Circulation

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BHS = the 'Big' Hydrological Society

That was the view of Malcolm Newson in his after-Dinner speech at the BHS International meeting in Newcastle last month. Perhaps it was only natural to feel somewhat euphoric, dining in the lavish surroundings of the Magpie Suite in St. James' Park, but it was surely a sentiment shared by many of the British delegates that night.

It was the end of Day 4 in an excellent meeting: fantastically well organised, lots of good papers and the opportunity to catch up with colleagues and make new friends. So, of course, we all agree with Malcolm that BHS has really 'come of age' and we can confidently play our roles on the hydrological stage of the future (see Andrew's message and also page 22).

There will be much more on the Newcastle event in the coming weeks. Papers — all 142 of them at the last count — will be published on the BHS web site (authors, stand by to check your proof PDFs shortly) and the forthcoming Special Issue of *Hydrology Research* is taking shape: more details to follow.

Overleaf is a personal take on 'Newcastle 2010'.

Celia Kirby





"So much of hydrology is now about modelling and how to quantify uncertainty associated with model predictions."
- Simon



"An excellent meeting with a wide range of international quality papers and a fantastic social programme - the best international meeting in years."
- Neil



"Stunning. There is so much to do; so many opportunities to act. We must rise to the many challenges."
- Andrew

"The Tyne field trip was fascinating, due mainly to the enthusiasm and detailed knowledge of the River Tyne experts."
- Peter

"The best one yet"
- Celia





"The talks were very informative and thought-provoking. I met several potential collaborators and had some valuable discussions. Overall, a great symposium."
- Isabella

"Exhausting but very enjoyable"
- Ian

President's piece

Life after Newcastle

Our front page has it exactly right, and it was fantastic to be there at this third international meeting of our Big Hydrological Society. It was a BIG meeting, perhaps most importantly for me because there were big messages that needed to be heard and which were amplified most effectively by excellent speakers. Some of the big messages may have been familiar, others new, and in either case, they were stimulating and thought-provoking.

It was a great honour for us to be able to welcome a tremendous line-up of keynote speakers to give us food for thought on four of the five days – our Penman Lecturer, Professor Zbigniew Kundzewicz; Jamie Hannaford from the National River Flow Archive; Shabhaz Khan from the UNESCO International Hydrological Programme and Professor Enda O'Connell of our host institution in Newcastle. Collectively, they reminded us of the great value in the progress that has been made in the past decade of hydrological research, some of the key limitations to our current knowledge and why they matter, the need to always maintain a critical perspective on all hydrological data sets and our dependence on data gathering activities.

We were urged to think global as well as local, to be ever mindful of interconnectedness, to recognise the role that we as a scientific community can play, and to seize opportunities to contribute. There was a recurring theme about the importance of listening and learning – not just from recognised experts but also from people with their own individual local or personal knowledge relating to hydrological systems. Such was the ongoing stimulation, people expressed surprise at not having conference fatigue by the end of 5 days – and that despite (or partly because of) the vigour with which extra-curricular activity was pursued!

There was certainly a very young feel to the symposium – great to see so many young, capable and enthusiastic PhD students presenting at the meeting and making the most of the networking opportunities. The judges were given a hard time trying to choose among the many excellent research posters presented for our postgraduate award. The meeting also lived up to its international promise with delegates from 20 countries attending, adding breadth and additional vigour to the whole event. It is our collective privilege to be able to welcome hydrologists from so many countries to join in to our event. And I must thank Newcastle University for the specific funding which allowed us to award 20 symposium fellowships to help many of these delegates and younger UK presenters to attend and take part.

Special mention must be made of the outstanding efforts of the whole Newcastle team in delivering such a successful meeting. Everything was done with a great deal of thought and attention to detail. Everything ran incredibly smoothly. Everyone seemed to greatly enjoy themselves and to get a great deal out of attending. And Claire Walsh's legendary reputation as a meeting organiser extraordinaire goes from strength to strength.

I could go on about the many other positives of the meeting – the valuable suggestions about future meetings, the excellent social programme, the invaluable support of our sponsors (thank-you!), the fantastic catering. But quietly, rarely voiced in sessions, there was an important awareness of some profound changes taking place and others on the horizon Savage spending cuts will affect much of the hydrology landscape which we presently know and will be affecting many members directly. Jobs are already being lost, and the fear is that many more will follow.

