



Reports and news from the IAHS Assembly at IUGG2011



Giuseppe Arduino (UNESCO), Carlos Tucci, Gabriel Arduino (WMO), and Gordon Young (IAHS President)

Carlos Tucci (Brazil) is awarded the International Hydrology Prize



The 2011 International Hydrology Prize was awarded to Carlos Tucci at the main Plenary Session of the IAHS Assembly at IUGG2011, in Melbourne, in recognition of his outstanding contributions to hydrology. The prize is awarded annually by IAHS, UNESCO and WMO. See the citation and response on page 4.



Tributes to Pierre Hubert who stands down after 11 years as IAHS Secretary General (and is elected to the IUGG Bureau) see pages 2 and 3.

The 2011 Tison Award goes to Emmanuel Pagneux

The winning paper: *Inundation extent as a key parameter for assessing the magnitude and return period of flooding events in*



southern Iceland, published in *HSJ* 55(5) can be viewed online at:

www.iahs.info/Tison/Pagneux.htm

See the citation and response on page 5.

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Message from the President

gordonyoung_wwap@yahoo.com

More than 3500 scientists attended the General Assembly of the International Union of Geodesy and Geophysics (IUGG2011) in Melbourne in June/July. The Assembly provided the opportunity for scientists from the eight IUGG Associations to mingle and exchange ideas. The many Union lectures were extremely stimulating, allowing scientists to learn of new achievements in related scientific disciplines.

IAHS was very active at the Assembly. Despite the very high costs of travelling to Australia, exacerbated by the growing strength of the Australian dollar, most major IAHS events were well attended. Reports of many of the six symposia and 18 workshops organized by IAHS are to be found elsewhere in the Newsletter.

New Officers

The Assembly was also the time when new officers of the Union and its Associations were elected. Welcome to the more than 50 officers elected within IAHS and its Commissions – details can be found on the IAHS website under “News from Melbourne”. A special welcome is given to Christophe Cudennec, our new Secretary General, who will be the driving force within IAHS over the next years, and to Hubert Savenije, our new President-Elect who has already assumed responsibilities regarding completion of the PUB decade and formulation of a new scientific initiative.

Thank you to those standing down

Tributes were made to the many officers retiring from duties within the Association. Especially significant were the tributes to Pierre Hubert, our retiring Secretary General. Pierre served as SG for eleven years during which he really was the dynamo keeping the Association running. He was extremely dedicated, prodigiously hard-working and innovative – the Association is enormously indebted to him. Luckily Pierre has been elected to the Bureau of IUGG and so will still be able to have influence on behalf of IAHS. Two more of our departing officers, Dan Rosbjerg and Makoto Taniguchi have been appointed to represent IAHS on a proposed new Union Commission on Climatic and Environmental Change.

Major decisions for IAHS

Major decisions concerning the future of IAHS were made during the two IAHS Bureau sessions. They are summarized below:

Working Groups

- The STAHy WG has been up-graded to the International Commission on Statistical Hydrology. Salvatore Grimaldi is its President and a slate of appointed officers will serve until regular elections for new officers in 2015.
- The Education WG will continue for another four years and will be expanded to more effectively include

the needs of developing countries – the Task Force for Developing Countries will be an active collaborator.

- The PUB WG is entering its 5th and final biennium to be chaired by Hubert Savenije; a PUB/FRIEND/HELP event is being proposed for the next Kovacs Colloquium likely to be held in June/July 2012; a major PUB wrap-up symposium is planned as part of the 90th birthday celebrations of IAHS in October 2012.
- The Precipitation WG will continue for another four years under the chairmanship of Daniel Schertzer; strong links with relevant Commissions are encouraged.
- The Task Force for Developing Countries will continue under the chairmanship of Denis Hughes.
- The GRACE WG has been terminated, its work to be undertaken by ICRS.
- The Hydrometeorology WG has been terminated, its work to be undertaken by ICCLAS.

The Benchmark series of books

The current series of nine publications will soon be completed under the general editorship of Jeff McDonnell. There was a strong decision that we should attempt to continue the series, conditional on it being cost-effective. There was agreement that the Commissions should be more actively involved in the editing of the series and that preferably there should be more than one editor for each volume.

A new scientific initiative for the future of IAHS

There was much effective debate during the IUGG Assembly on a new scientific initiative to take IAHS into the future in a similar fashion to the PUB decade that is scheduled to end in the next two years. A Task Force, to be chaired by Alberto Montanari, is in the process of being created. The mandate of this TF will be to suggest the theme, objectives and how to implement the new initiative, and its title. The TF should be composed of “younger” scientists (in their 30s and 40s) and will report to

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Edited by Cate Gardner

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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, Christophe Cudennec, preferably to: cudennec@agrocampus-ouest.fr, or to:

IAHS, UMR SAS, Agrocampus Ouest,
CS 84215, 35042 Rennes Cedex, France

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the IAHS Bureau, with Hubert Savenije taking a prime responsibility to oversee the process. The Bureau will take final decisions on the nature of the new initiative. The TF should operate for up to two years, the intention being that a new IAHS decade will commence at the next IAHS Assembly in 2013 (see below). Each Commission is encouraged to suggest one or two names of possible TF members.

The 90th anniversary of IAHS

2012 will mark 90 years of the existence of our Association. A special event will be held at the Technical University of Delft, in The Netherlands, from 22 to 26 October 2012. The event will have two elements – firstly a final PUB symposium designed to draw together the outputs from the PUB decade, and secondly a major discussion on the new scientific initiative scheduled to commence in 2013.

IAHS Assembly 2013

The next major IAHS Assembly will be held in Gothenburg, Sweden, from 22 to 26 July 2013. The Assembly will be held jointly with two of our sister Associations – IAPSO (International Association of Physical Sciences of the Ocean) and IASPEI (International Association of Seismology and Physics of the Earth's Interior). Two sets of symposia and workshops are envisaged: firstly joint symposia and workshops with our sister associations; secondly stand-alone IAHS symposia and workshops. Liliang Ren, newly appointed IAHS Vice-President, is in overall charge of this process.

And finally

So we now enter a new quadrennium with a new set of officers, with an additional Commission and with potentially a new major scientific initiative to be debated and selected in the next two years. This will be an exciting time for IAHS and I look forward to working with all of you.

Gordon Young

Message from the new Secretary General, Christophe Cudennec

Dear Colleague Hydrologists,

As the new Secretary General of the Association, I take the occasion of this newsletter to express two messages of gratitude and one message for the future.

First, I sincerely thank the national representatives who elected me in Melbourne. Michael van der Valk (NL) was also a candidate for the position, and I hope Michael will continue to be active for the Association in the future.

Secondly, let me draw your attention to the fact that Pierre Hubert has been Secretary General for 11 years (appointed in 2000, elected 2003–2007 and 2007–2011), thus serving under presidents J. C. Rodda, K. Takeuchi, A. Askew and G. Young. There is a large consensus (I have been aware of it on many occasions) that Pierre gave

a lot of energy, time, ideas, deontology and strategy to the Association, its community and its partnership. Dear colleagues, please join me to thank Pierre deeply, and as he deserves, for the tremendous job that he has done. By recognition (and fortunately for IAHS), Pierre has been elected to the IUGG Bureau, and appointed as the IUGG liaison officer with UNESCO.

Becoming IAHS Secretary General after Pierre will be both easy and difficult. Easy, because the house is in order. Difficult, because the comparison will be demanding. But overall, my duty will be to serve IAHS in addressing the numerous challenges over the next four years, and I am ready for this as a cog in a dynamic organization.

*Prof. Christophe Cudennec,
Agrocampus Ouest, France
cudennec@agrocampus-ouest.fr*



Pierre Hubert listens to a musical tribute at the IAHS dinner held in Melbourne during the Assembly.



IAHS now has an online bookshop at www.iahs.info

It is simple to order and pay online by credit card. Membership discounts are given where applicable.

Books are dispatched from IAHS Press at Wallingford, UK, as before.

IAHS publications can still be ordered from Jill Gash: jilly@iahs.demon.co.uk and/or using the order form at: www.iahs.info.redbooks/orderform.pdf

Presentation of the 2011 International Hydrology Prize

Citation by Gordon Young, IAHS President

For outstanding regional and global contributions to hydrology

I have great pleasure in presenting Professor Carlos Eduardo Morelli Tucci of Feevale University in Novo Hamburgo, Brazil, as this year's recipient of the International Hydrology Prize. Professor Tucci has had an outstanding career as a researcher in many fields of hydrology, as a teacher and a consultant.

Professor Tucci received his first degree in civil engineering in 1971 and his MSc in Civil Engineering/Water Resources in 1975 from the Federal University of Rio Grande do Sul, Brazil; he received his PhD in Water Resources Engineering from Colorado State University, USA, in 1978. Professor Tucci was full professor of the Hydromechanics and Hydrology Department of the Institute of Hydraulic Research (IPH) of the Federal University of Rio Grande do Sul (UFRGS) from 1972–2003 where he was Coordinator of Research activities in Urban Water Management and Modeling in Water Resources and Head of the Graduate Program on Water Resources from 1993–1997. He retired as a civil servant in September of 2003, acting as invited professor since then. Since 2009 he has been a Professor at Feevale University in Novo Hamburgo.

His main areas of scientific interest have included hydrology and hydraulics, simulation of water resources systems, urban water management, water resources management, climate variability and flow forecasting, and integrated environment assessment. He teaches the disciplines of Basic Hydrology, Engineering Hydrology, Hydrologic Simulation, and Computational Hydraulics at the graduate level, and Applied Hydrology and Stormwater Management at the undergraduate level; he is an advisor of Masters theses and PhD dissertations in the Water Resource graduate programs of IPH/UFRGS and Feevale.

Professor Tucci has held many important positions during his career, including Secretary of the Water Resource Investment Fund of the Ministry of Science and Education of Brazil, 2001–2003; President of the Brazilian Water Resource Association, 2003–2005; President of the South America Technical Advisory Committee of the Global Water Partnership, 2003–2005; researcher supported by the National

Research Council of Brazil, 1980–2010 and senior researcher since then; President of UNDP Capnet Brazil, 2007 until present; Vice-chairman and member of the Board of the UNESCO International Centre for Water Hazard and Risk Management, Japan 2006–2008 and member of the Board 2008–2010; main Editor of the Brazilian water resource journal *Revista Brasileira de Recursos Hídricos*; Editor of *Revista de Gestão da Água da América Latina* – a water management journal; Chairman of the Latin American Seminar on Water Resource Public Policies in Brasilia, 2004; Member of the scientific board of several national and international journals; Fellow of the International Water Resources Association; research advisor and project evaluator of State and Federal Research Agencies in Brazil, Uruguay and Argentina; member of the scientific boards of *Urban Water Journal* (UK) and of *Revista Latino Americana de Recursos Naturales* (México).

Professor Tucci has received many honours including: the Medal of Civil Defense of the State of Rio Grande do Sul in 1985; Best Book on Science and Technology in 1994 in the Book Editor Society of Rio Grande do Sul for "*Hydrology Science and Application*"; the bi-annual award of the Brazilian Water Resource Association, 2005; the Best Paper on contributions of application of meteorology, given by the National Institute of Meteorology in 2006. He has an impressive publication record including 22 books, 65 chapters in books, more than 130 papers in international and national journals, and more than 240 papers in symposia, seminars and reports.

