



IAHS Newsletter

NL95 December 2009



Participants of the Joint International IAHS–IAH Convention in Hyderabad, India, gathered on the last day

Reports from the Joint IAHS–IAH Convention in September 2009

See below and inside for overviews and reports of sessions and other events that took place in Hyderabad, pages 3–13.

Hyderabad 2009 – View from Africa

The prospect of travelling to Hyderabad, India, for the recently held 8th Scientific Assembly of IAHS co-hosted with the IAH, presented us with an opportunity to take a break from the demands of academic and consultancy life to visit a beautiful country. Our experiences in Hyderabad were truly remarkable in all respects.

We had thought that we would miss the chance of experiencing a monsoon storm event since it was towards the end of season, but upon arrival in Mumbai we were greeted by the most intense downpour we have ever experienced. The rains lasted over 4 hours. As hydrologists *Tendai Sawunyama and Evison Kapangaziwiri's account continues on p. 8.*



2009 International Hydrology Prize is awarded to Keith Beven

The International Hydrology Prize is awarded annually by IAHS, together with UNESCO and the World Meteorological Organization, to an individual, in recognition of an outstanding contribution to the science. Nominations for the Prize are made by IAHS National Committees and considered by the Nomination Committee, i.e. the President and a Vice-President of IAHS and representatives of UNESCO and WMO.

The citation and response are published in full on pages 6–



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The Tison Award goes to Japanese hydrologists

Their award winning paper, entitled *Global projections of changing risks of floods and droughts in a changing climate*, was published in *Hydrological Sciences Journal* in 2008 (vol. 53(4), 754–772), and is available open access at www.iahs.info. *Article on page 13*

Young/early career IAHS members set an agenda

The meeting convened by Kate Heal to provide a forum for young scientists to discuss how to increase their involvement and motivation within IAHS, was well attended and drew up recommendations for the IAHS Bureau to implement by 2011. *Article on page 4*

Second IAHS Ultimate Frisbee Tournament

Empirical Distributed Modellers: 8
Lumped Physically-based Modellers: 1

Match report by Vazken Andréassian and teams, with analysis of their performance and discussion of possible contributory factors. *See page 14*

Message from the President *from Gordon Young gordonyoung_wwap@yahoo.com*

In 1982, IAHS held its first Scientific Assembly in Exeter, England. Since then, and on a four year cycle, we have held our Assemblies in many different countries, sometimes as IAHS stand-alone events and sometimes in collaboration with other organizations. Two months ago, in Hyderabad, India, we held our 8th Assembly in conjunction with the 37th annual Congress of IAH (the International Association of Hydrogeologists of the International Union of Geological Sciences). This cooperative assembly was a great success, with a special focus on ground-water issues, but including a wide range of hydrological subjects – more details are provided within the report by P. Rajendra Prasad and S. N. Rai representing the local organizing committee, and in the reports by the convenors of individual events.

India is an incredibly interesting venue for a hydrological assembly. Within India are found some of the wettest places on Earth in Assam, and some of the driest in Rajasthan; precipitation is highly seasonal and there are frequent instances of floods being followed by droughts. Water resource managers are facing the increasing challenges of supplying water to a burgeoning population and to the mounting demands of a growing middle class. It was within this national and local context of hydrological challenges that our scientists located their debates.

As always, planning and executing an assembly is a major challenge to those intimately involved. We owe many thanks to our hosts Dr V. P. Dimri, Director of the National Geophysical Research Institute (NGRI) for making his facilities available to us, and to Dr Harsh Gupta, Vice President of IUGG and former Director of NGRI.

Special thanks must go to our IAHS Vice President, Dr Rajendra Prasad, who worked ceaselessly in the two years prior to the Assembly, in conjunction with our SG, setting up all the local facilities – a monumental task! Thanks too, to all our sponsors, including UNESCO, WMO and IAEA, for their generous financial contributions, and to our many convenors of symposia and workshops for making the individual elements of the Assembly so successful.

I had the honour of taking over the Presidency of the Association from Arthur Askew, to whom we all owe a special debt for conducting the affairs of the Association so successfully over the past four years. All of our nine Commissions also saw the change of their Presidencies, so the Bureau of the Association now has many new faces, as well as the continuity given through the Secretary General, the Vice Presidents, Treasurer, Editor and Chair of IAHS Ltd. The Past Presidents will continue their work in many capacities over the next two years.

Besides the symposia, workshops and numerous informal business meetings held during the Assembly were the meetings of the Bureau of IAHS, at which functioning of the Association, its Commissions and Working Groups are discussed and strategies for future activities are debated. There are many concerns regarding the future functioning of the Association and these were elaborated on page 3 of the last newsletter: www.iahs.info/newsletters/NL94.pdf. All these concerns were discussed by the Bureau and some major decisions were taken. Perhaps the most important were that there should be no radical change to the structure and functioning of the Association and its Commissions and Working Groups; nor should a fee

for membership be introduced (indeed it would be contrary to the statutes of our parent body, the International Union of Geodesy and Geophysics to do so).

Just as important were decisions on how to make our functioning more efficient and effective; they are as follows:

- National Representatives (NRs) should play a key role in the activities of the Association as countries are the official members of the Association and the NRs are the official representatives of their countries. The roles of NRs are now explicitly defined at our web site: www.iahs.info/nreps/Nat_Reps_responsibilities.pdf. NRs will be expected to play a much more active role in the future and individual members should be able to contact their own NR to gain further insight into the functioning of IAHS.
- Young scientists should be actively encouraged to participate in the activities of the Association. Kate Heal convened a very successful informal meeting of young scientists at Hyderabad; the results of that meeting are detailed later in this Newsletter, but the five main recommendations were that:
 - A young scientist should be appointed as an ‘officer’ in every Commission and Working Group;
 - All symposia and workshops at IAHS events should have one young scientist as a co-convenor;
 - Young scientists’ discussion groups/virtual communities should be set up to improve IAHS webpages;
 - Conferences should be made more attractive to young scientists;
 - The benefits of IAHS membership should be better communicated to young scientists.

These are excellent recommendations which we shall try to implement.

- We should, once again, make a strong effort to engage more scientists from less developed countries in the activities of the Association. Vice President Denis Hughes is leading this effort and in the coming months will be able to report on progress being made.

A few weeks after Hyderabad, Pierre Hubert and I attended the meeting of the Executive of IUGG in Melbourne, Australia to determine the organization

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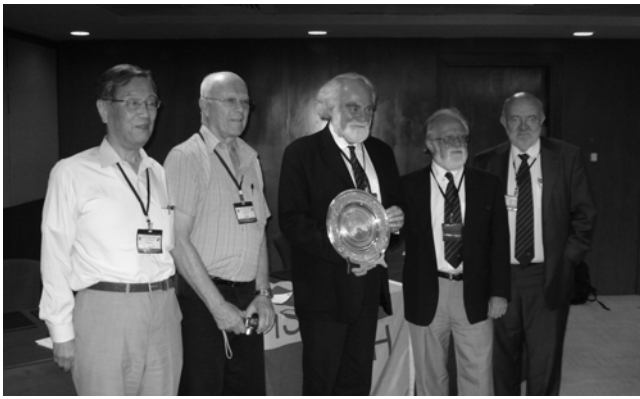
The Newsletter is provided free of charge to members of IAHS. This Newsletter and previous issues may be downloaded from: www.iahs.info

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

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Case 105, 4 Place Jussieu, 75252 Paris Cedex 05, France

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

The next Newsletter will be published in March/April 2010; copy deadline 28 February 2010.



Gordon Young receiving the IAHS President's silver plate, at the handing over ceremony.

From left to right: former presidents Kuni Takeuchi and Uri Shamir, Gordon Young, Arthur Askew – now Past-president, and Pierre Hubert, Secretary General.

and programme for the next General Assembly of the Union. Immediately after the meeting in Melbourne, Arthur Askew and I attended the General Assembly of the World Water Council in Marseille, France; Arthur reports on the outcomes later in this Newsletter.

We all have a great deal to do in the next years to maintain IAHS as the leading international association dealing with hydrological sciences. I look forward to working with all of you as a team to further our endeavours.

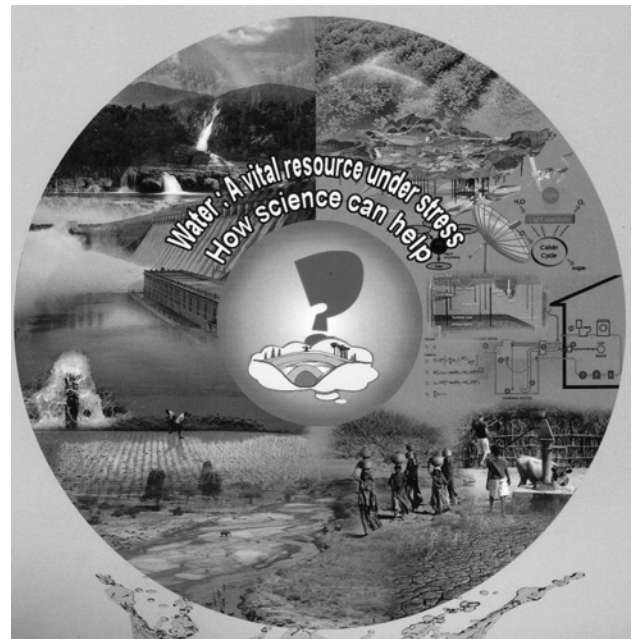
REPORTS FROM HYDERABAD – September 2009

From the organizers

The National Geophysical Research Institute (NGRI) in association with the Association of Hydrologists of India (AHI) hosted the Joint International Convention (JIC) of the 8th Scientific Assembly of IAHS and 37th Congress of the International Association of Hydrogeologists (IAH) at Hyderabad International Convention Centre (HICC; 6–12 September 2009). The theme of the JIC was *Water: A vital resource under stress: How science can help*. The IAHS and IAH are the pivotal global scientific associations dealing with the hydrological sciences and are committed to propagation of the recent trends in the development and management of water resources in different parts of the world.