Hydrology in the UK does much to contribute to quality of life, to protecting and enhancing the environment and to contributing to the economic prosperity of this country, not least in export markets. There is important work to be done to make sure these contributions are recognised and valued – if time still permits. There may well be threats to some of the supports of the considerable growth of hydrology which has occurred over recent decades – in universities, research institutes, in agencies and beyond. BHS is your Society for the advancement of hydrology. Let us

make best use of our collective capabilities to act together in what are undoubtedly going to be difficult times.

Andrew Black
President

To 'we' or not to 'we'?

Ian Littlewood's interesting article on page 2 in the last issue of *Circulation*, provoked the following replies. I was surprised (but delighted!) that there were such strong feelings as I thought it was only narrow-focused editors like me who even notice these things. However, because I naturally incline to the views of John and David, in the spirit of fair-mindedness, I sought some counter-argument from among delegates at Newcastle but nothing has yet materialised.

I think we should now leave the matter there. But for those of you who submitted papers to Newcastle, you will find that while I have (hopefully) attended to grammatical issues, I have left the 'we's alone. Clarity is keen, not pedantic rules.

Editor

The 'I's have it!

I failed my mock O-Level English Language exam. I didn't understand why we spent so much time on précis in English classes. I haven't written a technical paper for peer review in 30 years. So, you may be wondering, why do I have a strong opinions on Ian's paper?

Well, over that period I have consumed countless technical papers, text books and technical articles on a range of subjects. I have reviewed a number of academic bids for reearch funding. I've produced many reports, papers for Committees and briefings for senior managers to make them look good; reviewed bids for money, sometime in the millions, and where convincing arguments are crucial. I am a prodigious consumer of other people's work.

I recall when, as a young post-grad at the new Institute of Hydrology, when Ian and I were young and impetuous, I stumbled on an article in *New Scientist*. It discussed writing styles for technical papers. It suggested they were too stuffy and made the subject matter inaccessible, incomprehensible, to many readers. Whatever, the premise was that the academic style was not suited to communication. *New Scientist* commissioned a professional journalist to take a biological paper, rewrite it so it was intelligible to someone unfamiliar with the discipline, but losing none of the technical detail. I started reading the original and was lost during the second sentence. I read the rewritten version and was most annoyed when it stopped after the fourth paragraph – it really was quite interesting, even to a budding hydrologist.

What do I deduce from that seminal moment? That the academic style that many employ when writing their papers can make the subject matter inaccessible to many. Unless you are (should I have said "one is") familiar with the subject, unless you are (one is) bordering on being an expert in the field, many papers will go over your (one's?) head. The chances of cross fertilization of ideas across disciplines are diminished. Conversations around the subject are only open to the club of people who speak that language. I have seen a professor trying to explain simple concepts to lay people, but in a way that is so complex and riddled with technical jargon, that the lay people are left wondering whether they are stupid, or the professor has lost it, and really not knowing which.

Personally, I agree with Ian that "we" is a plural pronoun and should not be used instead of "I". The points he raises hinge on poor English Grammar. Perhaps we should focus more on the comprehensibility of the text. Let's teach young authors good style and grammar. Let's teach those journalistic tricks that can make interesting research interesting. Let's not kid ourselves that we are good role models — clearly we are not, as Ian admits. But I understand that younger generations (i.e. younger than us) are not taught such things, so maybe we should enourage them gently in the basics and subtleties of the English language.

Less compelling is Ian's view that when writing a peer-reviewed article we should continue to use the academic style and that this in some

way has a bearing on whether the paper is sound and novel and acceptable for publication. I shudder and at the same time giggle at the thought that a paper can only be a serious piece of work if written in "the traditional disinterested way". The *New Scientist* journo proved otherwise. And the concept that authors are not self-interested, or seem not to be, if they write in the third person has me hooting, such that my wife comes to see what's making me laugh.