Professor Tucci has served IAHS well as Vice-President, 1999–2003 and as President of the Local Committee for the Scientific Assembly of IAHS in 2005 in Brazil. He has also been a consultant on a broad range of topics world-wide for many international organizations including UNDP, UNESCO, WMO and the World Bank.

In the thirty years since the International Hydrology Prize was first presented, this is the first time that it has been awarded to a recipient from Latin America. Professor Tucci brings distinction to his country, his region and the global hydrological community. It is a privilege to award him the Prize on behalf of our Association, UNESCO and WMO.

Carlos E. M. Tucci's response to receiving the International Hydrology Prize 2011

On a Sunday in May, Pierre Hubert called me from Paris and at first I thought he was inviting me to participate in a prize committee. He had to insist that I had received the important International Hydrology Prize of IAHS; I did not realise initially that I was to receive the Prize.

It was an honour to receive this Prize because I am the first Latin American researcher working outside of the mainstream countries in hydrology science to receive it. I believe it is the result of the Brazilian investment in science since the 1980s with billions of dollars going into scholarship and supporting research. I believe it is also the result of my working in the Institute of Hydraulic Research, a 48-year old institution with its 43-year old interdisciplinary graduate



Professor Tucci makes his response.

program that was created by a UNESCO project in the 1960s to qualify professors and students from everywhere in Latin America. I am sure it is also the result of the education of my father and mother, the family I have of which I am very proud, and mainly my wife's support which took most of her time, besides her work, in raising the children and her understanding of my frequent absences from home.

I am very grateful to have the opportunity to work in a period of time of many changes in a country with so many challenges to deal with, starting with the inflation chaos of the 1980s to nowadays when 20 million people come from poverty to the middle class. In this environment we have many challenges in knowledge development which have direct use for society in some unique eco-hydrological environments, such as the Pantanal, Amazonas, Savanah of Central Brazil, semi-arid areas and 9000 km of coastal areas. The richness of that, in a continental country, strengthened our belief that natural sciences such as hydrology require development of local and regional knowledge related to the complex interactions of natural behaviour at different scales of time and space with human economic and social complexities, such as deforestation, urbanization, air and water contamination. There are no "turn key" tools but each environment has its own "hydrology DNA" to be understood and adapted in order to have a sustainable society.

In 2001 I had the opportunity to develop a strategic framework for research in water resources for Brazil and

today I am reviewing this strategy after 10 years. The key lines of research have been based mainly on the development of science and technology with real visibility for society, and discussed with private and public decision makers. It has been an important opportunity to understand how dependent modern society is on hydrology knowledge, which supports the environment, water supply, food and energy production and extreme events, among others.

In the next 40 years the world challenge will be the additional three billion persons in the cities of developing and poor countries with local high demand for natural resources. Hydrology plays an important role in the urbanization for support solutions. In these countries, there is a big gap of knowledge in Hydrology which leads to vulnerable societies. Consequently, it is important that the efforts start in developing capacity building in order that these countries develop their own solutions, outside of the common procedure of supply driven projects which usually leave more economic debts than benefits. I believe institutions such as IAHS have the opportunity to support these issues by its networks of researchers, professional and research centers, taking account of global existing economic resources.

I thank IAHS for this Prize and the opportunity to present this response.

Presentation of the 2011 Tison Award

Citation by Zbigniew W. Kundzewicz, IAHS Editor

The 2011 Tison Award, honouring an outstanding paper by a young scientist in an IAHS publication, goes to an Icelandic author, Dr Emmanuel Pagneux, for the paper "*Inundation extent as a key parameter for assessing the magnitude and return period of flooding events in southern Iceland*". This paper, published in *Hydrological Sciences Journal* 55(5) in 2010, was jointly authored by three scientists from Iceland – Emmanuel Pagneux, Guðrún Gísladóttir & Árni Snorrason, but only the lead author receives the Award, as only he is eligible, age-wise. The awarded paper emanates from a cooperative doctoral research project between the Icelandic Meteorological Office and the University of Iceland.

In the Icelandic river basin studied in the paper, there is a range of flood-generating mechanisms, such as precipitation and snowmelt; but also the formation, drifting and accumulation of river ice leading to ice jamming; glacial outburst (glacial lake emptying); and marine submergence induced by storms. Hence, when assessing the magnitude of floods, river discharge has to be used with caution, because for some events the extent of inundation is not reflected in the discharge records.

The awarded paper contains a GIS-based study, focusing on inundation extent and including several generation mechanisms, for the assessment and ranking of the magnitude of past flooding in a river basin. The approach enriches the interpretation of time series of inundations of both contemporaneous and historical events.

The technique was designed to deal with the specific situation in the particular river basin in Iceland with a record of damaging floods, hence the possibility of direct generalization is limited. However, the findings will be of

interest in regions where discharge records fail to reflect consistently the magnitude of floods. They will be of interest for implementation of the Floods Directive of the European Union, which obliges the EU Member Countries to create flood risk maps and flood hazard maps.

It is opportune that the Tison Award of the International Association of Hydrological Sciences goes to an international scientist – a Frenchman working in Iceland.



Dr Pagneux was unable to attend in person to receive the Award, but it was collected on his behalf by Dr Kristin Vogfjörð, Director of Research at the Icelandic Meteorological Office, here with Gordon Young and Zbyszek Kundzewicz.

Note, the Tison Award is sponsored by Taylor & Francis

As the Chair of the Tison Award Committee, I wish to express the wish that bestowing the Tison Award on Dr Emmanuel Pagneux encourages the author to further pursue fine research work in the domain of hydrological sciences, and serves as a springboard in his international scientific career.

Emmanuel Pagneux's message, read by Kristin Vogfjörð

Dear Colleagues, I deeply regret not being here with you in Melbourne. I would like to say how much I am honoured and surprised to receive the Tison award. As a geographer, I have to confess that being awarded this prestigious hydrology

prize is quite amazing and somewhat undue! I want to share this prize with the co-authors of the paper, Dr Guðrún Gísladóttir, professor of geography at the University of Iceland, and Dr Árni Snorrason, Director of the Icelandic Meteorological Office. It was important to us to demonstrate that the relation between gauge observations and the extent and boundaries of flooding events is weak in certain circumstances, and it was our objective to propose a comprehensive mapping methodology that would have a place in the preliminary assessment of flood hazard. We hope that the approach developed will serve beyond the frontiers of Iceland.

Thank you very much.

Impressions of a newcomer to IAHS at Melbourne



I heard about the organisation of the 25th IUGG General Assembly whilst doing fieldwork in the cultivated plains of Western Russia, which are characterized by wheat fields as far as the eye can see. This conference would take place in Melbourne, Australia. It is difficult to find any more remote and mythical place around the world when you live in Europe. But the conference was to be held at the end of June and in early July, which coincides with the beginning of the Southern Hemisphere winter. I nevertheless took the risk and submitted two abstracts to hydrology-related sessions and they were accepted.

After more than 22-hours plane trip with a missed connection at Singapore international airport and the conventional leg-room rationing (very convenient when you are 1.93-m tall), I arrived in the full Australian winter. The weather was sunny and mild (around 17°C); I must confess that I have experienced harsher winters.

The conference took place close to the Yarra River in the brand new Melbourne convention centre, with its modern escalators, conference rooms, lavatories and picture windows. The opening ceremony set the tone, with the showing of an impressive movie on the most severe catastrophes that have hit the world during the last few years, including the recent earthquakes that hit Japan and New Zealand. That was the kick-off of a 10-day scientific marathon about geodesy, volcanology, meteorology and, of course, hydrology. I was surprised by the great variety of English accents, not during

the speeches of non-native speakers, but in the mouths of the numerous Australian, Canadian, American and British scientists. In addition to the focused presentations grouped in numerous sessions, four plenary sessions were given by invited outstanding scientists. They addressed large audience topics such as “hydrology and change”, the “present-day sea level rise” or “earthquake forecasts”. Besides the sessions I was directly involved in (among which a very enriching sediment tracing workshop), I learnt a lot from other sessions such as those on “water quality and climate change” and “revisiting experimental catchment studies in forest hydrology”. It was made very clear that many countries are currently experiencing huge problems associated with the degradation of their water resources, either in quantity or in quality. I was particularly impressed by the severity of the challenges faced by the scientists and the population of certain countries (such as the acidification of water resources in Mauritius and the degradation of water quality in Kathmandu, Nepal).

An international conference is obviously not only an opportunity to learn a lot about science and the challenges it has to address, but it is also a very efficient way to meet scientists from all over the world. The two “poster social” evening sessions offered the occasion to discuss the science (and more or less remote topics, such as the absence of government in Belgium or the results of the Wimbledon championships) around a glass of Shiraz Cabernet or a VB lager. Cookies and apples were also served during the coffee breaks, and much appreciated. Participation in the traditional “IAHS dinner”, organised at a restaurant in the Melbourne Docklands was also a very good way to trigger the discussion on key hydrological issues, in an “all you can drink but not too much” atmosphere.

This journey was also the opportunity to discover Australia (or at least an infinitesimal part of the 6th largest country of the world), to taste the kangaroo fillets and to meet its very easy-going inhabitants. Despite a slightly disappointing closing ceremony, I leave Australia thinking of my next visit to this huge and diverse country, and full of e-mail addresses, new scientific ideas and techniques to test or develop, and sediment-inspired motivations. Who knows?! Those two enriching weeks in Melbourne will maybe offer me the opportunity of sampling sediment along those amazing Siberian rivers draining catchments of more than 2.5 million km². Nobody is expected to do the impossible, but it is really good to dream about it. I think that I have enough scientific dreams for the next four decades.

Olivier Evrard

New IAHS member based at LSCE (CEA-CNRS), in France



IAHS PUBLICATIONS – IUGG2011 Melbourne

GRACE, Remote Sensing and Ground-based Methods in Multi-Scale Hydrology

Edited by

MOHSIN HAFEEZ

IC Water, Charles Sturt University, Australia

Co-Edited by

NICK VAN DE GIESEN

TU Delft, Netherlands

EARL BARDSLEY

University of Waikato, New Zealand

FREDERIQUE SEYLER

IRD, France

ROLAND PAIL

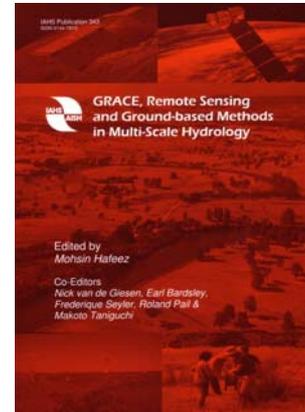
Technische Universität München, Germany

MAKOTO TANIGUCHI

Research Institute of Humanity and Nature, Kyoto, Japan

Recent advances in measuring hydrological variability by means of the Gravity Recovery and Climate Experiment (GRACE) mission, and other remote sensing platforms (TRMM, Landsat and MODIS), offer great potential for estimating spatio-temporal surface water balances, spatially-averaged water budgets, hydrodynamics, hydrological processes, and characterization of groundwater systems in gauged and ungauged basins, at regional and global scales. In parallel, advances in ground-based measurement techniques, such as distributed temperature sensing and geological-weighting lysimeters, are being incorporated into research and practice for determining hydrological parameters. The 30 peer-reviewed papers provide an overview of these techniques and their use with hydrological models for understanding multi-scale hydrological processes.