The JIC was opened by Smt. Daggubati Purandeswari, Honourable Minister of State for Human Resource Development (Higher Education), Govt of India, on 6 September 2009. Dr V. P. Dimri, Director NGRI, presided over the inaugural event. Dr Arthur Askew, President of IAHS and Dr Willi Struckmeier, President of IAH, addressed the delegates after releasing the five volumes of pre-published symposium proceedings – the IAHS red books. Prof. Pierre Hubert and Dr Shaminder Puri, the Secretaries General of IAHS and IAH, respectively, presented reports on the worldwide activities of IAHS and IAH. The Hon. Minister, in her inaugural address, dwelt on the necessity of scientific approaches for proper management of surface and groundwater resources. She touched upon the water quality problems that are being faced worldwide and more so in developing countries. She also made special reference to the issue of water pricing, and stressed the need for protection of the basic right of the availability of quality water to all the inhabitants. In her concluding remarks she hoped that the international community, together with the national hydrological experts, would be able to deliver amicable solutions to the persisting water-related problems. Dr S. N. Rai, Vice President of IAH and Convener of JIC, highlighted the significance of the JIC in the Indian context and proposed the vote of thanks.

This was followed by the inaugural lecture by Prof. Ghislain de Marsily, Emeritus Professor, University of Paris VI, France, on *Freshwater stocks on Earth as ice, surface water, ground water: are we losing water?* He emphasized the need for also focusing attention towards other issues, such as type of food, habitats, availability of quality soil, etc. to manage the water resources more effectively.



Another important event was a special lecture delivered by Prof. Stephen Foster, World Bank GW-MATE Director and IAH Past President, on *Hard-rock aquifers in tropical regions – using science to inform development and management* (9 September). He opined that there should be better coordination between water users and knowledge centres in order to educate users about the conservation and use of groundwater in a sustainable manner. On this occasion, Mr Popatrao Pawar, Chief of the Village Council of Hivre Bazar, a small village in a drought-prone area of Maharashtra State in India, was presented with the “IAH Distinguished Award” by Dr Struckmeier for his community-based water resources management schemes, which have brought all-round progress in his village. The IAH Plenary* session was held the same day, in the evening. As a part of the plenary, Mr Jacek Jezierski, Hon. Minister from Poland, made a presentation about preparations for the 38th IAH Congress to be held in Krakow, Poland. This was followed by a presentation by Prof. Ken Howard regarding the IAH Congress scheduled in Canada. Finally, Dr Struckmeier presented the IAH President's Award to Dr Peter Dillon and Honorary membership to Prof. Jirí Krásný, and thanked the speakers.

*The IAHS Plenary was held a different day and the awards and reports made during it are reported elsewhere in this Newsletter.

The JIC was structured as 22 events (symposia and workshops) dealing with almost all topics of hydrological science, including: Ecohydrology, Hydroinformatics, Groundwater sustainability in highly stressed aquifers, Integrated water resources management, Interaction between surface and groundwater, Transboundary water management, Isotope hydrology, High mountain snow and ice hydrology, Sediment management in Asian rivers, Flood risk management, Prediction in ungauged basins, Precipitation variability and water resources, New statistics in hydrology, Groundwater development and management in hard rock regions, Groundwater pollution, and Socio-economic issues relevant to groundwater. Of the 22 events, the four symposia focusing on *Hard rock hydrogeology* were organized by IAHS. A field trip to the Himayat Sagar and Osman Sagar, which are the main sources of drinking water supply to the twin cities of Hyderabad and Secunderabad, was organized on the morning of 9 September. A workshop on *Managed aquifer recharge* (MAR) was organized on 10 September by the IAHS

commission on MAR. More than 500 delegates from 62 countries attended the JIC and presented more than 680 research papers in either the 121 oral sessions or the nine poster sessions.

The closing ceremony, on the afternoon of 11 September, was presided over by Prof. H. K. Gupta, Vice President of IUGG, Dr Struckmeier, Prof. G. Young (newly elected IAHS President), and Dr V. P. Dimri, Chairman of the LOC, presented their views on significance of the JIC and the need for scientific approaches to be practiced for the sustainable development and management of water resources. On this occasion, Dr Struckmeier, Dr Arthur Askew, Prof. Gordon Young, Prof. P. Hubert, Dr Shaminder Puri, Dr John Chilton and Prof. Ghislain de Marsily were thanked for their contributions to the growth of hydrological sciences and their implementation. Prof. P. Rajendra Prasad, Vice President of IAHS, presented the vote of thanks.

S.N. Rai (IAHS) & P. Rajendra Prasad (IAHS VP)
Convenors, JIC of IAHS & IAHS

IAHS Young/Early Career Hydrologists Meeting

Meeting aim and format

The meeting was convened by Kate Heal (University of Edinburgh, UK) to provide suggestions from young scientists as to how to increase their involvement and motivation within IAHS. It was advertised in the Assembly programme and by word-of-mouth during the Assembly. Twenty-seven young hydrologists participated, including 13 PhD students and also project leaders, consultants and young lecturers from North America, Australia, Asia, Africa and Europe. A list of participants with email addresses was compiled. The meeting was organised as an interactive workshop. The participants were divided into five groups of four–six, each discussing amongst themselves the same three questions posed by the convenor. Feedback to each of the questions was gathered from all the groups, discussed and is summarised below.

Question 1: Why did you choose to participate in this conference?

- Good number of participants: enough for variety and opportunity to speak to many people, but not too many to feel overwhelmed/lost
- Opportunity to publish in a Red Book was attractive as Red Books are reviewed and SCOPUS-indexed
- More international than other conferences which tend to be either North American- or European-dominated
- India is an attractive location
- Find out about new ideas, concepts and techniques
- Exposure to other topics
- Networking opportunities
- Feedback on research (although could be improved – see suggestions below)
- Communication/advertisement of research
- Supervisor encouragement
- A break from consultancy

Question 2: What would encourage more young scientists to participate in IAHS conferences?

- Better publicity about conferences (e.g. dissemination of publicity through national representatives and members).
- Better publicity about the opportunity to gain publications through Red Book papers.
- Greater prominence of posters in conferences (dedicated poster sessions with refreshments and no concurrent oral

presentations; poster presenters could give 2-minute talks to advertise their posters; prize awarded for best young scientist poster – this should be of real use and value, e.g. registration fee waiver for an IAHS conference).

- More social events, ideally every evening providing further less formal networking opportunities.
- Better use of time that becomes available in the conference programme if speakers do not appear. All young scientists attending the conference could be advised in advance to bring a presentation in case space becomes available in the programme at short notice.
- Feedback on presentations using a standard proforma. Feedback could be provided by workshop/symposia convenors and/or anonymous members of the audience.
- Travel funds for participation by young scientists. These could be awarded on a competitive basis, e.g. convenor of each symposium/workshop nominates one young hydrologist paper on the basis of the abstracts submitted.
- Masterclass(es): technical workshop(s) held immediately before or after conferences for young scientists to learn from the expertise of senior scientists attending the conference. Topics for Masterclasses could be related to the conference theme. Alternatively, topics could be selected by allowing young scientists to vote on their preferred topics from a list.
- A dedicated young hydrologist event within conferences to provide additional opportunities for young scientists to meet each other and discuss common issues and concerns and to help build a network of young scientists.

Question 3: What would encourage more involvement of young scientists in IAHS?

