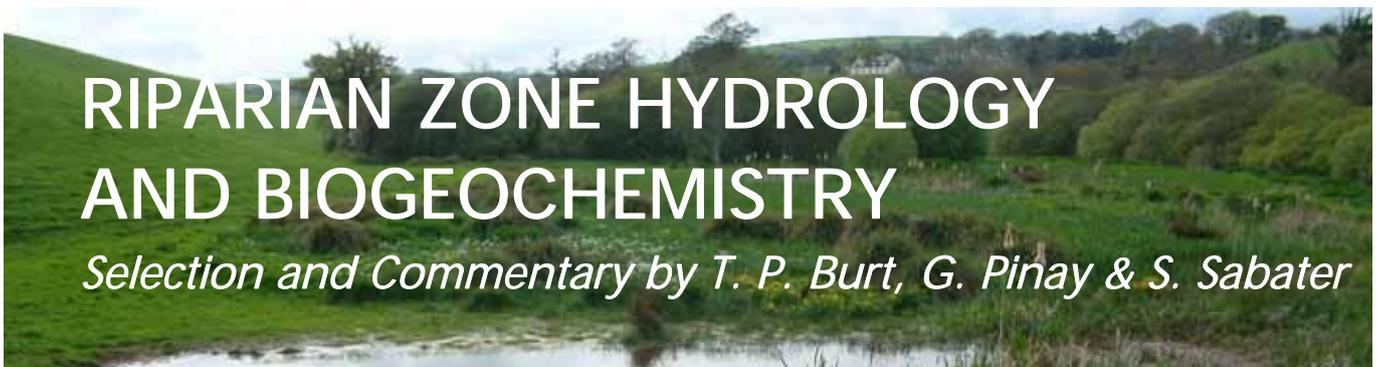
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## BENCHMARK PAPERS IN HYDROLOGY, vol. 5



### RIPARIAN ZONE HYDROLOGY AND BIOGEOCHEMISTRY

Selection and Commentary by T. P. Burt, G. Pinay & S. Sabater

Study specifically of riparian zones is relatively new in hydrology, and while the oldest benchmark paper selected for this volume dates to 1936, several of the others were published in the 1970s and 1980s. Burt, Pinay and Sabater introduce them with a review of the role of the riparian zone. Its services as a buffer for nitrates and other agricultural and industrial pollutants has focused the attention of ecologists and hydrologists. It is an ecological boundary between terrestrial and aquatic environments, but also a distinct ecotone because of the intimate connection between the two. The 36 benchmark papers are grouped under the topics Landscape Ecology, Hydrology of the Riparian Zone, Linking Riparian Zone Hydrology to Solute Transport, Biogeochemical Processes and Methods, Riparian Buffering of Surface and Subsurface Flows, and In-stream Processes. Together, the reprinted papers and the commentaries by the editors chart the breakthroughs in the development of this important subdiscipline.

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