John Mosedale

Dear Celia

I read Ian Littlewood's piece in *Circulation* No. 105 with a mixture of bemusement and incredulity. Can he really feel so strongly about such a trivial matter when there are so many other things of relevance to the world of scientific publishing to occupy his thoughts?

I well remember at school being taught that the correct way to report scientific investigations was in a dispassionate way following the logical Objectives, Method, Results, Conclusions format and, as far as I can remember, have always done so in papers I have written. So it came as a bit of a shock when papers started to appear using the first person narrative style. However, having got over that, I realised that there are, in fact, many advantages to it. Most obviously, it gives the credit (or blame) where it belongs, i.e. with the author(s), rather than implying that somehow all these things reported just happened. It makes us realise that science is a human activity, conducted by real people, not by automata, and who exercise human qualities like judgement in their work. How often do we see "it was decided…." in a paper? Well, who decided? The author(s)? If so, which ones? The boss? The funding body? But more importantly, to my mind, is that use of the first person narrative simplifies the language. I am fortunate to be a native English speaker, which is the language of choice for the majority of the scientific community. This gives me two advantages. Firstly, as an author, I am relieved of the responsibility of trying to express sometimes complex ideas in a foreign language. Secondly, I can read other peoples' work easily. I am full of admiration for our foreign colleagues who do not possess these advantages, so why should we insist that they use arcane phraseology and why should we subject them to it in our own writings? If we believe that the primary objective of publications is to communicate our findings to others, rather than enhancing our career prospects or impressing review groups, then the simpler the English, the better.

I believe that what Ian is advocating is use of the passive voice, not the third person narrative. Computer grammar checkers are always berating us for using the passive voice to the point that most of us turn them off, but they are probably right. Overuse of the passive voice is a step towards ever more circumlocutory language in scientific (particularly American) scientific writing, which would have been a far more worthy target for Ian, along with authors who publish the same paper in several different guises and those who chop up a modest piece of work into several parts to fill up their CV.

The use of the passive voice seems to have its origins in the days when it was considered vulgar to take credit too obviously for something well done. In the 21st century, we are far less diffident and, I believe, rightly so.

David Cooper

Editorial

We are still discussing in Committee ways of enhancing the profile of hydrology (and thus of BHS too). Among the issues are improvements to our web site, PR initiatives, and liaison with schools. As noted previously, we now have a presence on IWA waterwiki.com and would be pleased if members contribute to this as they see fit.

Don't forget that the AGM is coming up next month, to be held during the 'Urban Rivers' meeting at Birmingham on 22nd September. This is your chance to influence the Society, so do come if you can.

Celia Kirby

Using Water Better: water efficiency, supply and demand and hydropower

BHS SE Section Meeting
Thursday 29th April 2010

In recent years, environmental and climatic pressures on already limited water resources, combined with high demand for water, particularly in the 'water stressed' south-east England, have been highlighted. The situation is likely to become increasingly serious with demand for water due to housing growth. The capacity for new water resource options in the region is diminishing, so the need to maximise savings from water efficiency increases. Two presentations at this meeting described how water is being used more efficiently, both in terms of reducing consumption and for producing energy.

Hydropower

The first presentation was given by **Tim Reeder**, who is Regional Climate Change Programme Manager for the Thames Region of the Environment Agency. Tim focused on the development of hydropower in the Thames catchment. Tim began with the need to adapt to the effects of climate change and the work on this topic that the Environment Agency has been undertaking in the Thames Region. One strand being investigated is development of hydropower. Interest in developing small-scale schemes is increasing as Government initiatives encourage the use of renewable energy sources. The UK is committed to generating 15% of its energy from renewables by 2020; currently hydropower produces just 1.2% of electricity consumed in the UK. The potential to increase this is limited by the availability of suitable watercourses, but there is some potential for the expansion of small-scale 'low head' hydropower.

Nationally, the Environment Agency has published Good Practice Guidance for hydropower schemes, which clearly communicates what needs to be done to comply with environmental and other legislation. In particular, schemes must not increase flood risk, damage fluvial ecology or obstruct fish migration. The Environment Agency also held a consultation, which ran until June 2010, seeking ideas on how the administrative process for developing hydropower schemes could be improved and streamlined. This will also serve to improve co-ordination on how the various required permissions are dealt with. To encourage such schemes, the Environment Agency has produced a report and maps identifying and mapping hydropower opportunities in England and Wales and the environmental sensitivities associated with exploiting them.