- Better communication about the activities of Commissions and Working Groups and how to get involved. Many meeting participants were aware of the Commissions and Working Groups but did not realize that the meetings were open to all.
- A young scientist co-convenor of every symposium/workshop. This was viewed as attractive through a publication via co-editorship of a Red Book.
- A clearer statement of the benefits of IAHS membership for young scientists: networking, opportunities for financial support for conference participation, prizes for young scientists, opportunities to co-convene international symposia/workshops (important for career

- progression), publications in Red Books and as co-editors of Red Books, etc.
- A young scientist “officer” in every Commission/Working Group to represent the views of young scientists and act as nodes for communication between young scientists in IAHS. Young scientist officers could be selected initially from an email soliciting self-nominations sent to all IAHS members and those who participated in the meeting. Because of the restrictions on which nationals may become IAHS officers (have to be a national of a country which pays IUGG subscription) it may be that these posts would have a slightly different title so that all young scientists can participate.
 - Improve the design of the IAHS website to make it more attractive and interactive.
 - Develop an online discussion forum for young scientists run by young scientists. This could include news of conferences and workshops and be used to seek advice on questions and data sharing.
 - Make use of other online communication and knowledge exchange tools (e.g. a Facebook-style community, contribution to a water Wiki) to develop a virtual community of young scientists to maintain contact between conferences. It was recognized that membership fees may be necessary to support the development of such tools.
 - More regional/national IAHS groups with meetings/activities (similar to the Chapters within IAH)

Next steps

A summary of the meeting discussion was presented by Kate Heal to the IAHS Plenary at Hyderabad on 10 September. A full report of the meeting will be posted on the IAHS website and was circulated to all meeting participants and also IAH (who kindly shared their post-AGM drinks reception with the

meeting participants!). It is recommended that the five following actions from the lists of suggestions above are implemented within IAHS by/at Melbourne in 2011:

1. A young scientist “officer” in every commission/working group.
2. A young scientist co-convenor for all symposia/workshops.
3. Set up a young scientists discussion group/virtual community and improve IAHS webpages.
4. Making conferences even better for young scientists: increased prominence of posters, more social events, a young scientist event, feedback to young scientist presenters, financial support for young scientists to participate – awarded on a competitive basis.
5. Communicate to young scientists the benefits of IAHS membership and how to get involved.

However, it is important to note that concern was raised that the many time pressures on young scientists may act as a barrier to their participation in IAHS unless the benefits are clear for their career development.

To find suitable young scientists to take forward actions 1, 2 and 3 it is suggested that there is an open solicitation procedure (e.g. by email) from the commissions/working groups, symposium convenors and IAHS Bureau, respectively, which can subsequently select appropriate candidates, taking into account criteria such as country, gender, discipline, etc.

Many of these actions should be relatively straightforward to implement and can be shared tasks amongst existing IAHS officers, symposia/workshop convenors and the community of young scientists identified at the meeting. Indeed, many of these actions may happen during the ongoing review of IAHS and all will benefit IAHS as a whole.

Kate Heal, University of Edinburgh

A Sample of Reports from Session Convenors

Note: The other reports will be published in a future newsletter. Five IAHS Red Books were published at Hyderabad as the proceedings of each of the four Joint Symposia (JS.1, 2, 3 & 4) and one of the Hydrology Symposia (HS.2), see page 12. The HS.1 volume will be post-published.

JW.1 – Measuring and Modelling Interactions between Groundwater and Surface Water

This Workshop, jointly sponsored by ICGW, ICSW, ICT, IAEA, and IAH, was held over two days. It included participants from six continents and 19 countries. A total of 30 talks were presented during the oral sessions, which were visited by 50+ attendees per session. There were also 16 poster presentations given during the session on Monday. The talks presented a very well-balanced mix of topics, including:

1. Interactions between groundwater and surface water at different scales,
2. Modelling methods and application,
3. Unsaturated zone – transition from the surface to the subsurface, and
4. Aspects of water management and case studies.

They also covered a wide range of geographical locations and environments (e.g. different geological and climatic conditions, lowlands as well as uplands).

The first part of joint workshop JW1 concentrated on the mechanisms and processes of interplay between surface water and groundwater compartments at different scales. The hyporheic zone 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 Stefan Krause emphasized the importance of integrating methods like tracers, isotopes, groundwater transport and geochemical modelling, and showed the additional benefits that the cooperation between scientists from different disciplines can provide.

In the second part of the JW.1 Workshop modelling methods and their applications to surface water–groundwater interactions were presented. The audience was invited by keynote speaker Denis Hughes to take up the challenge of using simple models for describing discharge generation in ungauged basins in South Africa. This illustrated the strong connections between our workshop and other sessions at Hyderabad which were dealing with “Prediction in ungauged basins” and “Hydrological predictions in data-sparse regions”. Furthermore, some speakers identified the need for developing fully integrated modelling tools for addressing specific concepts of surface and subsurface flow.

In the third part of the workshop, the role of the unsaturated zone as a transition zone between the surface and the subsurface was outlined. In semi-arid and arid zones, for example, where groundwater levels are far below the river beds, the vadose zone plays an important role in water and solute transfer between rivers and aquifers, including biogeochemical reactions.

Finally, practical applications and specific case studies were presented. The keynote speaker, L. Surinaidu, demonstrated the necessity of coupling surface water and ground-water models to investigate saltwater intrusions in India. Saltwater intrusions are a worldwide problem and this talk was of great interest to many participants.

The workshop participants agreed that there is a need for a large variety of more detailed process studies to improve the understanding of surface water-groundwater interactions in different landscapes and climates, and also to provide a better basis for the development of integrated modelling systems.

The great interest in our joint workshop has demonstrated the increasing interest in the topic of surface water-groundwater interactions. 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. It is planned to publish a selection of the papers as a Red Book.

Gunnar Nützmann (main convenor), Aldo Fiori, Yun Shimada Corinna Abesser, Jianyao Chen David Rassam and Sarah Dunn

JW.2 – Rural and urban water systems: Minimizing adverse impacts of global change on water resources

The hydrological regime and water quality in rivers, lakes and aquifers depend on climate conditions and direct and indirect human activities, such as land use, urbanization and water management. Changing climate could lead to alterations in runoff, streamflow and water quality characteristics. Land-use patterns and agricultural practices have a very significant effect on water flows and water quality, as do management actions to control point and diffuse sources of pollution. Consumption of groundwater in large cities leads to lowering of groundwater tables, pollution of surface and groundwater, damage to ecological systems, and land subsidence. Rapid urbanization and its consequences for local and regional water systems (both quantity and quality aspects) are likely to become dramatic in the future. Therefore, water systems in the future will be very dependent on changing climate conditions, as well as on the whole spectrum of human activities. The Workshop intended to contribute to this important field of research.

The papers and posters presented contributed to this important field of research. Ten papers were presented orally, addressing different aspects of the observed and projected trends in water regimes and water quality under global change. Of these, three papers related to projecting changing climate and assessing its impacts, two were on agricultural practices and control of diffuse pollution, two were on challenges of urbanization, and three considered different aspects of water management in changing regional conditions. The poster presentations contributed to the same topic demonstrating a number of case studies in different regions.

Salvatore Grimaldi

HS.1 – Symposium on High Mountain Snow and Ice Hydrology

More than 30 snow and ice hydrologists took part in the one-day (Wednesday 9 September) High Mountain Snow and Ice Hydrology Symposium, during which there were 13 oral

presentations by authors from 10 countries. The presentations covered snow processes in mountain areas, lake ice, and runoff from glacierised basins. Around a sixth of the world's population relies on meltwater from seasonal snow cover and glaciers, so the distribution of the studies presented was wide – the Rocky Mountains of North America, the European Alps, the Caucasus, and the Altai, Karakoram and Himalayan ranges of Asia. Inevitably, impacts of climatic variation and of future climatic warming on runoff from snow and ice were underlying themes throughout.

The Symposium was introduced by ICSIH President John Pomeroy, who provided background information on the Commission since the establishment of the International Association of Cryospheric Sciences (IACS), co-sponsoring organisation of this Symposium, at Perugia in 2007. Only one of the promised papers on trends in mountain lake ice cover was presented, by Joanna Pociask-Karteczka, on Morskie Oko Lake in the western Carpathian Mountains in central Europe. Impacts of climatic warming on mountain snow-packs were considered for the western USA by Danny Marks, Canadian Rockies by John Pomeroy, and western Himalaya by Ramesh Singh. Distributed degree-day modelling of rainfall and snowmelt runoff generation in the Caucasus was presented by Alexander Gelfan, and modelling snowmelt initiation of landslides in the Alps by Cristina Rulli. Papers by Daniele Bocchiola and Willi Hagg looked at the influence of debris-covered ice on water yield from glacierised basins in the Italian Alps and Altai, respectively, both testing runoff models. Year-to-year variations in river water temperature in Swiss Alpine basins with differing proportions of ice cover were analysed by David Collins, and impacts of declining snow cover on water resources in the Austrian Alps were assessed by Davy Vanham.

Climate change and runoff from declining glaciers in the Himalayas is a major source of interest – hardly surprising given dramatic media claims that glaciers in the region are retreating at record rates, and that glaciers will be all but gone by 2030. Such headline statements have generated an industry of modelling studies in an area sparse in actual or available data. Characteristics of measured climate change in the Tibetan Plateau headwater basins of the great Himalayan rivers were described by Jiang Weijuan. Martijn Booij presented a modelling study for basins in the Karakoram, in which climatic warming was coupled with decline and ultimately disappearance of the glacierised area. The final presentation, by Christian Siderius, looked at methods of assessing impacts of changing water resources in the Ganga basin with climatic warming, focusing on interaction between glaciers and monsoon precipitation in the Himalayas.

The midweek timing of the Symposium, and the relatively small size of the group, allowed the schedule of presentations to be modified in view of known attendance/absence of individuals from the Assembly, so that, on the day, there was a full continuous programme, with no “no-shows”. The one available poster was changed to an oral presentation.