IAHS Publ. 343 (2011) 196 + x pp. ISBN 978-1-907161-18-6 £50.00



Hydro-climatology: Variability and Change

Edited by

STEWART W. FRANKS

University of Newcastle, NSW, Australia

EVA BOEGH

Roskilde University, Denmark

ELEANOR BLYTH

Centre for Ecology and Hydrology, UK

DAVID M. HANNAH

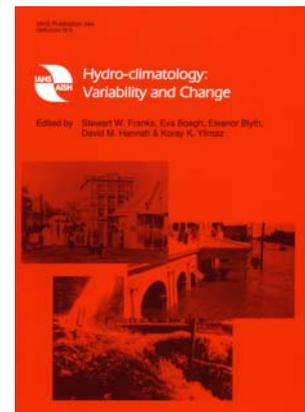
University of Birmingham, UK

KORAY K. YILMAZ

Middle East Technical University, Ankara, Turkey

The hydro-climatological approach of this volume illustrates the scientific and practical value of considering hydrological phenomena and processes in a climate context to improve knowledge of controls, process interaction, and past and future variability/change. Contributions deal with understanding hydrological systems given historic observed climate variability, or utilise climate models to project future climate scenarios and then assess the resultant hydrological consequences. Human interventions – water storages, extraction, irrigation, land-use change – i.e. the societal context, are also considered. The interdisciplinary approach reveals information and perspectives that go beyond the study of climate and hydrology alone.

IAHS Publ. 344 (2011) 254 + x pp. ISBN 978-1-907161-19-3 £58.00



Conceptual and Modelling Studies of Integrated Groundwater, Surface Water, and Ecological Systems

Edited by:

CORINNA ABESSER

British Geological Survey, UK

GUNNAR NÜTZMANN

Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Berlin, Germany

MARY C. HILL

US Geological Survey, Denver, USA

GÜNTER BLÖSCHL

Vienna University of Technology, Austria

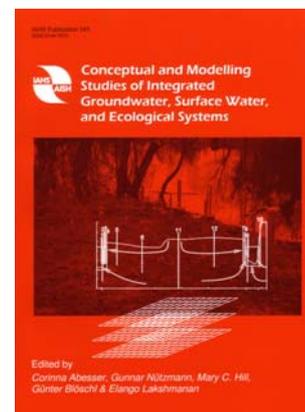
ELANGO LAKSHMANAN

Anna University, Chennai, India

Interactions between groundwater and surface water are critical to ecological communities and to resource management. Recent research has succeeded in identifying and understanding many underlying processes, such as the dynamics of flow, sediment transport, contaminant transport and chemical reactions in river beds and flood plains. Advances have been made through field, laboratory, and modelling investigations. The themes of this volume are:

- Improved process understanding for different scales and regions
- Advanced modelling methods and applications
- Sensitivity analysis and uncertainty evaluation
- Ecohydrological studies: from process understanding to management, and
- Case studies and large-scale applications.

IAHS Publ. 345 (2011) 274 + xii pp. ISBN 978-1-907161-20-9 £62.00



Cold Regions Hydrology in a Changing Climate

Edited by

DAQING YANG

*National Hydrology Research Center,
Canada*

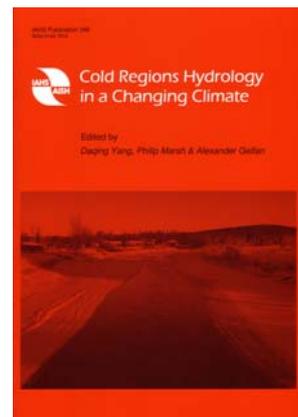
PHILIP MARSH

*National Hydrology Research Center,
Canada*

ALEXANDER GELFAN

Water Problem Institute, Russia

In cold regions, changes in hydrology related to changing climate, such as in frozen soils, snowfall/rainfall ratio, snow cover, river and lake ice, glacier cover and vegetation, are not well understood. The contributions here report new research results based on field observations, modelling and remote sensing in geographical regions ranging from Chile to the Arctic. Collectively they highlight recent progress in cold regions hydrology research and its linkage with climate change at various space and time scales, but also identify gaps and needs for future research. They cover a broad domain, including snow cover, glaciers, permafrost, streamflow, temperature, precipitation, groundwater and ecosystems.



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Risk in Water Resources Management

Edited by

GÜNTER BLÖSCHL

Vienna University of Technology, Austria

KUNI TAKEUCHI

*ICHARM, Public Works Research Institute,
Japan*

SHARAD JAIN

Indian Institute of Technology, India

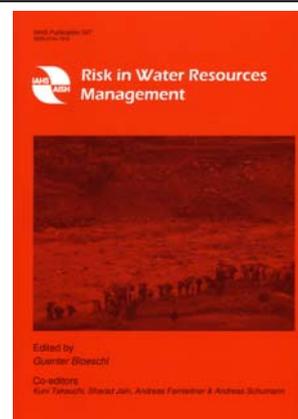
ANDREAS FARNLEITNER

Vienna University of Technology, Austria

ANDREAS SCHUMANN

Ruhr-Universität Bochum, Germany

Water resources management has to deal with incomplete knowledge of the current dynamics and the future evolution of water resource systems. Risk is a concept that helps in making management decisions under incomplete and/or incorrect knowledge by relating water-related hazards and their consequences. Risks related to floods and droughts, to the environment and to health, as well as economic and financial risk, are encompassed by water resources management. Obviously, it is not possible to completely eliminate uncertainty, but better understanding of the sources and magnitude of the uncertainties involved in a particular project will clearly lead to improved decisions: this volume aims towards that end.



IAHS Publ. 347 (2011) 276 + x pp. ISBN 978-1-907161-22-3 £62.00

Water Quality: Current Trends and Expected Climate Change Impacts

Edited by

NORMAN E. PETERS

US Geological Survey, Atlanta, USA

VALENTINA KRYSANOVA

*Potsdam Institute for Climate Impact
Research, Germany*

AHTI LEPISTÖ

*Finnish Environment Institute, Helsinki,
Finland*

RAJENDRA PRASAD

Andhra University, Visakhapatnam, India

MARTIN THOMS

CSIRO Land and Water, Australia

ROB WILBY

Loughborough University, UK

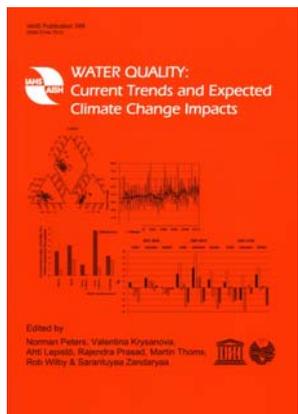
SARANTUYAA ZANDARYAA

UNESCO IHP, Paris, France

The proceedings of a symposium which brought together water quality scientists for a dialogue on the evaluation of climate change impacts on a wide range of water quality issues. The contributions included herein cover a broad spectrum of water quality issues and have been grouped accordingly:

- Seasonality and extreme event effects on water quality
- Effects on groundwater quality
- Climate change and water quality assessment
- Climate change and water temperature, and
- Climate change and water quality modelling.

This volume is a contribution to the International Hydrological Programme (IHP) of UNESCO.



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Mrs Jill Gash

IAHS Press, Centre for Ecology and Hydrology
Wallingford, Oxfordshire OX10 8BB, UK

jilly@iahs.demon.co.uk

tel.: + 44 1491 692442

fax: + 44 1491 692448/692424



www.iahs.info

Reports from Symposia and Workshops at the IAHS Assembly

The following reports have been provided by the convenors of several Symposia and Workshops at the IAHS Assembly

Symposium H01 Conceptual and Modelling Studies of Integrated Groundwater, Surface Water, and Ecological Systems

This Symposium, jointly sponsored by ICGW, ICSW, ICWQ and ICWRS was held over three days. It included participants from five continents and 20 countries. A total of 29 talks were presented during the oral sessions which were visited by 50 and more attendees per session. There were also 12 poster presentations given during the Wednesday session. The talks presented a very well-balanced mix of topics, including:

- 1 Improved process understanding at different scales and in different regions
- 2 Ecohydrological studies – from understanding to management
- 3 Advanced modelling methods and applications
- 4 Sensitivity analysis and uncertainty evaluation
- 5 Case studies and large-scale applications

They also covered a wide range of geographical locations and environments (e.g. different geological and climatic conditions, lowlands as well as uplands, freshwaters like lakes and rivers as well as salty or coastal zones).

The first part of Symposium H01 – split into two sessions – concentrated on the mechanisms and processes of interplay between surface water and groundwater compartments at different environments and scales. The boundary layer between surface water and groundwater was addressed in micro- and mesoscale approaches with a focus on hydrological and biogeochemical characterisation of the exchange between groundwater and surface water in both freshwater and coastal aquifer systems. Keynote speaker Donald O. Rosenberry emphasized the importance of advanced techniques to measure the exchange rates at this interface, as well as to understand process dynamics at different spatial and, especially, at temporal scales. Numerous novel approaches have been developed to investigate and quantify groundwater–surface water interactions using different parameters (isotopes, temperature and soil moisture). Frequently, these field-based surveys are incorporated into modelling applications as a way to verify and improve the conceptual understanding of the observed processes and interactions.

In the second part of the H01 Symposium, ecohydrological studies were presented demonstrating the impacts of groundwater–surface water exchange on nutrient distribution, water pollution and habitat conditions. Potential problems include contamination, over-abstraction and land-use changes, as well as the rise in water temperatures in surface waters and in groundwater due to climate change and growing urbanization. Adverse effects are reflected in the degradation of water quality and/or quantity, but inevitably also impact on the health of biota within surface water and/or groundwater habitats as well as on connected ecosystems. At the same time,

biogeochemical and ecological processes can also impact on water quality through the important role they play in many surface–subsurface environments, such as the hyporheic zone.

In the third section, advanced modelling methods and their applications to surface water–groundwater interactions were presented. Modelling surface water–groundwater interactions is increasingly important to assess the impact of local or global changes, increasing demands/abstractions, climate change and episodic events on these systems in different environments, as well as to holistically manage competing water needs, plan restoration efforts or to assess risks associated with any of these measures. Regional groundwater models often simplify exchange with surface flow models, and the interaction between channel flow and the aquifer is often described within the framework of transient storage. Recently, considerable efforts have been made to couple different types of models and to develop integrated tools, which could describe interactions between groundwater, surface water and ecological systems. Such integrated models show great potential in enhancing our understanding of underlying processes and as forecasting tools for sustainable water resources planning and management.

Because the output from integrated surface water–groundwater models is strongly controlled by the quality of input data and parameter values, as well as by the model structure, the fourth session dealt with sensitivity analysis and uncertainty evaluation. In recent years, great efforts have been directed towards the quantification of these model uncertainties in order to allow evaluation of model performance and outputs. In data-sparse regions (e.g. ungauged basins), the ability to model surface water–groundwater interactions is often restricted by inadequate data availability and/or quality. Various regionalization methods and parameter estimation approaches have been developed to overcome these limitations.