In Thames Region, the Agency has assessed the potential for low head hydropower generation by using existing structures, for example weirs, whilst working within the environmental constraints. There are many weirs on the River Thames and the first pilot trial, which will power Windsor Castle, will be operational later in 2010. Currently, work is progressing on the second phase of works on three further weirs. The Environment Agency is also working with communities to develop schemes at Osney in Oxford and at Goring.

Water efficiency, supply and demand

The second speaker was **Helen Chapman**, Water Efficiency Consultant and Team Leader at Thames Water. She presented the work Thames Water has been undertaking to promote water efficiency, the current challenges that water companies, particularly in south-east England, face and the role of water efficiency in balancing supply and demand. For a large portion of the 25-year water resources planning period, Thames Water is relying upon demand management options to balance supply and demand. In addition to water companies' statutory duty to

'promote the efficient use of water', from 2010/11, each water company in England and Wales has a mandatory water efficiency target of 1 litre per property per day. This equates to 3.45 Ml/d across the Thames Water supply area.

Work has been carried out by Thames Water to promote water conservation. It has targeted different users with different, sector-specific messages. Additionally Thames Water has sought to promote the uptake of the Code for Sustainable Homes to improve the water efficiency of new houses and has also investigated the retrofit of existing housing stock for water efficiency. Various water saving devices have been trialled and research is ongoing to provide innovative and effective solutions. Thames Water has carried out commercial water audits and water regulations inspections at, amongst other properties, hospitals, prisons and schools. These have been found to yield water savings.

Thames Water has also been working with various interest groups with shared aspirations such as the Energy Saving Trust and the WWF. There is a plan to offer customers who are having an energy audit a water audit at the same time. Research undertaken includes large scale trials for both domestic and commercial properties. Since 2006, approximately 9000 domestic audits, 84 public sector audits and 187 school audits have been carried out. A key outcome is the provision of quantifiable feedback and monitoring to measure the effectiveness of these activities and thus inform future investment in water efficiency.

Helen Procter and Jo Wakefield, Atkins Ltd and BHS SE Section Committee

New members

Caroline Ballard.....Imperial College London
Ruth Boogert.....Queen Mary, University of London
Martin Borthwick.....University of Plymouth
Susana Margarida Cardoso Lopes de Almeida.....
Imperial College London
Richard Chibanga.....Halcrow Group Ltd, Glasgow
Declan Conway.....University of East Anglia
Evan Stephen John Dollar.....MWH, High Wycombe
Juan Duan.....Imperial College London
Ahmed S El-Hames.....King Abdulaziz University,
Jeddah
Richard Evans.....Golder Associates, Maidenhead
Claire Gardner.....JBA Consulting, Northampton
Philippe Gleizon.....Westlakes Scientific Consulting,
Carlisle
Laura Hewitt.....RS Hydro, Bromsgrove
Zaheer Igbal.....University of Edinburgh
Kirsty Sheila Margaret Jack.....SEPA, Dingwall
Laura Marina Kruitbos.....Northern Rivers Institute,
Aberdeen University
Edward Alexander Lang.....RS Hydro, Bromsgrove
Geoffrey Lloyd Mandeno.....Mouchel, Exeter
Kent McClymont.....University of Exeter
Ana Mijic.....Imperial College London
Joanne Parker.....Loughborough University
Greg Sage.....University of Dundee
Rob Stevens.....RS Hydro, Bromsgrove
Hela P.V. Vithana....Independent Consultant, Basingstoke
Frederik Wetterhall .....King's College London
Dehua Zhu.....Swansea University

Hydrology Research

Two papers of likely to be of interest to BHS members are published in Volume 41 Number 2. You can access the Abstracts and full text PDFs via the link on the BHS web page 'Publications'.