As the number of papers was not great, there was time not just for questions after each presentation, but also for periods of more general discussion, contributions to which bubbled up from the loyal band of participants who spent the whole day following the mountain snow and ice theme. The range of topics was broad, and discussion was wide ranging – from degree-day to full energy-balance approaches to modelling inconsistencies in estimates of future precipitation between climate models, how debris cover affects glacier

melt and how debris cover impact could increase in future, how declining glacier dimensions will interact with enhanced energy availability for melting in determining future runoff, and what impact changing patterns of monsoon precipitation might have on glaciers and runoff in northern India.

Convivial discussion continued late into the evening for the 22 participants and friends who had braved taxis and tuc-tucs in the rush-hour traffic to Fusion 9, a restaurant in the Banjara Hills area of Hyderabad, for the informal snow and ice dinner. They were rewarded by excellent biryani, Kingfisher beer, and post-prandial pyrotechnics arranged by the bar staff.

This small highly-specific Symposium consisted of well-presented papers and generated extensive discussion; it was enjoyed by all. Papers from the Symposium will be published soon as an IAHS Red Book (Publ. 332).

David N. Collins (main convenor)

HS.2 – New Approaches to Hydrological Prediction in Data-Sparse Regions

Symposium HS.2 on *New Approaches To Hydrological Prediction In Data-Sparse Regions* was successfully held on 8–9 September 2009. Dr Yilmaz (convenor) and six co-convenors were present during the Symposium and shared the session workload equally. Dr Neale (co-convenor) was unable to attend due to other responsibilities, nor was Dr Yang (co-convenor) because he was unable to obtain a travel visa. The sessions were organized according to four themes focused on diverse subjects related to predictions in data-sparse regions. The themes were: 1. Hydrological Modelling in Poorly-gauged and Ungauged Basins, 2. Hydro-meteorology and Climate Change Assessment, 3. Remote Sensing Applications in Hydrology, and 4. Characterizing Rainfall Variability and its Impacts on Hydrological Modelling. Seven oral sessions were held with a total of 36 scheduled oral presentations. Fortunately, only four oral presenters were unable to attend the conference; all had been unable to obtain travel visas. However, they had communicated their absence to Dr Yilmaz a few days prior to the symposium. During the introductory talk, Dr Yilmaz made an announcement and indicated that there was an opportunity for the audience to present their HS.2-related research in these open slots. Two of the empty slots were filled by new speakers (Kevin Shook and John Pomeroy discussing *Physically-based energy balance modelling for hydrology in data-sparse regions*, and Hubert Savenije on *Moisture recycling*) after confirmation from the convenor. The remaining empty slots were filled by extending the time allocation of previous speakers in the session.

A general discussion time was allocated during the last session of Day 1, which received great attention. The following major remarks were made during the discussion:

1. Current statistics (e.g. NSE, RMSE) to measure model performance do not tell us much about what is wrong with our models (i.e. they are not hydrologically meaningful). We therefore need measures that have hydrological context and that are able to differentiate between good and bad models in a hydrologically meaningful way.
2. To improve understanding, we should focus not only on streamflow, but also on other components of the hydrologic cycle. Analysis of the energy balance component of hydrological models was suggested.

3. Analyses of sub-processes and their triggering mechanisms were identified as important to improve our understanding of hydrological processes.
4. Use of statistical tools together with the physical models was suggested. The idea is that statistical tools may identify switching mechanisms, threshold processes, etc. and hence may help to improve physical models.
5. Input uncertainty (quality of precipitation data) was suggested to be the most critical information in hydrological modelling.

A poster session was held on the second day of the symposium and was well attended. The session was at 10:45–12:15, and no oral session was held during this time so as to increase attendance. One recommendation for future meeting organization is to allocate a specific session time at the meeting (e.g. 2 hours) for all poster sessions to be held concurrently, without any oral sessions running in parallel. We believe this will give more opportunity for poster presenters to get attention.

Overall, the attendance at our sessions was extraordinary. As convenors of the Symposium we have received very positive feedback from the attendees. We believe that IAHS and IAH provided an excellent setting for the hydrological community to share their research and to network.

Koray K. Yilmaz (main convenor)

HW.1 – Regionalisation of models for operational purposes in developing countries

This workshop was designed to be held over six sessions with 22 oral papers and five posters. The programme was organized by themes with two sessions focused on general hydrology and water resources modelling and regionalization techniques, a session on Africa, a session on flood analysis and a session on agricultural applications. The poster papers addressed groundwater and water quality issues and were allocated a separate session for viewing and subsequent discussion. For the first three sessions, 12 out of 14 papers were delivered, while four out of five of the flooding issues papers were presented. Unfortunately none of the poster presentations were present and that session was cancelled. Similarly, the final session on agricultural issues was also cancelled due to no-shows. A total of 16 papers were therefore delivered, of which approximately 50% were presented by young scientists.

The objectives of the Workshop were to highlight the issues associated with the application of science in practice within developing countries, with an emphasis on regionalizing models in data-scarce areas. Most of the papers did address these issues directly and, in general terms, the scientific quality and relevance of the papers was very good. Some papers focused a little more on the science of regionalization and tended to neglect the practical aspects of using the models for operational purposes. However, some of the discussions did look further at how such approaches could be applied in practice. The authors kept their presentations to time and there was always time for discussion.

The overall conclusion is that there are many examples where innovative hydrological science is being put into practice to enhance operational water resources management, but that there are also many opportunities for these links to be expanded. The fact that the workshop was co-convened by the International Commissions on Surface Water and Water Resources Systems, as well as the PUB Working Group,

demonstrates that there is a strong interest in putting science into practice among different groups within the international hydrological community.

A final discussion led by Dan Rosbjerg (Co-editor of the journal *Hydrology Research*) decided that it would be worthwhile to bring together some of the papers in a special issue of *Hydrology Research*.

*Denis Hughes (main convenor)
Dan Rosbjerg and András Bárdossy*

HW.7 – STAHY-WG Workshop

The STAHY Working group organized the Workshop HW.7 “New Statistics in Hydrology” coordinated by Salvatore Grimaldi, Demetris Koutsoyiannis and George Kuczera. The Workshop involved nine oral contributions and one poster, and was attended by 60 people. All the authors delivered interesting presentations underlined by a rich discussion. Of particular interest was the invited lecture given by Prof. Hoshin Gupta. An insightful presentation on Bayesian analysis for model identification was given, leading to good discussion on the future development of this approach. Other interesting contributions were given by Prof. Taha Ouarda on copula function application in regionalization analyses, and by Prof. András Bárdossy who proposed the innovative depth function concept in the hydrological modelling calibration to identify the parameter space border. During the week there were many occasions to share new ideas with the STAHY members present at the Scientific Assembly.

For the benefit of those unable to get to Hyderabad, we are collecting and posting .pdf files of the presentations given by contributors during the workshop at the STAHY-IAHS website (www.stahy.org).

Salvatore Grimaldi (main convenor)

IAHS Hyderabad 2009 – view from Africa

(continued from page 1)

we started asking questions about the kind of hydrology in this part of the world, what processes would be dominant and how is it modelled and explained? The science of hydrology in India must be a joy. Unfortunately, having arrived at midnight, we couldn't get to visit places in Mumbai, but Hyderabad, when we finally got there, proved to be a warm and welcoming city. Our stay in the city left an indelible mark on us with regard to societies, culture, religion and life. Our experiences during our stay in Hyderabad can be divided into two – the academic and non-academic.

Academic

There was so much on offer at the conference and almost all was eye-opening, interesting and of relevance to us individually and to the needs of our country. The convention opened with a gripping presentation by Prof. Ghislain de Marsily on global freshwater stocks. While he may have made some rather startling, if not controversial conclusions on the water crisis, his presentation set the scene for more lively debates, discussions and presentations.

In general, while a laudable attempt was made to integrate the two associations (IAH and IAHS), most presentations did not reflect any integration, which in our humble opinion is something that current scientists should aim to

HW.8 – New hydrological theory and limits to predictability

The quality of most of the oral and poster presentations was very good to excellent. Although we had a couple of no shows, especially from Indian participants, we found three excellent substitutes, namely Hubert Savenije, Ross Woods and Keith Beven who each gave a talk.

Highlights among the oral presentations were:

- Hubert Savenije's talk about *Thresholds in our understanding*
- Stan Schymanski's talk about how optimality principles can aid hydrology and PUB
- Erwin Zehe's talk on how thermodynamic principles might contribute to a better understanding of space time organisation of flow processes
- Michaels Hauh's argument that the behaviour of biotic components in hydrological systems could be more important than physics (at least sometimes)
- Luis Samaniego's talk on introducing subscale variability into mesoscale models and its benefit for improving predictions
- Simon Lorenz's talk to introduce a new hillslope-based model based on hydro-pedology
- Thorsten Wagener's talk on catchment classification, suggesting it might be more promising to regionalise functional signatures of catchments than to regionalise conceptual model parameters

The discussion was extremely fruitful, Hoshin Gupta, Ross Woods and Michael Hauhs playing a key role. The conclusion is that we still do not know how a hydrological theory should look. But we now know much better which questions have to be addressed to make fundamental progress and how this could be achieved. There was agreement to aim for a special issue on this topic in a leading scientific journal.