Case studies and large-scale applications were presented in the last part of the H01 Symposium. Here, the papers ranged from maintaining floodplain wetlands in Australia, to water scarcity problems in the Mediterranean regions, and to estimation of future sustainable groundwater yield in a large aquifer system in northern Thailand, and were well discussed. These talks, in particular, demonstrated the necessity of coupling groundwater and surface water systems into one framework, because otherwise it would not be possible to develop strategies and measures for sustainable water resources management in any region of the world. The great interest in our joint workshop has demonstrated the continuing and increasing interest in the topic of surface water–groundwater interactions with all facets of this topic. The interdisciplinary approaches, modelling applications and case studies presented have confirmed that a better understanding of the exchange processes between surface water and groundwater is a key to the protection and effective management of our water resources, qualitatively as well as quantitatively.

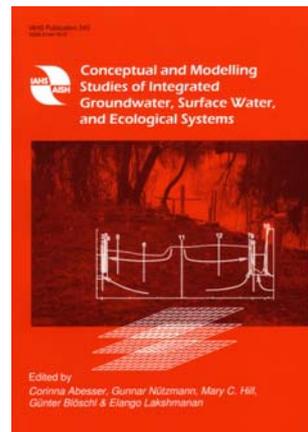
Last, but not least, it must be noted that a Red Book of the Symposium was pre-published containing 42 papers.

Gunnar Nützmann

Edited by:

Corinna Abesser,
Gunnar Nützmann,
Mary C. Hill,
Günter Blöschl &
Elango Lakshmanan

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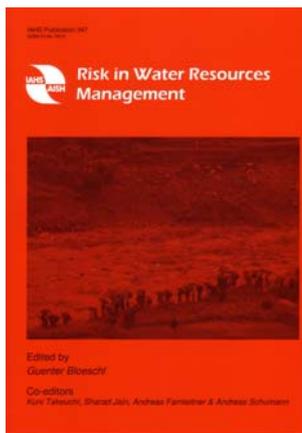
flood discharge. The presenters proposed new methods based on flood data, rainfall and hydrogeological information. Another set of papers presented examples from case studies around the world, including effects of floods on groundwater supply and inundation mapping. Drought hazards were also discussed. Uncertainty of the risk predictions were of particular interest, involving presentations on uncertainty of runoff measurements and runoff modelling, as well as uncertainty in water resources assessment and allocation. The effects of climate variability and change on future water resources and the associated risks were addressed. A set of papers examined water resources optimisation to minimise supply risks, and groundwater assessment and use. One paper provided a global perspective on water availability and the potential sources of conflict in water resources management. Case studies of integrated water resource management complemented the methodology papers with a focus on risk, and included mapping of the feedbacks between the components of a water resources system relating demand and supply.

Both the oral and poster sessions were very well attended with some 120 audience in the lecture hall. The Symposium also produced a Red Book, number 347, with a total of 41 papers.

Günter Blöschl

Symposium H03 Risk in Water Resources Management

The Symposium H03 on "Risk in Water Resources Management" was organised by the ICWRS, ICSW and ICWQ. The purpose was to bring together the various concepts of risk, tools and methodologies to specify them, and new approaches to address risk in water resource systems. The importance of risk in water resources management was reflected by the large number of contributions to the symposium drawn from a range of disciplines. A total of 62 abstracts were received for H03; out of these, 14 were presented as oral presentations, the others as posters. The contributors were asked to address aspects of water-related risks in a broad way in order to integrate across the disciplines and/or sectors and thus contribute in a pro-active way to water resources management.



Edited by
Günter Blöschl,
Kuni Takeuchi,
Sharad Jain,
Andreas Farnleitner &
Andreas Schumann

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The keynote paper was given by Trevor Daniell and dealt with the conjunctive use of surface water and groundwater and the management of multi-objective storage systems. The contributed oral and poster presentations were grouped into three themes: flood and drought hazards; uncertainty and climate; and water use and risk, notwithstanding the many interactions between these aspects of water resources management. A number of papers were concerned with increasing the accuracy of flood hazard estimates in terms of

Symposium H04 Assessment of Water Quality Under Changing Climate Conditions

On 30 June the lead convener of Symposium H04, Jake Peters, informed the IAHS President and the co-conveners about his unavailability to attend the Symposium for health reasons. At the IAHS Bureau Meeting on 1 July it was decided that Valentina Krysanova would take over the lead convenor's role.

The Symposium included five sessions:

- 1 Seasonality and extreme event effects on water quality
- 2 Seasonality and extreme event effects on water quality, including groundwater quality
- 3 Climate change and water quality assessment
- 4 Climate change and water temperature
- 5 Climate change and water quality modelling

Altogether, 26 papers were presented. All five sessions were quite well attended, mostly by 40–55 people.

The Introductory talk was presented by Sarantuyaa Zandaryaa (UNESCO International Hydrological Programme), who provided an overview of the current status and future trends of water quality worldwide, and of potential climate change effects on water quality.

The first two sessions were devoted to climate seasonality and extreme event effects on water quality, including groundwater quality aspects. The papers broadly dealt with impacts of extreme events and seasonal variability on water quality parameters of surface waters and groundwater. Some papers also considered contaminant transport. One contribution, presented by R. Prasad, was devoted to analysis of rainwater quality as an indicator of industrial development. Two papers (by C. Han and X. Chen) dealt with diffuse pollution from agricultural watersheds in China

as affected by specific winter processes and extreme events. A presentation from Japan by G. Jin dealt with the reconstruction of phosphorus input fluxes into the system from the analysis of sediment core samples as a reflection of climatic implications. It concluded that extreme rainfall events could be used as predictors of total phosphorus. S. Payraudeau's contribution highlighted the significance of rainfall variability within a storm event on contaminant transport through surface runoff, and demonstrated that potential shifts in rainfall patterns under changing climate can significantly impact the contaminant load. Another paper (by K. Nosrati) addressed water quality parameters as a response to drought conditions and changes in land use. Three papers (from USA, Z. Deng, Mauritius, M.D. Nowbuth, and Katmandu, D. R. Pathak) considered effects of climate, land use and anthropogenic activities on surface- and groundwater quality.

The third session focused on water quality assessment under current land use and changing climate conditions. Research results from Europe and North America were reported. The studies presented focused on investigating the contribution of land use/land cover (biofuel plantations), soil processes (organic matter decomposition), extreme climate effects (intense rainstorms) and future climate on water quality parameters. According to a study from Finland by A. Lepistö, multiple effects might have contributed to increasing DOC (dissolved organic carbon) concentrations in surface water bodies in Europe and North America, because changes in both hydrology and catchment soils have impacts on increasing organic C and N fluxes. A paper by Y. Jun Xu focused on nitrate mass loading from the Red River, the last major tributary to the Mississippi-Atchafalaya River system, and potential effects of future precipitation change in the basin on discharge and nitrate export. The presentation concluded that the nitrate contribution from the Red River was not significant, and it was projected to decline in the future based on a low-emissions scenario. Y. Shimizu, from Japan, focused on the effects of changing climate on nutrient discharge to the coastal area in Japan. A paper from Slovenia by B. B. Zeleznik presented an assessment of impacts of heavy rainstorms on groundwater quality, highlighting that extreme rainstorms after long, dry periods may cause dangerous infiltration of fertilizers, pesticides and manure from surface to groundwater, which is used for drinking water supply. The paper by P. Antunes focused on effects of climate change on water quality of Azores volcanic lakes, which are strategic sources of freshwater and water supply for human consumption. The paper stressed that global warming could disrupt the normal water balance of the lakes, whereas increased precipitation events during winter would increase the input of fertilizers and sediments, causing water quality degradation in the lakes. The study on biofuel effects from USA (by J. Nettles) concluded that operational pine plantation had little effect on water quantity and water quality. Several papers highlighted the potential enhancement of eutrophication processes under warmer climate.

Session four covered topics from impacts of climate change on streamwater temperatures to climate change aspects in water quality modelling. In two of the papers, by H. Chang and R. Wilby, vegetation shading by riparian zones and their impacts on the stream systems were addressed, using both empirical data, modelling and scenarios. A contribution by M. Bourqui explored long-term forecasting of flow and water temperature in the Rhone River for cooling

applications. Three modelling studies on climate change impact on water quality were presented by C. Donnelly, M. Rode and M. Martinkova. The climate change effects on nutrient loading and N retention processes were studied using modelling tools at different scales, from the river-basin scale to the large geographical scale (the whole watershed of the Baltic Sea). Effects of changing climate are important for reducing uncertainties and better understanding the balance of N sinks and N sources in future climate. However, at large geographical scales, model applications have to compromise between more practical conceptual approaches and detailed process description.

The final session included two modelling studies, from Australia, presented by F. Dyer, and Japan, presented by S. Onodera, devoted to water quality response to changing climate conditions and seasonality. A paper from Russia, presented by V. Belyaev, demonstrated how geochemical properties of floodplain sediments can be used as indicators for particle-bound pollutant transport in fluvial systems.

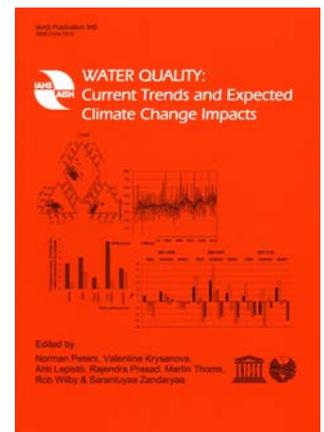
General comments

Most of the papers provided interesting scientific information on current trends in water quality, their drivers and possible behaviour in future under changing climate conditions. However, though an attempt had been made by most authors to relate their results to climatic variability, and some of them – to climate change – using available climate change scenarios for their regions, most of the papers reflected only regional and rather short-term dynamics. There was only one large-scale study on water quality under changing climate, for the Baltic Sea watershed. This perhaps indicates that research on 'water resources quality and climate change' has to be enhanced and more focused to create more knowledge on this subject, which could be generalized and used for finding adaptation options. This would also enable interregional comparisons of different studies in future.

Edited by

NORMAN E. PETERS
VALENTINA KRYSANOVA,
AHTI LEPISTÖ,
RAJENDRA PRASAD,
MARTIN THOMS,
ROB WILBY &
SARANTUYAA
ZANDARYAA

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The discussions following presentations demonstrated interest in further research and study on the subject. Although not all papers were in line with the major topic, there is a hope that due to this Symposium the challenging topic of climate impact on water quality will attract the attention of scientists working in this and neighbouring fields. It is time for scientific communities to give more attention to this issue and encourage young PhD students and colleagues to work in this important area of research, as better understanding of potential impacts of climate change on the quality of water

resources will help the finding of appropriate solutions for adaptation to climate change.

The pre-Symposium proceedings book *Water Quality: Current Trends and Expected Climate Change Impacts*, edited by J. Peters, V. Krysanova, A. Lepistö, R. Prasad, M. Thoms, R. Wilby and S. Zandaryaa, was published in the IAHS Red Book series (IAHS Publ. 348). It consists of 27 papers, most of which were presented during Symposium H04.