Water quality of lowland, permeable Chalk rivers: the Frome and Piddle catchments, west Dorset, UK
N.J.K. Howden, C. Neal, H.S. Wheater and S. Kirk.
Abstract | Full Text PDF | doi:10.2166/nh.2010.102

Investigation of the performance of a simple rainfall disaggregation scheme using semi-distributed hydrological modelling of the Lee catchment, UK
Marie-Laure Segond, Howard S. Wheater and Christian Onof

EGU General Assembly

Vienna, Austria
2-7 May 2010

This year BHS was able to offer travel grants to several members and thus we are blessed with lots of accounts of the meeting, each reflecting the different interests and impressions made by this great event. Inevitably, there is some overlap in the comments made by delegates so we have taken the liberty of pulling these together here before the accounts of specific sessions.

As always, the Assembly drew large numbers of participants — over 10,000 researchers from 94 countries — despite *Eyjafjallajokull* threatening to close European airspace for the second time within a month. A vast number of presentations were scheduled: 4,431 oral and 9,370 poster presentations in almost 600 sessions. Unsurprisingly, the hydrology session was very big this year, with 13 overall themes and a very large number of sub-sessions.

Our BHS delegates all acknowledge that it was an extremely well-run event, for which credit is due to the organising committee, all session convenors, and an extensive number of assistants. Everyone appreciates the opportunity to meet and discuss scientific topics with colleagues from around the world. Also, the special effort to address young scientists through short courses such as "Isotope hydrology" in collaboration with IAEA, "How to write a scientific paper" and "Meet the expert in hydrology" were liked.

We thank all travel grant recipients for fulfilling your obligation to 'sing for your supper' and list your accounts in alphabetical order of delegate.

Christian Birkel, from The Macaulay Land Use Research Institute and Northern Rivers Institute, University of Aberdeen, has a very interesting account of some linked interdisciplinary oral and poster sessions on Catchment Hydrology, Geomorphology and Isotopes in Geosciences.

Observational hydrology: Recent developments in distributed sensing techniques and experimental catchments; Snap-shot sampling of streams and catchments and recent development in isotope and other tracer methods

The three *Observational hydrology* sessions proved to be of interest to field experimentalists and modellers concerned with new measurement techniques and data suitable to better describe and simulate catchment systems. The programme included oral presentations during the whole day and all posters in the evening opening space for extended discussion among all participants. Contributions by **Doerthe Tetzlaff** et al. (invited talk, University of Aberdeen), **Thomas Grabs** et al. (Stockholm University) and **Brian McGlynn** et al. (Montana State University) showed how multi-tracer snap-shot sampling can be successfully applied to couple water and solute fluxes at different catchment scales and between functional units such as the riparian zone – stream interface. New techniques and measurement devices were presented by **Heidi Mittelbach** et al. (ETH, Zurich) evaluating a capacitance-based low cost soil moisture sensor and related hydrological applications. **Theresa Blume** et al. (German Research Centre for Geosciences) showed uncertainties and limitations of fibre-optical distributed temperature sensing applied to a UK lowland river suitable to demonstrate the spatial distribution of increased groundwater-surface water interaction. A novel GPS inland water buoy system for precise and high temporal resolution water level and movement monitoring was presented by **Heiko Apel** et al. (German Research Centre for Geosciences).

Isotope tracer methods were presented in efforts to improve groundwater dating (**Pradeep Aggarwal** et al., IAEA) and to conceptualise spatio-temporal variability in river water of large basins (**Paul Koeniger,** Leibniz Institute for Applied Geophysics). **Fabrizio Fenicia** et al. (CRP - Gabriel Lippmann, Belvaux, Luxembourg) incorporated stable isotopes into conceptual rainfall-runoff models to assess the impact of mixing assumptions on mean

residence time estimates. Successful time-variant transit time assessment in catchments was the topic in the solicited talk by **Markus Hrachowitz** et al. (TU Delft) Both presenters demonstrated the usefulness of isotopes in advancing the understanding of mean residence time and distribution of water in catchments and emphasised the importance on linking water and solute transport to tackle water quality issues. **Katrin Schneider** et al. (Justus-Liebig-Universität Gießen, Germany) showed how stable isotopes can be used to improve water management practices by estimating phreatic evaporation in irrigated cotton fields. Finally, **James Kirchner** (Swiss Federal Institute for Forest, Snow, and Landscape Research, ETH and University of California) on behalf of Colin Neal announced their unique 7-hourly 2-year dataset of virtually everything on the periodic table to be accessed by the community in 2011.