Erwin Zehe (main convenor)

achieve. Few papers looked at the interactions between surface water and groundwater. Overall there is still a need for improvement and encouragement for scientists, especially the young professionals, to work towards integrating the two fields of hydrology. It is important that hydrologists and geohydrologists start to share and exchange knowledge to enhance better understanding of our water resources in this changing climate and environment. One way of integration which was achieved at the conference was the distribution of conveners with different backgrounds (either hydrology or geohydrology) to sessions for which they are not specialists.

IAHS sessions

All the themes received substantial contribution and attendance from the members. However, some sessions were over-subscribed, especially when well-rated scientists were presenting, leaving other sessions with few people. In the PUB session, six challenges for ungauged basins were raised:

- Finding new hydrologically-relevant catchment descriptors
- Physical similarity *versus* spatial proximity
- Identification of useful donors for ungauged basins
- Evaluation of regionalization approaches
- The need to keep on improving models
- The need to integrate point streamflow measurements where available

The discussion on what makes catchments similar observed that similarity could be defined in terms of physical infor-

mation (i.e. response characteristics), climatic and functional characteristics. Areas suggested for further investigation were:

- The need to include other disciplines such as ecosystems
- The need to consider non-static conditions (dynamic in signatures) in modelling as more focus is on static conditions
- The use of bias and mean square error as performance measures as they suffer from scale effects
- Uncertainty assessment of remote sensing data
- Target regions – the need for typical case studies
- Large errors in mountainous regions where measurements are poor

The last discussion on PUB was on the future of the initiative and this was summarized as:

- Model development – the need for models that address the influence of temporal lumping.
- Model evaluation – need to consider uncertainty in all aspects of model formulation and application.
- The need to add the science of hydrology to the process of parameter estimation as opposed to mere calibration.

While we cannot explain all the discussions in detail, the key points that were important for us relate to the new information, ideas and directions being explored or to be explored in hydrology, e.g. the concepts of a universal model and an uncalibrated model, and the various ways by which the issue of uncertainty in hydrological predictions can be tackled.

We also managed to present our work on a modelling framework for southern Africa that explicitly incorporates uncertainty and rainfall variability and uncertainty in water resources assessments in the region. The feedback we got from colleagues was positive and constructive.

We also managed to attend a few IAH sessions on transboundary aquifer management. It was noted that effective management requires a multi-disciplinary approach which includes hydrological scoping, legal, socio-economic, institutional and environmental aspects. One significant question raised in the session was whether it was possible to integrate transboundary aquifers into transboundary water resources.

Non-academic

Besides the important “business” of attending the various sessions/workshops, we also made a number of ancillary observations about the whole organisation of the conference and managed to have tours around the city. In spite of the disruptive changes made to the programme*, in general the LOC should be commended for good organization and management of the conference. The choice of venue, the Hyderabad International Conference Centre, was quite good. It was spacious enough for the conference activities and the staff working around the Centre were very helpful. The seminar rooms were close together which reduced chances of time loss between sessions if one needed to change sessions. All the symposia and workshops were run smoothly and timely. We were quite impressed by the reasonably smart restrooms which were continuously cleaned by support staff.

Transport arrangements to and from the conference centre were not too comfortable, but adequate; the distances were short, after all. The Jet Airways pilots work stoppage that took place a couple of days before the end of the convention, nearly ruined a wonderful trip. Luckily, the airline made alternative arrangements and we managed to get flights from Hyderabad to Mumbai where we connected onto a flight home.

We also managed to go on a couple of tours around the city and its environs. The city is quite beautiful with some unique architectural designs in places. One of the spectacular


places that we had the opportunity to visit was the Golconda Fort which is an old fort comprising huge halls, vaulted cellars, a mosque, a temple, etc.

Of the few side meetings that we managed to attend, the Young Scientists Meeting facilitated by Kate Heal was very significant. A number of issues pertinent to young or early career scientists were raised and discussed. Essentially, many want to be more visible and active within IAHS. This is a good initiative that prepares and eases young scientists into the structures and committees of the Association.

Lastly, this memorable trip would not have been possible without the generous financial support that we got from our institution Rhodes University, our department, the Institute for Water Research, and IAHS. We are profoundly grateful for their support.

Evison Kapangaziwiri
Institute of Water Research, Rhodes University, South Africa
Tendai Sawunyama
IWR, Water Resources, South Africa

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Remote Sensing and Hydrology 2010

27–30 September 2010 – Jackson Hole, Wyoming, USA

Abstracts due by: 26 March 2010

For information and abstract submission go to:

<http://www.remotesensinghydrology.org/>

Planned session themes:

Remote sensing of: precipitation; evapotranspiration; soil moisture and groundwater;

Snow and ice; wetlands and riparian zones

Hydrological modelling and forecasting using remote sensing data

Operational hydrological applications of remote sensing data

The role and importance of large-scale experiments in hydrological understanding

New airborne and satellite sensors for hydrological monitoring and modelling

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The 2009 International Hydrology Prize is awarded to Keith Beven



Citation by Dr Arthur Askew

Keith Beven is currently Distinguished Professor of Hydrology at Lancaster University in the United Kingdom.

He started his research career with Professor Keith Clayton and Richard Hey, who supervised his PhD at the University of East Anglia in the 1970s. There he produced the first finite element model of hillslope hydrology. This was in the days when computer models were, physically, boxes of punched cards and when it took 12 hours of computer time on the University's "mainframe" computer to simulate 12 hours of real time.

Following his PhD, he worked as a post-doc with Professor Mike Kirkby at the University of Leeds. A central element of this work was the development of what is probably the most referenced hydrological model in the world at present, namely TOPMODEL. His work on TOPMODEL, which has been used in more than 30 countries worldwide, can be credited with a fundamental increase in our ability to model distributed hydrological processes.

Following research work at the Institute of Hydrology in Wallingford, UK, Dr Beven started his academic career at the University of Virginia in Charlottesville, USA. After a second spell in Wallingford, he returned to academia in 1985 to a permanent appointment at Lancaster as Lecturer, Reader and, then in 1991, as Professor. Earlier this year, 2009, he was made one of Lancaster University's 14 Distinguished Professors. He has been Head of the Hydrology and Fluid Dynamics Group at Lancaster and was instrumental in the formation of the Centre for Sustainable Water Management in the Lancaster Environment Centre.

He has been a visiting professor at the KU Leuven, UC Santa Barbara, EPFL Lausanne, and Uppsala University where he was recently the King Carl XVI Gustaf visiting professor in environmental research. He is the author and editor of seven books and over 300 refereed journal articles.

Professor Beven's reputation, although originally based on the development of fully distributed hydrological models, has also encompassed random particle models for surface and subsurface transport and the ADZ model for pollution incident prediction. In recent years he has become well known for his work on uncertainty modelling. He is the originator of the Generalised Likelihood Uncertainty Estimation (GLUE) Methodology. This seminal work on uncertainty estimation has been applied to a wide variety of fields, including rainfall-runoff modelling, flood inundation, flood frequency estimation, sediment transport, recharge and groundwater modelling, the impact of change in hydrological systems, and forest fire and tree death modelling.

He is the co-author of the fourth and fifth currently most highly cited papers in hydrological science and has the highest h-index of any internationally known hydrologist.

Professor Beven is without doubt one of the most distinguished British hydrologists of his generation. His work has been recognized, not only in his own country, but throughout the world and for this he has received many prestigious awards such as the Linnaeus Lecture Award at Uppsala University, the Dalton Medal of the European Geosciences Union and the Horton Award and Langbein Lecture Award of the American Geophysical Union.

Keith Beven,
who also kindly gave
permission for us to
reproduce a couple of
his photographs, see
opposite.



One of Keith's particular strengths is his ability to see things from a number of different angles. For example – and I quote – *“In my academic research I have developed ways of trying to imitate landscape dynamics by means of computer simulations but one of the fascinating aspects of this as a research area is the sheer impossibility of capturing the wonderful natural dynamics of the landscape without ambiguity by approximate mathematical means. Mathematics can have its own internal beauty; but the nature of water flows and the way in which they interact with rock and light are there for all to see and appreciate, with the sound of flowing water adding another dimension”*. Anyone interested in the source and relevance of that quote should go to www.mallerstangmagic.co.uk to fully appreciate how good a photographer he is.