Valentina Krysanova, Sarantuyaa Zandaryaa, Rajendra Prasad, Rob Wilby & Ahti Lepistö

Workshop HW01

Tracer application in sediment research

There were five sessions in workshop HW01, with 18 oral presentations and one poster. The studies presented were undertaken in all continents. Scientists from Australia, UK, China, Italy, Mongolia, South Africa, Russia, Belgium, France and Germany presented their latest results of application of different tracers for evaluation of sediment redistribution in different chains of fluvial systems. The first and second sessions included papers about application of ^7Be , ^{210}Pb and bomb-derived ^{137}Cs for evaluation of erosion and deposition rates. D. Walling (UK) described the possible directions in application of ^7Be for evaluation of erosion rates, sediment transport and deposition. Several successful examples of use of ^7Be in sediment redistribution studies were demonstrated. J. Olley (Australia) discussed the question of application of ^{137}Cs and ^{210}Pb for different tasks in cases of nonlinear distribution of tracer fallouts.

P. Porto (Italy) showed how both tracer approaches and direct monitoring can be applied for evaluation of spatial and temporal sediment redistribution within small catchments in southern Italy. An example of application of ^{137}Cs for identification of soil loss/gain in the South Korean mountains was shown in the poster presentation by A. Orkhonselenge (Mongolia). The advantages and limitations in use of Chernobyl-derived ^{137}Cs as a tracer was discussed in the presentation by V. Golosov (Russia). It was shown that using both bomb-derived and Chernobyl-derived ^{137}Cs for evaluation of overbank sedimentation rates allows evaluation of sedimentation rate dynamics and sediment-associated pollutants. Several examples of application of ^{137}Cs for evaluation of sediment redistribution rates in different landscapes of China were demonstrated by X. Zhang (China). Land-use changes are considerably influenced by the intensity of erosion processes in Chinese mountain areas. V. Belyaev (Russia) described features of overbank deposition rates along the Plava River basin, located in an area with very high levels of Chernobyl contamination. It was shown that most of the contamination was transported by the river flow to the Upa River with very minor sediment deposition on the Plava River floodplain. An interesting example of the use of sediment colour as a tracer for analysis of sediment redistribution in a small Australian catchment was presented by W. Erskine (Australia).

The fingerprinting technique was the main topic of the second part of the workshop. D. Walling (UK), with a team from Chile, presented the first results of a detailed study of the impact of forest harvesting on fine sediment yield. H. Smith (Australia) talked about evaluation of sediment sources in forested upland catchments subject to wild fires,

showing the differences between the erosion occurring in catchments, located in dry and wet areas. P. Theuring (Germany) described results of identification of fluvial sediment sources in a mesoscale catchment in Mongolia. Preliminary results of a sediment sources study in a South African catchment were given by P. Mzobe (South Africa). A very detailed investigation of sediment sources impacting on fish spawning gravel in an English catchment was demonstrated by A. Collins (UK) in his presentation. O. Evrard (France) presented the results of application of an integrated approach for quantification of the spatio-temporal dynamics of fine sediment in French Alps and Mexican Highlands catchments. An example of using tracer techniques for evaluation of riparian buffers efficacy for English watercourses was given by L. Williams (UK). Temporal variation of geomorphological coupling in a Turkish catchment was explained by K. D'haen (Belgium). G. Hancock (Australia) described the evaluation of different sediment sources in a large rural Australian basin using radionuclide, geochemical and CSIA tracing techniques. Very detailed studies of sediment sources for river catchments affecting the Great Barrier Reef, based on tracer techniques and erosion modelling, were demonstrated by S. Wilkinson (Australia).

The workshop was well attended and all papers included in the IUGG2011 Programme were presented. Evidently tracer techniques are becoming more popular for evaluation of sediment redistribution rates in different parts of fluvial systems, as well as for identification of sediment sources for river catchments. It is even more useful if tracer techniques are applied together with other methods and approaches, to give more comprehensive results.

Valentin Golosov

Workshop HW05

Revisiting experimental catchment studies in forest hydrology

This workshop included 37 oral presentations and 12 posters, the quality of which was generally very good. The attendance was exceptional, ranging from a minimum of 35 to about 85, the latter despite seating for only 70 being available.

The workshop began with a keynote presentation by A/Prof. David Scott from the University of British Columbia, Canada. He neatly summarised the present and future value of catchment experiments for forest hydrology, which was a useful introduction to the themed sessions that followed:

- (i) Answering new questions using old data sets
- (ii) The impacts of fires and other disturbances
- (iii) Defining the "forest" in forest hydrology
- (iv) Water quality and aquatic ecology
- (v) Ecosystem services
- (vi) Climate change impacts and tropical forests

Invited presentations introducing themes (iii) and (iv) were given by Don McGuire (ForestrySA) and Dr Dan Neary (US Forest Service), respectively. In addition to many thought-provoking presentations and subsequent questions and answers, we engaged in a discussion that I facilitated at the end of the last session to revisit the key points raised in David Scott's keynote address. We ultimately concluded that

experimental catchment studies (or paired catchments) had been at the core of forest hydrology for at least 100 years and should play a role into the future. However, throughout the workshop some of the limitations of this approach were raised and so we would argue that such catchment studies need to be better integrated with process studies that utilise new techniques and methods. Professor Yanhui Wang (Chinese Academy of Forestry) prepared a summary of outcomes, which I have condensed to a few key words to describe possible future directions in forest hydrology:

- (a) Structure – forest structure or quality exerts a significant influence on catchment hydrology. Often hydrologists characterise forests only as either present or absent and so we advocate better description of forest/vegetation structure using indicators such as LAI.
- (b) Pattern – in experimental catchment studies there is usually a uniform spatial pattern of vegetation. However, at larger catchment scales vegetation is spatially distributed as a mosaic across different slopes, soils, climates and landforms. Understanding these patterns will help in the development of appropriate distributed hydrological models.
- (c) Scale – up-scaling from small experimental catchments to large basins or regions is increasingly required for both policy-making and watershed management. Paired catchment studies are mostly small-scale, so up-scaling to larger basins is an unresolved issue that will need to be overcome.
- (d) Processes and their coupling – many individual processes make up the overall influence of forests on hydrology. These include hydrological processes such as canopy interception, transpiration and evaporation; and also ecological processes such as tree growth, LAI dynamics and soil properties. What is needed in forest hydrology is also an understanding of the coupling of these eco- and hydrological processes based on model application.
- (e) Modelling – vegetation, climate, landforms and soils jointly influence catchment hydrology. The traditional approach using paired catchments fixes all of these factors with the exception of vegetation. However, this is not the reality where, at a large-basin scale, all of these factors are variable and changing. Forest hydrology requires integrated studies and the development and application of process-based models which integrate all aspects (environment + vegetation structure + processes).

With regard to future meetings, the group expressed an interest in meeting more formally and more regularly. We noted that the scope of this meeting was confined to catchment studies and that forest hydrology incorporates more than this. Also, there is no formal forest hydrology society or association so meeting under one of the commissions of IAHS in future is possibly an advantage. However, we may not wish to participate in a general assembly setting again. The majority of participants attended only this workshop with little interaction with the other symposia. In future a smaller, more intimate conference would be preferred.

Field Trip

Twenty-nine people participated in the field trip organised by A/Prof. Patrick Lane and A/Prof. Leon Bren. All were

involved in the HW05 Workshop, except for one oceanographer. The trip took us to Healesville, Badger Weir, the Coranderrk paired catchment experiment in Melbourne's water supply catchments, a water balance experimental study site, and the forests surrounding Marysville that were severely impacted by the Black Saturday wildfires of January 2009. Despite the cool weather, an enjoyable day was had by all participants.

IAHS Red Book

We have arranged to publish a Red Book of reviewed papers from the conference and have secured sponsorship for it.

Ashley Webb

Workshop HW06

Expert judgement vs statistical goodness-of-fit for hydrological model evaluation

Context and objectives

The evaluation of hydrological models is a difficult task. One can use either visual assessment (simulated and observed hydrographs, scatterplots, etc.) or a multitude of statistics (Nash-Sutcliffe efficiency, RMSE, bias, etc.). Do the statistics agree with the expert judgement? How do people think when they evaluate a model? Which statistics capture the expert judgements?

Prior to the workshop, a few models were tested on a variety of conditions and an Internet-based survey was developed to gauge expert judgement (preparatory work by L. Crochemore at Cemagref). Participants to the workshop were invited to undertake the evaluation survey during the workshop. It consisted in ranking the models' fit using the graphical results of the tested models for two main objectives (high-flow and low-flow simulation). Results were compared to the ranking of models obtained using a set of statistical measures. The aim was to test the hypothesis whether there is a link between the way an expert thinks and statistical criteria that reflect the expert opinion.

The workshop also had invited presentations on the following issues:

- procedures for model assessment and comparisons
- meaning and use of statistical criteria *versus* expert judgement
- the use of criteria for model calibration and diagnosis
- the role of uncertainties in model assessment



Workshop HW06: Attendees at work during the survey (Photo: S. Grimaldi)

Programme and attendance

The workshop was divided into four sessions on two half days (3–4 July). After an introduction presenting the objectives of the workshop, there were 12 oral presentations, half an hour for the survey, 1.5 hour for discussions and one poster presentation. Four other contributions initially scheduled in the workshop program were cancelled at the last minute. About 60 people attended the workshop at each session.

Main outcomes

During the workshop, there were lively discussions and exchanges on the issues of criteria, model calibration, evaluation procedures, model diagnosis and uncertainty assessment.

The main focus of the workshop (comparison of expert judgement and statistical criteria) generated interesting feedbacks and much debate. Several studies similar to that conducted during the workshop were reported or commented on (presentation by J. Olsson from SMHI; work in Australia mentioned by F. Chiew; work done at CEH by H. Houghton-Carr). The definition of objectives was one of the main problems identified by participants in the survey presented during the workshop. The usefulness and limits of various criteria were also discussed when used for model calibration, evaluation, comparison and diagnosis.

The results collected during the survey will be further analysed. This survey could serve as a basis for further investigations on expert judgement for various objectives, or for the evaluation of probabilistic approaches. A summary of the workshop will be made available on the STAHy webpage: www.stahy.org.

Convenors: Charles Perrin, Mark Thyer, Salvatore Grimaldi, Hoshin Gupta, Jean-Emmanuel Paturol

Workshop HW07 Hydro-geomorphology

Hydro-geomorphology is a discipline that explicitly encompasses and addresses the interface between geomorphology and hydrology. Hydro-geomorphology is renewed and enhanced by original approaches to data acquisition, management and modelling. The objectives are to better understand the hydro-geomorphological dynamics and structures, and to link them to actual issues such as integrated water and risk management, upstream–downstream impact assessment, sustainability of water resources and uses, eco-hydrology, traditional/modern techniques assessment, scaling and complexity understanding, regionalization and PUB methodologies. This workshop was the first ever explicitly organized on the topic, in the frame of IAHS.

The workshop was quite successful, with 22 oral and 15 poster presentations, over six sessions plus a 1.5 hour poster break. The chairing was handled by R. Moussa and C. Cudennec. Several speakers had benefited from financial support from IAHS. Four additional presentations were cancelled because the presenters were unable to travel (from China, India, Nigeria and Sri Lanka).

The first session was dedicated to water-related solid transportation, allowing discussion of metrological difficulties in semi-arid wadis, the benefit of synoptic studies over peri-Arctic rivers, and the complex coastal interface of the Mississippi River.

Sessions 2 and 3 collated naturalistic and geomorphometric approaches, and addressed hydro-geomorphological objects and entities together with the causal and/or dependent hydrological processes: amphitheatre valleys, fluvial knick-points, upland streams, braided rivers, river networks, riparian wetlands, coastal features and palaeo-lakes. This panorama allowed us to identify and discuss some generic and specific items across the World.