Impact of land use and water management on hydrological processes under varying climatic conditions

This Hydrological Sciences session convened by **Renata Romanowicz** and **Martijn Booij** was of great interest to practitioners and scientists as the audience was introduced to a wide range of important cause-effects of land use change on hydrology. The invited talk by **Helge Bormann** (University of Oldenburg, Germany) analysed the impacts of environmental change on catchment hydrology and water management. This presentation pointed out that different strategies are required to investigate the complexity of effects of historical and future changes on catchment hydrological behaviour. It was also shown that reliable "numbers" of change are a prerequisite for a successful adaptation to changing environmental conditions and to reduce hydrological risk. This talk was followed by several regional cause-effect analyses and scenarios. **Martijn Booij** et al. (University of Twente, The Netherlands) simulated potential effects on present and future discharges at the Nile River under environmental change. Similarly, **Chantal Donnelly** et al. (Swedish Meteorological and Hydrological Institute) showed combined effects of nutrient load reduction and climate scenarios for the Baltic Sea basin. **Bernd Diekkrüger** et al. (University of Bonn, Germany) assessed the impact of land use change on hydrological processes and water resources in Benin.

Water quality at the catchment scale: Prediction and management of nutrient and sediment fluxes

This session focused on the understanding of diffuse pollution transfer in catchments presenting hydrological model and statistical time series tools. **Chiara Medici** et al. (Polytechnic University of Valencia, Spain) kicked off this session with a sensitivity analysis of a nitrogen model to enhance understanding of hydrological and nitrogen interactions. Especially important for water quality measures is knowledge of groundwater travel times, which was shown by **Ype van der Velde** et al. (Wageningen University, The Netherlands) for a lowland catchment in the Netherlands. **Peter Valent** et al. from University of Bratislava, Slovakia introduced the use of non-linear time series analysis to predict long-term catchment nutrient export with the Danube River as case study. **Fred Worrall** et al. (University of Durham) gave an overview of the fluvial nitrogen budget of the UK and **Tobias Krueger** et al. (University of East Anglia) introduced a "twin-track" approach to directly include stakeholders into the modelling process. This has great opportunities to more effectively realize water management.

Improving process understanding, classification, model development and evaluation in hydrology using comparative assessment techniques

This modelling session started with a "battle against hydrological monsters" by **Dmitri Kavetzki** et al. (solicited talk, University of Newcastle, Australia). The author pointed out that distinguishing between data uncertainty, structural errors and numerical artefacts in rainfall-runoff modelling should be considered more carefully. **Neil McIntyre** from Imperial College London presented a data-based mechanistic modelling approach to intercompare catchments and to develop process understanding. This proved very useful to better understand non-linearities. The use of historical discharge data for model calibration in a Bayesian framework was shown by **Ida Westerberg** et al. (Uppsala University,

Sweden) applied to the Central American region. **Hilary McMillan's** et al. (National Institute of Water and Atmospheric Research, New Zealand) work is based on common knowledge that hydrological models based on inappropriate conceptualisations of the catchment can still be calibrated to give good performance in reproducing discharge records. They developed a toolbox of diagnostic tests for model structure, which allow hydrological modellers to test hypotheses about different aspects of model structure.

Interdisciplinarity in hydrology
This session consisted exclusively of invited talks giving speakers the opportunity to present a topic over 30 minutes. All presentations were highly interesting, but here I would like to point out a series of 3 talks starting with **William Ingram** et al. from the Department of Physics, University of Oxford on the physical constraints of climate predictions important to hydrology. GCM climate change simulations seem to be slowly converging with encouraging evidence of their ability to predict the distribution of rain within a season as well as the total. However, reliable local predictions for hydrological change under climate change is still not possible. Bearing the difficulties for climate predictions in mind the next speaker **Bernard Barnier** (Université de Grenoble, France) showed the direct dependence of the earth climate to ocean circulations, which act at a much smaller scale. These challenges could be synthesized by **Daniel Loucks** (Cornell University, United States) in his talk on adapting to a changing world: Implications for water management.