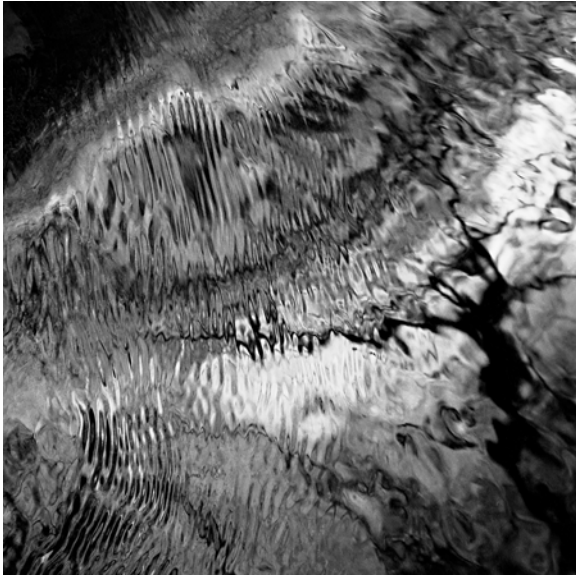
Keith has a reputation for being very clear and completely honest in presenting his ideas and in discussing those of others. Evidence of this is to be found in the titles he gives to his papers. For example:

- *Ignorance is bliss: seven reasons not to use uncertainty analysis*
- *Surface runoff at the Horton Hydrologic Laboratory (or not?)*
- *On modelling as collective intelligence*
- *So just why would a modeller choose to be incoherent?*

and Routledge have recently published a book of his entitled *Environmental Modelling: An Uncertain Future?*

Last, but certainly not least, Keith is known by all as one of the most modest and approachable of colleagues. He is easy to get on with and is always willing to help others: qualities that lead his students to catch his enthusiasm for the science of hydrology and hence ensure that his ideas are passed on to future generations of hydrologists.

There is a lot of uncertainty in environmental modelling, but there was no uncertainty among the representatives of IAHS, WMO and UNESCO, who sat on the Nomination Committee this year and decided to award Professor Keith Beven the International Hydrology Prize for 2009.



River Eden, photograph by Keith Beven

Professor Beven's Response

I must start by admitting that this is one prize that I never thought I would be awarded, so the invitation to be here tonight came as a real surprise. I have always thought of the International Hydrology Prize as a recognition for those who have done something really useful for the practical application of hydrological science in the real world, particularly the developing world – which would have been really pertinent today here in Hyderabad.

I suspect that there are many people who think I do not qualify on that count – for much of my career I seem have been highlighting the problems of applying hydrological theory in a way that they would not consider useful at all! Hence my surprise.

It was very generous of Arthur to give a reference to my photographic activities in his citation for this award, although I am sure that many of you might consider it as really rather sad that the main hobby of a hydrologist is taking photographs of water. That is, however, also rather revealing of the pathway by which I got into the study of hydrology and why it has maintained my interest for over 40 years. Not only is water so important as a constraint on so many human endeavours, but it is also very attractively dynamic, particularly the ever changing interactions with rock and light that attract the photographer's eye. It may therefore appear somewhat paradoxical (even if an artistic challenge) to try and capture this dynamic nature into a still image, but this problem can nicely illustrate another influence on my research. Even the simplest of images reveals complexity in the nature of water flows that is hard to quantify and to

describe by mathematical models. Because of nonlinearity, that small-scale complexity can still have an important effect when we scale up to larger catchment scales.

So, the implication is that our theory and predictions will be necessarily approximate, a problem compounded by the severe limitations we have to deal with in the techniques of hydrological measurement. I had the good fortune in my PhD thesis to develop a model that failed to produce adequate predictions for the small catchment I was studying. The model was based on the best hydrological theory available at the time – so ever since, I have been trying to understand why it failed, a path that has been much much more interesting than if I had developed a model that had worked. What that taught me was to be honest about the recognition of the real differences between reality, uncertain observations and uncertain models. What it has ultimately led to is an attempt to provide uncertainty estimation techniques in the GLUE methodology that allow us to be more honest about those differences in a structured way. Those techniques are not yet adequate (and not, for those of you have followed the on-going debate about GLUE, because they are not formally statistical – the types of epistemic uncertainties we have to deal with as hydrologists are not statistical either), but I have a strong hope that they might yet come to be considered to be useful by the practitioner.

I must recognise that I would not be here if it was not for the help and encouragement and scientific debates I have had with many other hydrologists, including a succession of graduate students and post-docs at Lancaster. Among the most important friends and colleagues have been Mike Kirkby, who gave me a job as a post-doc when I had nothing else in prospect; Jim McCulloch, who gave me a job at the Institute of Hydrology when I had nothing else in prospect; George Hornberger, who gave me the chance to work at the University of Virginia for an extended period; and Peter Young, who gave me the chance to join Lancaster University where I have now worked for 24 years. All have been important influences on my thinking and, along with many others, have made me think much more deeply about our difficult science.

It is worth adding an aside here for the encouragement of young hydrologists. Some of you may have already heard me say this when I gave the introduction to the Dalton Medal presentation to Mike Kirkby at the EGU last year. I may also need to remind many of you that it was Mike Kirkby who originally thought of the topographic index idea – not me (though I have since discovered that Robert Horton got really really close in a paper in 1938 that is reproduced in the IAHS Benchmark Papers Series). My role in the development of TOPMODEL was to create a working model based on the index. As Arthur noted, TOPMODEL has of course been

*Nab from
Angelholme,
UK.
Carboniferous
Dales limestone
pavement in the
foreground.*

*Photograph by
Keith Beven*

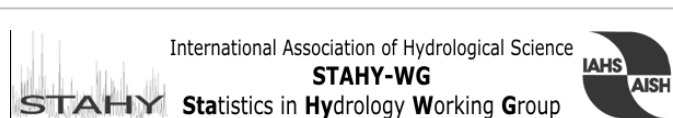


very widely used – and very widely misused – since. In the process, our original paper has received a very high number of citations. The encouragement to all the young hydrologists here is that the 1979 paper was originally rejected by the *Journal of Hydrology*. Eamonn Nash, the editor who dealt with it, thought that the enormous effort of the topographic analysis required – which in the 1970s essentially had to be done manually – would mean that it would only ever be of local interest. This was rather important to me at the time as it was only the second paper I had submitted. Fortunately, the paper was later accepted by the *IAHS Hydrological Sciences Bulletin* – clearly far more forward thinking at that time – and it is now one of their most highly cited papers. So, there are three lessons here for young hydrologists. The first is to make sure you publish in the *IAHS Hydrological Sciences Journal*, it leads to great things. The second lesson is to look forward to what might be possible in the future, even if it is not now. The third is not to get downhearted if your first paper is rejected, it may yet become a very highly cited paper and you may yet get to receive the International Hydrology Prize. In fact do not even get downhearted if you have five papers in a row rejected by *Water Resources Research*. When that happened I wrote to the editor at the time asking what the world record for successive rejections in *WRR* was because having got to five I really wanted to go for it. He wrote back saying they did not keep such records but would still be happy to receive any of my future papers for consideration!!

Thinking about our difficult science is not, of course, enough. As a practical science in which uniqueness of place plays an important role, we also need observations and improved observational techniques. This has a direct bearing

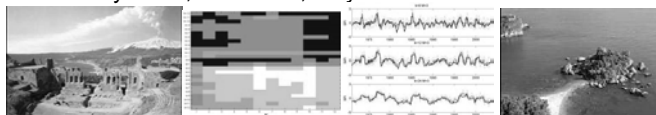
on the estimation of uncertainty and the evaluation of models as hypotheses. If I can finish by pointing to the future, the most important thing I can say is that the current concern of many modellers with uncertainty estimation is not the most important question, nor should it be the end point of a study. I say this despite the fact that I have advocated that all papers published in hydrology – both model and field results – should include an uncertainty analysis. However, estimating uncertainty actually poses a further question – how can that uncertainty be reduced or constrained, or better models differentiated, by the use of additional or improved or different types of observations. The implication of uncertainty estimation is that modellers and field hydrologists should work more closely together. There have been many such calls before of course – this time, however, hypothesis testing within the context of uncertainty estimation provides a context for doing so much more effectively. It is worth noting that the field hydrologist has a real advantage in this framework, since observations (taking proper account of uncertainties) can demonstrate the inadequacy of a model hypothesis (to the chagrin of the modeller and the joy of the field hydrologist). So there is a real incentive for future work in field hydrology arising from the need to assess and constrain predictive uncertainty. It should be a fun period for hydrological research – at least for the field hydrologist – as we work some of these issues through together.

Thankyou again to the Association for this award, and to all of those on the committee who thought that my not-so-useful exhortations to modellers, to be more realistic about their claims and predictions, were worthy of such a great honour.



Advances in Statistical Hydrology

23–25 May 2010, Taormina, Italy



This workshop has the main objective of providing a forum for exploring the potential of novel statistical methods and techniques to analyse hydrological and other geophysical processes. The main focus is towards univariate and multivariate probabilistic analysis and modelling of hydrological extremes, stochastic modelling with reference to space–time simulation methods, long-term persistence, analysis of nonstationary processes, as well as development and application of non-parametric methods.

Presentations giving emphasis to new applications of traditional approaches are also encouraged.