Sessions 4, 5 and 6 provided an overview of actual geomorphology-based hydrological analysis and modelling approaches. A range of concepts was (re-)introduced, discussed and illustrated, especially: scale, connectivity, regionalization, the inverse-problem, geomorphology-based transfer functions, segmentation and delineation, HRU, GIS valuing; the illustrations and applications being in line with actual issues such as PUB, water resources management, river restoration and farming practices.

The poster session enlarged the panorama in terms of the variety of entities, processes and driving forces (landslides, typhoons, wetlands, drainage galleries) considered, as well as of the methodological approaches (Lidar, DEM analysis, geo-information technologies, modelling).

The whole workshop was attended by ~120 individuals. A special issue of an international refereed journal is under consideration with the corresponding editors and the candidate authors, as a valuable output of this workshop.

C. Cudennec

Co-convenors: Houda Boudhraâ, Stephan Gruber, Roger Moussa, Scott Peckham, Riccardo Rigon, Colin Starck

Workshop HW08 Tracer hydrology as a tool for estimating flow parameters, groundwater dynamics, pollution transport and bioremediation processes

First, we would like to recall our good friend and president of the International Commission on Tracers (ICT), Prof. Dr. Giovanni-Maria Zuppi from Italy, who died suddenly in May this year in Rome, aged 64. Due to the loss of Giovanni-Maria, Vice-president Prof. Dr Piotr Maloszewski became acting president of the ICT in the middle of May.

During the ICT Workshop HW08 *Tracer hydrology as a tool for estimating flow parameters, groundwater dynamics, pollution transport and bioremediation processes*, we had 10 oral presentations in three sessions. Five planned presentations were cancelled. To fill the programme, the convener invited Dr Mike Stewart from New Zealand to give an additional oral presentation, and there were prolonged discussions after different talks. The contributions were from nine countries representing three continents: Europe 5; Australia & New Zealand 2; Asia 2. On average, 23 specialists, mainly from Europe, attended the sessions.

The papers presented at the workshop covered wide areas of hydrology. They included reports on the tracer approaches and studies in different countries of Europe, Australia, New Zealand and South America, as well as an overview of how tracer techniques contribute to the understanding and quantification of water dynamics and pollutant origin, application of new methods for water age estimation using ^{85}Kr and ^{14}C , mathematical analysis of the influence of input data on parameter interpretation, development of new tracers for surface water application, applying temperature as a tracer in bank filtration processes,

using isotope fractionations for estimation of biodegradation processes, example of combined use of geochemistry to understand water circulation in large wetlands in Argentina, as well use of artificial and environmental tracers to understand and quantify surface water losses due to mining activities in fractured sandstone aquifers.

The workshop was a good overview of current research mainly at the regional scale. A significant trend in research is toward sustained long-term monitoring of precipitation and river discharge to enable better characterization of spatial and temporal variability in isotope signatures and their underlying causes. The study of hydrological controls on water geochemistry and fractionation of isotopes in pollutant studies, as well the application of artificial tracers in heterogeneous aquifers, are a major emerging research trend that stems from the unique ability to integrate isotope sampling within both water quality and water quantity surveys, as well as in estimation of flow and transport parameters in heterogeneous media.

Piotr Maloszewski

Workshop HW11 Water supply and water quality in large metropolitan areas and megacities

This turned out to be a small workshop, as several authors of accepted papers were unable to attend, some due to lack of funding. Also, the authors of both invited key lectures: Jules van Lier and Jan Peter van de Hoek, were unable to get to Melbourne. Therefore, it was decided that Hubert Savenije would present the keynote lecture. As a result, the Workshop consisted of this keynote lecture and four papers. The latter, though quite diverse, provided useful and interesting information on water resources management in metropolitan areas and hydrological ecosystem services under multiple climate change scenarios.

A paper on "Exploring the derivatives of a noisy distributed temperature signal" was presented by R. Van Nooijen (The Netherlands). The objective was to derive information from the temperature signal for the determination of the derivatives of noisy signals. A possible application is in the search for wrong sanitary hook-ups on storm drains in metropolitan areas with a separated sewer system.

H. Chang's (USA) contribution was on "Potential impacts of climate change on hydrologic ecosystem services in the metropolitan fringe". Hydrological ecosystem services were investigated under multiple climate change scenarios in two watersheds located in the Portland metropolitan area. A moderate increase in annual discharge and dissolved phosphorus was projected, though there are high uncertainties associated with climate change projections.

The paper presented by X. Chen (China) considered "Impacts of rising sea level on water level changes along the Pearl River Estuary in China". Water level changes have tremendous influence on water resources management in the densely populated Pearl River Delta. It was concluded by the authors that the influence of the rising sea level on the annual mean water levels in the region is considerable, though it is currently small compared to tidal variations.

The presentation by A. Armienta (Mexico) addressed "Groundwater quality and urban development: the southern part of Mexico City". Physico-chemical parameters, including heavy metals and arsenic, were analysed in water samples from 80

wells in three campaigns. Most of the samples complied with the drinking water standards. However, higher concentrations of nitrates, iron, manganese and organic compounds were detected in some wells. This was attributed either to sewerage system functioning and fertilizer use, or to leakage from small industrial facilities or highways. The results were communicated to the City authorities.

Though the workshop topic is very important, the workshop cannot be evaluated as successful due to the inability of many authors of accepted papers to attend and present their papers.

Valentina Krysanova and Hubert Savenije

Workshop HW12 Quality and quantity aspects of green and blue water: impact on agriculture, environment, energy and industry

The requirement for green water has increased many-fold with the growing demand for food, biofuel production and carbon sequestration. At the same time, the blue water requirement has also increased with expansion of municipal limits (urbanization), industrial growth, hydro-electric power production and irrigation needs. However, many anthropogenic and natural factors have polluted blue and green waters, resulting in decline in productivity in agriculture, industry, energy production, etc. Green water quality is important as well as its quantity, as excess salts in soil moisture reduce agricultural productivity. With greater attention to green and blue water linkages, there is a strong need to see rain rather than blue water as the basic water resource in a catchment, especially in semi-arid agriculture. The challenge is to find synergies and complementarities between green and blue water use for socio-economic development and ecosystem management in the context of climate change and variability. With the backdrop of this theme, the papers presented at the workshop varied from the indigenous wisdom of the people in blue and green water management to trade, industry, sustainable production of bio-fuel feed stocks, as well as the impacts on water resources, and social learning for awareness among the stakeholders with regard to blue and green water management.

Drought is a creeping hydrological phenomenon due to below-average rainfall. It is more conspicuous in underdeveloped and developing areas where there is more reliance on water without an adequate technological backup for the mitigation of hydrological extremes. There is need for optimization of water allocation under physical and socio-economic constraints. It is necessary to promote dynamic, interactive and multi-sectoral approaches to water resources management and identification and protection of potential sources of freshwater supply, that integrate technological, socio-economic, environmental and human health considerations. The farmers of the Kandi region of Jammu and Kashmir state of India, have developed innovative techniques of rainwater harvesting and soil moisture enhancement and conservation, due to their ingenuity and skill. They use indigenous ploughing which does not invert the soil but simply loosens it, thus breaking the capillary movement of water and considerably reducing the soil moisture loss to the atmosphere due to evaporation. Sufficient soil moisture exists below the base of the plough layer, the zone where the crop-seeds are placed at sowing time. Retention and conservation of dew moisture in the field is

an important aspect of enhancing soil moisture. The field is ploughed early in the morning, two to three hours before the sun-rise, keeping the furrows open to imbibe dew water. The ploughing operation is done five to six times during October to retain sufficient moisture and improve the physical condition of the soil for easy and optimum germination of crop seeds. The seed germination was above 90% at soil moisture contents of 16% and above, whereas the germination percent was much less at lower ploughing rates. Embankments are also made by the farmers, individually or on a community basis, with sandstones and clayey soil, at appropriate places to harvest rainwater. The stored water is used for life-saving irrigation at critical stages of crop growth. These embankments not only retain rainwater but also reduce the runoff water velocity during the rainy season, thus reducing soil erosion.

Trade can mitigate local water scarcity in water scarce regions, but does not always do so because of economic or other pressures to export water-intensive products. To assess the impacts of trade on blue and green water use in agriculture, two dynamic, global and spatially explicit models were applied. The trade effects were quantified by comparing scenarios with and without trade for current and predicted future climatic conditions. Although an interesting result in itself, an estimate for relaxation or intensification of water scarcity by trade is still missing. This relation can then be taken as an indicator for the efficiency of trade on the local savings of blue water.

Many parts of Africa are being targeted for biofuel production by international investors because of the availability of large areas of seemingly suitable land. However, in Africa, society is largely dependent upon that land for its survival, and plans for production of food, fibre and fodder. Utilising a variety of feedstocks, most African countries have already instigated biofuel projects, many on the scale of 1000s of hectares. However, the impacts of water resources are largely ignored in these developments. An African perspective on the water resources aspects of large-scale biofuel production was provided, highlighting the reality that much of Africa is subject to extremely high rainfall and hydrological variability, and the implications this has for both the sustainable production of biofuel feedstocks, as well as the impacts on water resources. South Africa, in anticipation of a large demand for land suitable for biofuel production, has developed a national Biofuel Industrial Strategy, and coupled with its strong National Water Act and other environmental policies, provides some useful lessons for sub-Saharan and other developing countries. Of particular interest is an approach where both green water and blue water flows are considered at different stages of assessment of likely land-use impacts on water resources and how these are integrated into current water resources management approaches. Social learning to integrate blue and green water management at the catchment scale was highlighted. This would make the people aware of the importance of blue and green water management for the overall good of the community.

Uttam C. Sharma

Workshop HW13

Recent development of statistical tools for hydrological application

The workshop collected 16 oral contributions and 14 posters organized in three oral sessions and a poster session. George

Kuczera, Dan Rosbjerg, Hafzullah Aksoy, and Demetris Koutsoyiannis served brilliantly as chairpersons.

The Convenor and Co-convenors agreed to allocate their contributions to the poster session to make more oral slots available for Australian researchers and to make the poster session more appealing. The result was more than positive; indeed, the poster area was extremely crowded stimulating discussion for more than an hour.

The first oral session involved all speakers describing statistical methods and applications currently in use in Australia. It was particularly interesting to have the evidence that in Australia, the research community, and above all the institutions, are advanced users of statistical methods in hydrological applications. Particularly attractive were the presentations about the use of max-stable processes and Partial Information Theory given by Ashish Sharma.

The second oral session was characterized by more general topics. Interesting contributions were presented about copula function application. In the first one (Elena Volpi), an attempt at the selection of peak-volume flood information for a given joint return period was proposed, and in the second an innovative application, in terms of data used, was given (K. Arbjerg-Nielsen) considering water depth and the rainfall amount as variables.

In the third session, presentations about Unusual events (Andreas Bardossy) and Dragon kings (Daniel Schertzer) were particularly appealing.

The workshop was attended by around 100 people. As for the other workshop sponsored by the STAHy-WG (HW06), this report will be posted on the www.stahy.org website together with presentation and poster files and some pictures of the lecturers.