Christian Birkel

Jonathan Eden, from the School of Geography, Earth and Environmental Sciences, University of Birmingham, has interests which lay with the sessions on Hydrological Sciences, Atmospheric Science and Climate: Past, Present and Future.

HS5.4 Hydrological change versus climate change

This well-attended session sought to highlight the linkages between water and climate, and also the need to study both together in order to fully understand future hydrological change. The session opened with a solicited talk by Myles Allen which described an innovative approach to correcting the geographical and seasonal errors in model-simulated precipitation using image-warping software originally developed for application in brain imaging. Such an approach may potentially improve multi-model agreement in future precipitation changes. A second invited talk by Gabriele Villarini followed which discussed the importance of considering different flood generating mechanisms, such as land-falling tropical cyclones, in understanding the stationarity of flood peak distributions in the eastern United States. Rachid Bouabid and Maddalen Mendizabal spoke about regional hydrological responses to climate variability in Morocco and northern Spain respectively. After a coffee break, two further solicited talks were given. The first, by Günter Blöschl, discussed the reliability of climate change impact studies and argued that the reliability of such studies is often talked-up and the effects of society presented as a worst-case scenario. Blöschl called for a greater transparency in describing the ability to predict and to clarify the limitations of such studies. The second solicited talk was given by Reinhard Böhm about the homogenization of instrumental climate data.

HS5.1 Precipitation: from measurement to modelling and application in catchment hydrology

This session focused on the hydrological response to precipitation at the catchment scale, and in particular the spatio-temporal variability of precipitation. The first part of the session featured talks concerned with rainfall uncertainty and use of ensembles in hydrology. John Schaake gave an invited talk on the importance of ensemble precipitation estimation for hydrologic prediction systems and examples were given to show how single-value best estimates for precipitation contribute to biased estimates of streamflow. Hyungiun Kim spoke about the estimation of uncertainty in global precipitation observations and the impact of such uncertainty in model-simulated evapotranspiration and runoff. Geoff Pegram's talk centred on the link

between daily rainfall and circulation patterns, and how future rainfall scenarios can be inferred from circulation patterns generated by regional climate models.

CL3.7 Extreme Events and Impacts
This very interesting and topical session focused on observed extreme precipitation and temperature events in the recent past and how such extremes are expected to shift under changing 21st Century climate. Here, I report specifically on talks dealing with precipitation extremes. A particularly interesting talk was given by Christine Radermacher which looked at extreme-value analysis of future trends in heavy rainfall over Europe based on an ensemble of eight regional climate models. A main topic of focus was the limited validity of the Clausius-Clapeyron relationship between temperature and precipitation. Future work will continue in the differences between large-scale and convective precipitation. Similarly, Gregor Leckebusch's presentation was based on a multi-model ensemble analysis of extreme European storm events, which are cited as the most important meteorological hazard by the impacts sector. Conclusions again pointed to the benefits of basing future estimates on an ensemble mean rather than the results of a single model. Christopher White spoke about the ability of dynamically-downscaled GCMs to assess future changes in extreme events. Precipitation projections for Tasmania were produced on a 0.1° grid and were shown to correlate strongly with changes in regional climate drivers. Dynamical downscaling appears to capture local variability well, which is especially relevant for estimating future changes in extremes.

NP3.8 Geophysical Downscaling Methods
This multi-disciplinary session was intended to bring together all scientists from different geophysical disciplines working on downscaling problems. A number of talks, including my own presentation, focused on the downscaling of precipitation. The session began with **Filippo Giorgi's** solicited review of dynamical downscaling and its use in climate change studies over the last two decades. The presentation provided an extremely useful summary of the principles on which dynamical downscaling is based, the advantages and limitations, and future perspectives. **Matthias Themeßl** looked at model error correction of daily precipitation from climate change simulations. A post-processing step using quantile mapping was shown to reduce RCM errors by one order of magnitude. **Malaak Kallache** looked at the challenges involved in deriving local-scale extreme precipitation from GCM output. A probabilistic downscaling approach was presented in which a transform function is used to link the cumulative distribution function (cdf) of large- and local-scale extremes at five stations in southern France. My presentation, co-authored by **Martin Widmann**, introduced a new downscaling approach that involves applying a statistical correction to GCM-simulated precipitation. A fundamental requirement in establishing the relationship between simulated and observed precipitation is a GCM-simulation in which the large-scale circulation fields are forced towards 'real world' observations, in this case ERA-40. This correction approach is known as Model Output Statistics (MOS) and is shown to yield more skilful precipitation estimates than traditional downscaling approaches.