Workshop themes:

- Coping with non-stationarity in the hydrological cycle
- Dealing with risk and uncertainty in hydrology
- Analysis, prediction and forecasting of hydrological and geophysical processes
- Tools for advanced hydrological assessment and stochastic modelling

Abstract submission deadline: 31 December 2009

Contact: Sandra Lazzarini, Dept of Civil and Environmental Engineering, Viale A. Doria, I-95125 Catania, Italy; fax: +39 095 7382748

More information at: stahy2010@dica.unict.it

Red Books published for the Joint IAHS–IAH Convention in Hyderabad

Ecohydrology of Surface and Groundwater Dependent Systems: Concepts, Methods and Recent Developments JS.1

Ed. by M. Thoms, K. Heal, E. Boegh, A. Chambel & V. Smakthin

Publ. 328 (2009) ISBN 978-1-901502-99-2 240 + viii pp. Price £51.00

Trends and Sustainability of Groundwater in Highly Stressed Aquifers JS.2

Ed. by M. Taniguchi, A. Dausman, K. Howard, M. Polemio & E. Lakshmanan

Publ. 329 (2009) ISBN 978-1-907161-00-3 318 + x pp. Price £62.50

Improving Integrated Surface and Groundwater Resources Management in a Vulnerable and Changing World JS.3

Ed. by G. Blöschl, N. van de Giesen, D. Muralidharan, Liliang Ren, F. Seyler, U. Sharma & J. Vrba

Publ. 330 (2009) ISBN 978-1-907161-01-8 382 + x pp. Price £71.50

Hydroinformatics in Hydrology, Hydrogeology and Water Resources JS.4

Ed. by I. D. Cluckie, Y. Chen, V. Babovic, L. Konikow, A. Mynett, S. Demuth & D. A. Savic

Publ. 331 (2009) ISBN 978-1-907161-02-5 528 + viii pp. Price £92.00

New Approaches to Hydrological Prediction in Data-sparse Regions HS.2

Ed. by K. K. Yilmaz, I. Yucel, H. V. Gupta, T. Wagener, D. Yang, H. Savenije, C. Neale, H. Kunstmann & J. Pomeroiy

Publ. 333 (2009) ISBN 978-1-907161-04-9 344 + x pp. Price £66.00

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The 2009 Tison Award

Citation by Professor Z. W. Kundzewicz

In April 2009, a decision was made by the jury of the IAHS Tison Award to select a paper by Dr Yukiko Hirabayashi and co-authors as the best IAHS publication by young scientists (under 41 years of age). The awarded paper, entitled *Global projections of changing risks of floods and droughts in a changing climate*, was published in *Hydrological Sciences Journal* in the August 2008 issue (vol. 53(4)). The affiliation of the principal author is the Interdisciplinary Graduate School of Medicine and Engineering, Yamanashi University in Kofu, Japan.

Dr Hirabayashi is the lead author of the awarded publication, but the paper is co-authored by four other Japanese scientists: Dr Shinjiro Kanae and Dr Seita Emori, who share the award with Dr Hirabayashi, and Professor Taikan Oki and Dr Masahide Kimoto, who are not eligible for it.

The awarded paper deals with projections of risk of extremely low and high river discharges, under future, changing climate. Projections are based on mathematical modelling with the help of Japanese tools: MIROC GCM (MIROC – Model for Interdisciplinary Research on Climate; GCM – general circulation model/global climate model) and TRIP (Total Runoff Integrating Pathways) for the global runoff network.

The topic of the paper is very timely. In many areas, water-related extremes have already become more frequent and/or more severe in the changing climate, and projections are indicating further increase of frequency and severity. Observations of increasing damage generate a lot of interest, and concern. At the same time, there is a huge uncertainty around the future projections – we know better that, in fact, we know little. Climate models reconstruct only broader aspects of the past and do not fit the ground-truth data for the control period satisfactorily, so they are not really trustworthy as regards a remote future.

This paper maps areas where a 100-year flood in the control period is projected to become more frequent (e.g. a 10-year flood) in the future horizon, and areas where a 100-year flood becomes less frequent (e.g. a 1000-year flood).

This is of much relevance and interest for stakeholders and decision makers, despite the high uncertainty.

Dr Hirabayashi is an ambitious and brave lady. She has addressed a very complex topic of extreme flows, where difficulties result, among others, from a multi-factor context and multiple generating mechanisms, and general data scarcity. Indeed, Miss Hirabayashi has embarked upon a “mission impossible”. Many experts say that it is not possible to make meaningful flood and drought risk projections, because our models are not good enough yet.

I encourage everyone here to read this paper*. I am sure that it will find its way to the IPCC assessments, both the Special Report on Extremes and the Fifth Assessment Report.

This is the second time that the Tison Award has been bestowed upon young Japanese scientists. In 2003, during the IAHS Scientific Assembly in Sapporo, the Tison Award went to Taikan Oki of the University of Tokyo and co-authors. Now, Prof. Oki, who also co-authored the awarded paper, is 41+, so not eligible to share the 2009 Award. However, Shinjiro Kanae was also among the Tison Award winners in

*The award winning paper, published in 2008 (*HSJ* 53(4), 754–772), is available open access at www.iahs.info.



Gordon Young with Drs Shinjiro Kanae and Yukiko Hirabayashi, and Zbysek Kundzewicz, after presentation of the Tison Award – the third awardee, Dr Seita Emori was unable to be present.

2003. He was not the lead author in either 2003 or 2009, but nevertheless he is the first scientist to receive the Tison Award twice.

The honour goes to Japan again, a country that demonstrates huge progress in global-scale hydrology. There are quite a few young Japanese hydrologists who very skillfully manipulate large global data sets, aptly combining satellite information and results of global mathematical modelling.

The monetary part of the Award is symbolic, US\$1000, to be divided between the three co-authors who are eligible age-wise. But the prestige of the Award extends far beyond the monetary value. I can tell this first hand, with much confidence, because I was the first recipient of the Tison Award, back in 1987 at the IAHS General Assembly in Vancouver.

Ladies and Gentlemen, please join me in applauding Drs Yukiko Hirabayashi, Shinjiro Kanae and Seita Emori, the laureates of the 2009 Tison Award.

Response by Yukiko Hirabayashi

Thank you very much Dr Kundzewicz and IAHS for the Award. I am very much honored by this award and to have our name added to such a prestigious prize in the field of Hydrology. It is very encouraging that the research of projecting future potential warming climate is recognized as an important issue in IAHS. I am proud to share the Prize with the other two co-authors, Drs Kanae and Emori. Thanks a lot to Profs Oki and Kimoto, who also contributed to the publication as co-authors.

We recognized that it is very difficult to show future projections of streamflow scientifically, especially over some specific basins, because of the current limitations of climate models in terms of the number of ensembles of experiment and model resolutions. At the same time, we are expected by society to show some information about this issue.

Our target in this paper was therefore not to show future projections of streamflow at every river basin, but to investigate several mechanisms of possible changes under the warming climate by comparing various river basins in different hydrologic conditions. I would like to continue this topic and am very grateful for the contribution of other colleagues in IAHS in this field.

Results of the second IAHS Ultimate Frisbee Tournament

*Empirical Distributed (ED)
Modellers 8*

*Lumped Physically-Based
(LPB) Modellers 1*

The Ultimate Frisbee Tournament has now become a tradition at IAHS meetings. Two years ago, in Perugia, the tournament was between the Distributed and the Lumped modellers, but unfortunately, the game had to be stopped due to poor light (it was almost dark!), so the teams tied at 1–1. This time, the teams were re-organized in a strange but efficient way, if we can judge from the very net score, and the game took place in Hyderabad just before the closing ceremony.

It is interesting to analyse the factors contributing to this victory:

- on the one hand, the ED team won because of its better spread on the field and because it was more efficient in defence: its members having no prejudice against calibration, they kept recalibrating all the time;
- on the other hand, the LPB team lost because they spent too much time discussing the physical significance of

effective parameter values (a discussion which did not really contribute to improve their performance). In particular, they lost time taking and analysing soil samples after falling on the ground, and complaining about the unavailability of satellite imagery. The fact that they stayed quite lumped on the field did not help either. They claimed finally that the score gave a wrong picture of their true intrinsic theoretical value, because the boundary conditions of the fields were poorly defined.

Of course, a single game is too little to draw any general conclusion. We need to collect more data in order to improve our knowledge. We noticed for example that the LPB team started to score at the end of the game, which probably shows that their perceptual model required a longer warm-up period.

But now, we would like to invite all IAHS members to train ready for the next game that will take place in Melbourne in 2011. We should get a better picture there of the value of the different ultimate (frisbee) modelling approaches.



The two teams with the frisbee,

From left to right Barry Croke, Lionel Berthet, Wouter Buytaert, Audrey Valéry, Johan Strömqvist, Charles Perrin, Stan Schymanski, Georges Kuczera, x, Niels Schütze, Vazken Andréassian, Martijn Booij, Dmitri Kavetski, Gianluca Boldetti, Mark Thyer, Mehmet Demirel, Denis Hughes, x, x. With apologies to x



and some of the action

IAHS and the World Water Council

The World Water Council (WWC) was founded in 1997. Its aim was, and still is, “to promote awareness, build political commitment and trigger action on critical water issues at all levels”. Its main, but not exclusive, means of action is through the convening every three years of a World Water Forum. IAHS has been a member of the Council from the very start, seeing it as an opportunity to meet with and work alongside a wide range of actors in the freshwater community “to promote the study of hydrology as an aspect of the earth sciences and of water resources” – to quote from the IAHS Statutes. This has not been easy, given the heavy emphasis of most other members on management issues and economic and political aspects. We have strived to be active members of the Council. We have organized events within each of the five Fora held so far. While we have not made as much impact as we would have wished in raising the profile of hydrology and of scientific non-governmental organizations in general, we can say that our involvement with the Council over these 13 years has been worth the time and resources that we have devoted to it. The balance is positive largely because we have always been elected and re-elected to the Council’s Board of Governors over the years, which has given us more influence than most members have had.