Salvatore Grimaldi

Co-convenors: Demetris Koutsoyiannis, Antonino Cancelliere, George Kuczera, Hafzullah Aksoy, Dan Rosbjerg

Workshop HW14

Education in the hydrological sciences

The workshop had originally attracted some 17 abstracts on the subject, three of which were listed as poster presentations. In the event, eight oral presentations were given, plus three posters. About 15 participants attended at the start, but at its close the room was full, with over 50 present for a final 45 minutes of lively and very informative discussion.

Based on the papers presented, the workshop considered a wide range of topics associated with education in the hydrological sciences. It was recognized that the extent and nature of education in the science varies widely, but that many problems and opportunities are of universal interest.

The workshop was invited to consider alternatives to the traditional class lecture and the difficulty of assessing whether other options did truly achieve better results. Attention then turned to the challenge of teaching the hydrological sciences in developing countries. Unfortunately, economic progress has not necessarily led to improved education in hydrology because it has not been given the importance that it deserves by government authorities. Rapidly changing and expanding agendas in Africa raised many challenges for those in charge of teaching and a frequent over-reliance on external donors remained a major factor. There is an urgent need for more hydrologists to be trained and for more of these to go into the teaching profession.

Information was provided on efforts being made to survey what resources were available for the teaching of the hydrological sciences and the workshop was informed of the remarkable success achieved by taking a small group of students to stay together with an equal number of experienced hydrologists for a period of six weeks, studying, debating and conducting self-motivated research.

After this, the participants discussed many issues raised by the presentations. These may be summarized as follows:

- (a) A lot of work is being put into preparing resource material for teaching hydrology, much of which is, or can be, made available on-line.
- (b) Courses in hydrology are linked to a range of different fields: engineering, earth sciences, environmental sciences, which influence greatly how the course is taught and how it is viewed by potential students.
- (c) We need to use novel methods to teach hydrology and go beyond the traditional classroom lecture, but it is not easy to devise methods that are effective and are feasible within time and financial restraints.
- (d) There is a serious problem in some countries with students starting courses without an inadequate grounding in the basic sciences and mathematics.
- (e) In many cases, the existence and effectiveness of a course depends entirely on the unique abilities and dedication of one lecturer/professor and so, when that person moves or retires, the course rapidly falls away.
- (f) Hydrologists work in an interdisciplinary environment and so they need to view the world from a broad perspective. Potential students are aware of this and expect courses to be very broad. However, to be effective in interdisciplinary work, one must first have an in-depth understanding of one's own discipline. This presents the challenge of finding the best balance between depth and breadth in devising courses in hydrology and making them attractive to potential students.
- (g) Intense periods of study either in the field or one-to-one with staff and students can produce remarkable results, but they are very demanding of time and finances.
- (h) Distance learning has great potential, but it can result in students gaining no personal experience of field conditions and, in developing countries, it can encourage a neo-colonial result with the countries becoming ever more dependent on external expertise with little recognition of local demands, experience and conditions.

At the close of the workshop, it was agreed that those who added their names to the list of participants would accept to act as an IAHS Education Network, whose aim would be to encourage and assist the Association in its work on education in the hydrological sciences, in particular in conjunction with the IAHS Working Group on Education. This is an open network and any other members of the Association who wish to be included should contact Arthur Askew:
arthuraskew@greenmail.ch

IAHS Members

- Do you receive occasional emails from IAHS with information about new books, publication of the Newsletter online, etc?
- Did you recently receive a copy of the new IAHS Publications Catalogue? Was the address on the envelope correct?
- Have you checked your account details at the IAHS Membership Area recently?

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Log in to your account at the Membership Area at www.iahs.info (your Username is the email address that IAHS has registered for you) and check/correct the information there.

Nb: If you are eligible for access to *Hydrological Sciences Journal*, your access is via the HSJLink button in your account at the Membership Area.

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This offer is provided courtesy of **Taylor & Francis**, our partners in publishing *Hydrological Sciences Journal*.



Clockwise from top left, the Melbourne Convention Centre, on the banks of the River Yarra, where IUGG2011 was held; participants in the third IAHS Frisbee Tournament of hydrological modelling teams (see report below); the new IAHS Bureau which met at the end of the Assembly (see below); the starter at the *Hydrological Sciences Journal* working dinner for Editors and Associate Editors; the Chinese group at the IAHS dinner.

Participants in IAHS Bureau meeting, left to right: Yangbo Chen (ICRS, S), Liliang Ren (IAHS V-P), Hafzullah Aksoy (ICSW, P-E), Denis Hughes (IAHS V-P), Christophe Cudennec (IAHS Secretary-General), Cate Gardner (IAHS Press), Eric Servat (ICSW, P), Chuck Onstad (Treasurer), Gordon Young (IAHS President), Hubert Savenije (IAHS P-E), Yan Huang (ICSW, S), Günther Blöschl (ICWRS, P), Berit Arheimer (ICWQ, P-E), Gunner Nützmann (ICGW, S), Paolo Porto (ICCE, S), Eva Boegh (ICCLAS, P-E), Zbyszcz Kundzewicz (HSJ Co-Editor), Thorsten Wagener (IAHS V-P, Education WG), Demetris Koutsoyiannis (HSJ Co-Editor), Valentina Krysanova (ICWQ, P), Valentin Golosov (ICCE, P), Dan Rosbjerg (IUGG), Piotr Malozewski (ICT, P), Des Walling (IAHS Ltd).

The Third IAHS Frisbee Tournament

The traditional IAHS Assembly frisbee contest took place during the IUGG conference in Melbourne (a tradition begun in 2007 in Perugia, and continued at Hyderabad in 2009).

This year, it opposed probabilistic modellers against deterministic modellers and was refereed by Dr Trevor Daniell.

The deterministic modelling team were so sure of their victory that they kept moving and playing in a very predictable manner. The probabilistic team started playing well spread on the field and with sometimes random attacks. But they iteratively updated their strategy in a Bayesian way, and so progressively reduced the number of missed passes and catches, and so got the better of the deterministic team.

At the end of the legal time, the probabilistic team was winning 10 to 8. However, given their natural addiction to random processes, they could not refuse the proposition of the disappointed deterministic team to play the result on throws of dice. And fortune decided to favour them a second time.

Vazken Andréassian and Charles Perrin

The frisbee match participants were, see photo above: Back row : Niels Schütze, Julien Lerat, Simon Gascoin, Marie Bourqui, Luk Peeters, Trevor Daniell
Front row : Tom Pagano, Charles Perrin, Hillary McMillan, Laurent Coron, Vazken Andréassian, Ashenafi Gragne, Frédéric Hendrickx

First meeting of National Hydrological Associations

In the August 2010 issue of the Newsletter, I wrote of IAHS's plans to establish a loose but effective Network of National Hydrological Associations (NHAs) that could serve a number of purposes to the benefit of the Associations themselves and also IAHS.

I am pleased to report that these plans have moved a major step forward with the convening of the First Meeting of NHAs. This was held on 30 June 2011, in conjunction with the XXVth General Assembly of IUGG. It was chaired by Gordon Young as President of IAHS and hosted very generously by the University of Melbourne. From the outset, IAHS has made it clear that, as the Network is to serve the needs of the NHAs, the Associations themselves should have a major say in how it is implemented. Accordingly, the meeting had a very simple agenda under which representatives of a number of NHAs introduced their Associations leading to a fruitful discussion on what steps to take next.

Despite the fact that the meeting was called at quite short notice, 14 participants attended and presentations were

provided by representatives of the NHAs from Germany, France, UK, Australia, India, Italy, the Nordic region and The Netherlands.

In summary, it was clear that there was great variety in the origin, structure and status of each NHA. For example, Australia has no national association, but rather groups in Canberra and South Australia, whereas India has two associations. However, they all had similar aims and activities and it was agreed that they could certainly benefit from more extensive exchanges of experience. The idea of a Network of NHAs was strongly endorsed, using the participants in the first meeting as a basis. It was recognized that it would be important for this Network to be light enough so as not to interfere with existing national and international structures, while being strong enough and sufficiently well defined to be effective in its actions.

It was agreed to work by correspondence to define more precisely what form the Network would take and establish a draft programme of work for the next five to ten years which would be presented for discussions and endorsement at a Second Meeting of NHAs. This will be held as an integral part of the programme for the next Scientific Assembly of IAHS to be held in Gothenburg in July 2013.

Arthur Askew, Former President IAHS

85th Birthday of Prof. (em) Dr.-Ing. habil. Siegfried Dyck

Siegfried Dyck was born on 3 August 1926. He studied Civil Engineering in Dresden from 1947 to 1952, majoring in hydraulic engineering. After his graduation as Diplom-Ingenieur, he joined the Berlin Institut für Wasserwirtschaft IfW (Institute of Hydrology). His first tasks included *i.a.* calculating the water balance of river basins and designing reservoirs. Following his dissertation and an intermediate position at the nuclear power station at Rheinsberg where he dealt with water management issues, he headed the department of Hydrology and Water Resources Management at the IfW. This group established essential elements of general and applied hydrology, of water balance calculation, precipitation–runoff relation as well as the calculation of flood and low flow. Siegfried Dyck had a major effect on the scientific fundamentals in these years.

In 1967, Dr Dyck was appointed Professor of Hydrology and director of the newly founded Institute of Hydrology at the Technical University (TU) Dresden. At this time, a technically close-knit structural unit had been created at the TU Dresden by combining the fields of hydraulic engineering, technical hydromechanics, water resources management, hydrology and meteorology into one department. In addition to university education in the field of water, this structural unit also used to represent a vital potential of water research in the GDR. In this respect, the layout of the Dresden School of Hydrology has always been highly interdisciplinary. From the outset, the study of hydrology in Dresden has been based on a profound mathematical-physical basic education; in addition to the scientific principles of hydrology, engineering, hydrochemical and hydrobiological issues have also been taught on this basis. In Germany, such complex studies in hydrology as designed by Siegfried Dyck were unique well into the 1970s. Due to the dedicated activities of Prof. Dyck and his staff, both unity of research and teaching as well as

the community of teachers and learners could be actually experienced in Dresden. An almost familiar atmosphere predominated at the institute, which most people who were able to experience and help form it, like to recollect.

Under the direction of Prof. Dyck, research of great breadth and depth was conducted. Hardly any section of the then current hydrological issues was not followed up in Dresden. His admirably universal hydrological knowledge is also expressed by numerous scientific papers that, in addition to national recognition, also brought Siegfried Dyck the acclaim of the international scientific community. The international esteem is also evidenced by the international positions he held: President of the International Committee for Evaporation, several periods in office as Vice-President of the International Commission for Water Resources Systems, from 1987 to 1991 elected first Vice-President of the IAHS, activities in the UNESCO (IHD and IHP) and the WMO (OHP). In 1992, Prof. Siegfried Dyck was awarded the International Hydrology Prize by the IAHS.

The scientific results achieved were speedily translated into textbooks. In the 1970s and 1980s *Applied Hydrology* came into being. With lightning speed, this book turned the name Dyck into a byword for the state of knowledge in hydrology. This concentrated collection of hydrological knowledge became a German-language classic and consulting the “Dyck” virtually became an obligation. In addition to this standard reference, the book *Grundlagen der Hydrologie* was written in cooperation with Prof. Peschke in the 1980s and 1990s. This book was also excellently received.

The work of Prof. Dyck at Germany's oldest Chair of Hydrology continues to have an effect on research and teaching even many years after his retirement.

We wish Professor Dyck all the best and good health on behalf of all staff members of the Institute of Hydrology and Meteorology of TU Dresden.

Dr Robert Schwarze and Dr Franz Lennartz
Technical University Dresden, Germany

TUBITAK Young Scientist Award

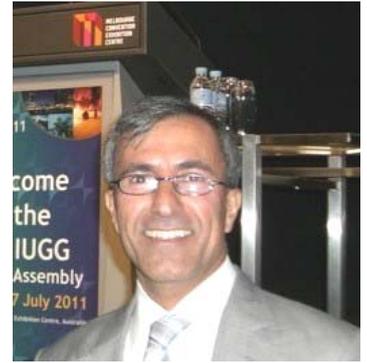
Since 1966, the Scientific and Technological Research Council of Turkey (TUBITAK) has established awards, in several categories, for outstanding scholarly achievement of scientists who are citizens of the Republic of Turkey. Given on the basis of international level significant contributions to the advancement of scholarship, the awards are the most prestigious national level science awards. Among these awards, the TUBITAK Young Scientist award is given to scientists who are under the age of 40 and who have proved to have the necessary qualifications to contribute to science in the future at an international level.

The awardees are notified on 24 July every year, which is the anniversary of the establishment of TUBITAK. Awards are given to the winners at a ceremony held every year.

Prof. Dr Hafzullah Aksoy has been awarded the TUBITAK 2011 Young Scientist Award in the Engineering category for his international level significant contributions in statistical

hydrology, rainfall–runoff modelling and new modelling techniques in the major area of Hydrology.

Prof. Dr Hafzullah Aksoy (PE, ICSW-IAHS; VP, ICSW-IAHS 2007–2011) has been affiliated with Department of Civil Engineering of Istanbul Technical University, Istanbul, Turkey since 1991. His major area is Hydrology, dealing with different topics such as surface water, open channel hydraulics, water resources planning and management, hydromechanics, renewable energy resources, watershed modelling and statistical analysis.



From December 2010 to January 2011, Queensland, Australia, experienced widespread flooding, with three quarters of the state declared a disaster zone.

Understanding Floods: Questions and Answers (UFQA) explains fundamental scientific and engineering concepts regarding floods, in clear and simple language. It provides balanced and authoritative information within the current state of knowledge, and focuses on three key themes: floods and their consequences; flood forecasts and warnings; and managing floods. It was written by the Queensland Floods Science, Engineering and Technology (SET) Panel, convened by the Queensland Chief Scientist, Dr Geoff Garrett, AO. The

SET panel includes 25 Australian and international specialists with expertise across the range of flood-related disciplines. UFQA was developed in support of the Queensland Floods Commission of Inquiry, to build capacity and understanding of floods in general. UFQA will also educate our leaders, the media and the Queensland community at large on the complex, inter-relational factors impacting on floods. UFQA will facilitate informed decisions to help shape the way in which we can plan for and mitigate our level of flood related risk now, and in the future.

To read the report go to:

<http://www.chiefscientist.qld.gov.au/publications/understanding-floods.aspx>

Calendar of Meetings Organized/Sponsored by IAHS and Its Commissions

2011	Conference	Contact details
Besançon, France 1-3 September	H2Karst, the 9th Conference on Limestone Hydrogeology	Prof. Jacques Mudry: h2karst.besancon@gmail.com http://www.sites.google.com/site/h2karst
Gdansk, Poland 5-8 September	WMHE 2011, 12th International Symposium on Water Management and Hydraulic Engineering	http://www.wmhe2011.wilis.pg.gda.pl
Lima, Peru 6-9 September	Hydrology and present geodynamics of South American basins. 4th HYBAM Scientific Meeting	www.ore-hybam.org
Vienna, Austria 11-14 September	Water Policy 2011 – Harmonizing water management strategies at multiple scales to sustain ecological, agricultural, and urban/industrial needs	Water Policy 2011 Secretariat, Institute of Water Management, Hydrology and Hydraulic Engineering, Muthgasse 18, 1190 Vienna, Austria doris.steinbauer@boku.ac.at
Manaus, Brazil 13-16 September	International Workshop on Hydrometry	Director Dalvino Troccoli Franca, dalvino.franca@ana.gov.br
Leipziger Kubus, Germany 19-22 September	ModelCare 2011, 8th International Conference on Calibration and Reliability in Groundwater Modelling: <i>Repositories of Knowledge</i>	modelcare2011@fu-confirm.de
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; info@ifi-home.info
Jeju Island, Korea 18-21 October	The Second Asia-Pacific Coastal Aquifer Management Meeting	http://www.apcamm.org tel: +82-51-200-7629; mnspar@kau.ac.kr
Xi'an, China 21-23 October	International Symposium on Impacts of Climate Change on Water Resources in Arid and Semi-arid Regions	Prof. Xia Jun xiaj@igsrr.ac.cn
Irvine, CA, USA 30 Nov-3 December	Groundwater Resources Management : Adaptations to Water Scarcity. Science and Policy Responses	www.groundwater-conference.uci.edu gwater@uci.edu
2012	Conference	Contact details
London, UK 26-29 March	Planet under Pressure: New knowledge towards solution	http://www.igpb.net
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	Dr Zbynek Hrkal, Charles University, Prague, and T.G. Masaryk Water Research Institute (VÚV), Prague, Czech Republic. Also Secretary of Czech National Chapter of IAH; tel: +420 220 197 463; zbynek_hrkal@vuv.cz Karel Kovar, VP IAHS/ICGW: karel.kovar@pbl.nl http://web.natur.cuni.cz/qwfr2012/
Ohrid, Macedonia 28 May-2 June	BALWOIS 2012 Conference on Water, Climate and Environment	http://www.balwois.com/2012
Banff, Canada 11-15 June	IAHS-ICCE International Conference. Wildfire and Water Quality : Process, Impacts and Challenges	Michael Stone mstone@uwaterloo.ca
Paris, France	Kovacs Colloquium at UNESCO, Paris, planned for June/July	cudenec@agrocampus-ouest.fr
Hamburg, Germany 14-18 July	10th International Conference on Hydroinformatics HIC2	loebkens@tutech.de
Oulu, Finland 13-15 August	NORDIC WATER 2012, XXXVII Nordic Hydrological Conference, Catchment Restoration and Water Protection	Prof. Bjørn Kløve, University of Oulu bjorn.klove@oulu.fi
Niagara Falls, Canada 16-23 September	IAH Congress. Confronting Global Change	conference@iah2012.org
Vienna, Austria 24-27 September	HydroPredict2012, International Interdisciplinary Conference on Predictions for Hydrology, Ecology and Water Resources Management	Universität für Bodenkultur Wien (BOKU) University of Natural Resources and Applied Life Sciences Institute of Water Management, Hydrology and Hydraulic Engineering, Vienna, Austria Prof. Hans-Peter Nachtnebel or Mr Karel Kovar hans_peter.nachtnebel@boku.ac.at or karel.kovar@pbl.nl
Tunis, Tunisia October	Statistical Methods for Hydrological Application, 3rd official STAHy workshop (postponed from October 2011)	
Chengdu, China 11-15 October	International Symposium of IAHS-ICCE	Prof. Xiubin He, Prof. Xinbao Zhang, Dr Yuhai Bao http://iahs.info/conferences/2012_Chendu_ICCE.pdf
Baghdad, Iraq 17-18 October	First International Conference on Water Resources Engineering Technology in Iraq and its Obligation for Technical Potential to Satisfy the Future Demand	Prof. Dr Aqeel Al-Adili, University of Technology, Baghdad, Iraq tel: 009647901766126 aqeeladili@yahoo.com
Delft, Netherlands 22-26 October	IAHS 90th Anniversary meeting	h.g.savenije@tudelft.nl
2013	Conference	Contact details
Göteborg, Sweden 22-26 July	Joint IAHS-IAPSO-IASPEI Scientific Assembly	
Alice Springs, Australia September	IAH Congress	
2014	Conference	Contact details
Hanoi, Vietnam February/March	FRIEND Conference	
2015	Conference	Contact details
Prague, Czech Republic 22 June-2 July	XXVth IUGG General Assembly, including the IAHS Assembly	



International Association of Hydrological Sciences Association Internationale des Sciences Hydrologiques

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Information about all aspects of IAHS is available from the IAHS web site: www.iahs.info or:

Prof. Christophe Cudennec, at cudennec@agrocampus-ouest.fr or IAHS, UMR SAS, Agrocampus Ouest, CS 84215, 35042 Rennes Cedex, France

Registration, please register online at the web site or contact:

Mrs Jill Gash, Membership Secretary, IAHS Press, Centre for Ecology and Hydrology, Wallingford, Oxfordshire OX10 8BB, UK

jilly@iahs.demon.co.uk

For information about the Commissions and other groups visit their web sites via www.IAHS.info or contact:

ICCE, Continental Erosion

President: Valentin Golosov, golosov@rambler.ru
Secretary: Paolo Porto, paolo.porto@unirc.it

ICRS, Remote Sensing

President: Ian Cluckie, i.d.cluckie@swansea.ac.uk
Secretary: Yangbo Chen, eescyb@mail.sysu.edu.cn

ICSIH, Snow and Ice Hydrology

President: John Pomeroy, pomeroy@usask.ca
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ICSH, Statistical Hydrology

President: S. Grimaldi, salvatore.grimaldi@unitus.it
Secretary: S. Vandenberghé sander.vandenberghé@ugent.be

PUB, Predictions in Ungauged Basins

Chair: Hubert Savenije, h.h.g.savenije@tudelft.nl

ICCLAS, Coupled Land–Atmosphere Systems

President: Stewart Franks, stewart.franks@newcastle.edu.au
Secretary: Dawen Yang, yangdw@mail.tsinghua.edu.cn

ICWQ, Water Quality

President: Valentina Krysanova, valen@pik-potsdam.de
Secretary: Wouter Buytaert, wouter@paramo.be

ICT, Tracers

President: Piotr Maloszewski, maloszewski@helmholtz-muenchen.de
Secretary: Przemyslaw Wachniew wachniew@novell.ftj.agh.edu.pl

Education Working Group

Thorsten Wagener, thorsten@engr.psu.edu and Earl Bardsley, web@waikato.ac.nz

ICGW, Groundwater

President: Chunmiao Zheng, czheng@ua.edu
Secretary: Gunnar Nützmänn, nuetzmänn@iqb-berlin.de

ICSW, Surface Water

President: Eric Servat, eric.servat@univ-montp2.fr
Secretary: Yan Huang, y.huang.ctw@gmail.com

ICWRS, Water Resources Systems

President: Günter Blöschl, bloeschl@hydro.tuwein.ac.at
Secretary: Nick van de Giesen, n.c.vandegiesen@tudelft.nl

Precipitation Working Group

Daniel Schertzer daniel.schertzer@cereve.enpc.fr

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d.hughes@ru.ac.za

Institute for Water Research, Rhodes University, Grahamstown 6140, South Africa
Tel: +27 (0) 46 6224014 Fax: +27 (0) 46 6229427

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FOREST HYDROLOGY

Selection, Introduction and Commentary by
David R. DeWalle

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