Gordon Young is well known to the wider community of the World Water Council. He has attended many meetings of its Board and contributed personally to some of the World Water Fora. I myself have sat on the Board for over ten years, representing first WMO and then IAHS and some years ago I agreed to use my “bureaucratic” expertise to assist in the work that was needed to revise the Council’s Constitution, By-Laws and election procedures. As a result, I was appointed to the Bureau of the Council.

The Council recently held its Fifth General Assembly in Marseille, France. It was well planned, well run and conducted in a very open and positive spirit. It was attended by over 200 people representing about half of the 300 plus member organizations.

The meeting was suspended at one point for the signing of a formal agreement between the French Government, the city of Marseille and the Council which sets the stage for the Sixth World Water Forum to be held in Marseille in March 2012, with a budget of €38 million. This alone is a major achievement for the Council.

As agreed by the IAHS Bureau in Hyderabad, IAHS put forward its candidature for the Board of Governors of the Council with Gordon as Governor and myself as his

Alternate. Council elections follow a collegiate system. In previous elections, we have been one among 11 or 12 competing for eight seats. This time there were a total of 22 candidates, which was good as an indicator of the increased interest in the Council, but bad for our chances of getting elected. In the event, we did not obtain enough votes to be elected and so we, along with the International Water Association, CSIR of South Africa, ICOLD and some long-standing members of the Board, must now accept our position as ordinary members. In fact there has been a marked shift in the membership of the Board and the Bureau and it will be interesting to see whether this will have any

influence on the Council's policy and the way in which it conducts its business.

What attitude should IAHS now take in relation to the WWC? Will we attend the Kick-off Meeting for the Sixth Forum that will be held in Marseille next March? Will the Association maintain its commitment to the "Data for all" theme that may be retained as part of the scientific programme for that Forum? These are all questions that will need to be addressed in the coming months, but one thing is clear: our great days of close involvement with the Council are over – at least for the present.

Arthur Askew

HydroPredict' 2010

2nd International Interdisciplinary Conference on Predictions for Hydrology, Ecology and Water Resources Management: Changes and Hazards caused by Direct Human Interventions and Climate Change

20–23 September 2010, Prague, Czech Republic
Abstract submission deadline 1 February 2010

SCOPE AND OBJECTIVES

Over the last 50 years increasing damage by natural hazards has been reported globally. According to the 2003 UN World Water Development Report, between 1991 and 2000 over 665 000 people died in 2557 natural disasters – 90% of which were water-related and 97% of the victims were from developing countries. The reasons are manifold. First, due to climate induced changes, the frequency and intensity of natural hazards may have increased, and second, due to direct human interventions and modifications of the flow paths of water, the exposure to hazards has been magnified. The conference has three objectives:

1. To present models for describing hazardous processes and their impacts with a high spatio-temporal resolution. This would provide the basis for predictive tools and early warning systems in different environmental settings.
2. To describe methods to discriminate among impacts originating from climate change and impacts caused by direct human interventions, such as deforestation, overexploitation of groundwater, land development, water abstraction from rivers and urbanization.

3. to bring together experts from different disciplines such as geomorphologists, meteorologists, hydrologists, hydraulic engineers, forest managers, water resources engineers, regional and landscape planners, as well as experts from governmental institutions and from the insurance sector, to exchange experiences about the adaptation and mitigation of adverse effects.

CONFERENCE THEMES

- A1 How can we identify and quantify water-related changes due to direct human interventions (analysis of long-time past records, future developments)?
- A2 How can we identify and quantify water-related changes due to climate change (analysis of long-time past records, future developments)?
- B How can we discriminate among impacts of direct human interventions and impacts caused by climate change, and how can we quantify the impacts?
- C How can we quantify/predict changes in water-related hazards?
- D How can we adapt to/mitigate water-related hazards; resilient and robust ways to adapt to water-related disasters?

<http://www.natur.cuni.cz/hydropredict2010/>

Calendar of Meetings Organized/Sponsored by IAHS

2010	Conference	Contact details
Agadir, Morocco 24–26 March	Integrated water Resources Management and challenges of Sustainable Development (GIRE3D)	
Taormina, Italy 23–25 May	Advances in Statistical Hydrology	Sandra Lazzarini, Dept of Civil and Environmental Engineering, Viale A. Doria, I-95125 Catania, Italy; fax: +39 095 7382748; stahy2010@dica.unict.it
Ohrid, Macedonia 25–29 May	BALWOIS 2010	secretariat@balwois.org
Zurich, Switzerland 13–18 June	GG10 Groundwater Quality 2010 Conference	Prof. Dr. habil. Mario Schirmer, Eawag - Swiss Federal Institute of Aquatic Science and Technology; mario.schirmer@eawag.ch
Warsaw, Poland 14–18 June	International Symposium on Sediment dynamics for a changing future	Prof. Dr Kazimierz Banasik, SGGW, icce2010@sggw.pl
Paris 2–3 July	X Kovacs Colloquium	Pierre Hubert, pjy.hubert@free.fr ; Shahbaz Khan, s.khan@unesco.org
Stellenbosch, South Africa 6–9 Sept.	11th International Symposium on River Sedimentation (ISRS)	Technical aspects: Prof Gerrit BASSON grbasson@sun.ac.za ; tel: +27 21 808 4355 Other aspects: Marechia BASSON msb@aspl.co.za ; tel: +27 79 4909 210
Tianjin, China 7–11 September	9th International Conference on Hydroinformatics HIC2010	
Krakow, Poland 12–16 September	XXXVIIIth IAH Congress	Stanislaw Witczak, tel: +48 (12) 617 2437; witczak@uci.agh.edu.pl
Prague, Czech Republic 20–23 September	HydroPredict'2010 : 2nd International Interdisciplinary Conference on Predictions for Hydrology, Ecology, and Water Resources Management	Dr Zbynek Hrkal, zbynek_hrkal@vuv.cz ; Prof. Hans-Peter Nachtnebel, hans_peter.nachtnebel@boku.ac.at http://www.natur.cuni.cz/hydropredict2010/
Jackson Hole, USA 27–30 September	Remote Sensing and Hydrology 2010	Christopher Neale (VP ICRS); christopher.neale@usu.edu
Fez, Morocco 25–29 October	6th World FRIEND Conference <i>Global Change: Facing Risks and Threats to Water Resources</i>	Eric Servat, friend2010@msem.univ-montp2.fr http://www.unesco.org/friend2010/water/ihp/pdf/call_papers.pdf
2011	XXVth IUGG General Assembly, including 9th IAHS Assembly will take place in Melbourne, Australia 27 June–8 July 2011	http://www.iugg2011.com

International Association of Hydrological Sciences Association Internationale des Sciences Hydrologiques


www.iahs.info

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Rainfall–Runoff Modelling

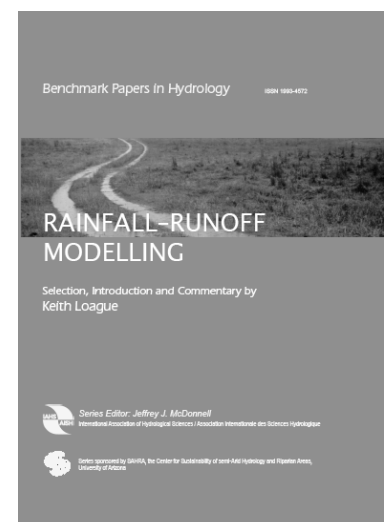
Selection, Introduction and Commentary by Keith Loague

Keith Loague charts the development of rainfall–runoff modelling up to 1989 with 30 benchmark papers. He begins with Mulvaney’s (1851) presentation of the rational method for estimating peak flow, regarded by many as the first rainfall–runoff model. The original papers on other empirical approaches, such as Sherman (1932) introducing the unit-hydrograph method, and Mockus (1949) which provided the basis for the SCS curve number approach, are included. So too are the Richards (1931) and Smith & Parlange (1978) soil physics papers presenting equations central to physically-based rainfall–runoff modelling. The innovative contributions of Alan Freeze, and later Keith Beven, to physically-based modelling are represented by several of their respective papers. The seminal papers of Moore & Clarke (1981), a statistical distribution approach to rainfall–runoff modelling, and Abbott et al. (1986), the well known process-based SHE model, are also included.

Loague notes that hundreds, if not thousands, of hydrologic-response models have been developed over the years, but that not all were created equal. This volume presents papers that exemplify the best in rainfall–runoff modelling. It forms a natural companion to the first Benchmark Papers in Hydrology volume, *Streamflow Generation Processes* by Keith Beven.

Volume 4 in the IAHS Benchmark Papers in Hydrology Series

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