As a PhD student, I was very grateful to have the opportunity to communicate my research findings in the form of an oral presentation to an audience of experienced researchers and I was equally appreciative for the useful comments that I received.

Jonathan Eden

Robert Grabowski, from Queen Mary University of London, attended several sessions pertaining to river processes and sediment transport, as well as presenting results from his PhD research on cohesive sediment erodibility.

In the session 'Experimental methods on soil erosion research', researchers discussed the need for more empirical data to improve erosion models. Anthony Parsons (University of Sheffield) demonstrated that many models used to predict soil erosion do not accurately

represent observations. One example was the raindrop size distribution predicted by Marshall-Palmer model which affects estimates of interrill erosion. Peter Heng's talk (Loughborough University) focused on micro-scale soil erosion processes. He discussed how sediment deposition due to surface microtopography caused suspended sediment concentrations to differ from those predicted by the 1-D Hairsine-Rose model. Finally, Gunay Erpul (University of Ankara) presented results from ongoing flume experiments to quantify wind-driven soil erosion. Their research group is extending raindrop detachment models to incorporate the added kinetic energy and change in angle of impact that wind impacts on a raindrop.

In a session on water quality, researchers presented models for the prediction of nutrient fluxes at a catchment scale. Brian Konvag and Hans Thodsen (Aarhus University) discussed the development of large-scale models of nutrient transport in Danish surface waters. Their models combine empirical data on nutrient loading, river discharges, and nutrient retention to predict loadings to coastal environments. Fred Worrall (University of Durham) presented the results of a large-scale model of temporal trends in nitrogen species in UK surface waters to quantify N flux to the sea and dentrification. Despite a decrease in dissolved inorganic nitrogen loading in the UK, fluvial export of dissolved organic nitrogen (DON) is increasing. At 1000 t N/yr, the UK is now one of the largest exporters of fluvial DON in Europe.

The oral presentations in the session 'Restored river corridors' covered a range of topics relevant to river restoration and management, including biogeochemical processing, groundwater residence times, and river geomorphology. Klement Tocket (Leibniz-Institute of Freshwater Ecology and Inland Fisheries) opened the session with a discussion on managing large river landscapes. He argued that river systems in Europe are so altered, and interconnected by canals, that restoration projects will be unable to recreate the historic aquatic communities. Successful restoration can increase habitat diversity and species richness, but the resulting ecosystem will consist of novel assemblages. Simone Peter (Federal Institute of Aquatic Science and Technology) presented results showing high rates of denitrification in the hyporheic zone beneath riparian willow trees. She was among a series of postgraduate students presenting papers on groundwater hydrology and nutrient processing in the hyporheic zone of a restoration project on the River Thur, Switzerland. Angela Gurnell (Queen Mary, University of London) discussed her ongoing research programme on the ecosystem engineering capabilities of aquatic plants. She demonstrated that plants alter river hydraulics and sediment transport processes causing the formation of large deposits of fine sediment. She suggested that a river geomorpohology restoration project using aquatic plants may be cheaper, quicker, and more efficient that those relying on bank stabilisation by riparian trees.

Thursday was sediment transport day at the EGU, with four sessions in the Erosion, Sedimentation and River Processes grouping. Juergen Schmidt (TU Freiberg) began the day with a summary of the different process-based models used to predict soil particle detachment, transport and deposition, as well as the challenges in creating accurate 3-d models of soil erosion from hillslopes. Some of these models can predict both the particle size distribution and yield of sediment entering rivers, which is crucial information for those of us interested in modelling sediment transport in rivers. Mark Macklin (Aberystwyth University) discussed how industrial activities, both present and past, have left an astonishing legacy of heavy metal contamination in the environment. Drawing on his worldwide research experiences, he noted that the UK has higher levels of metal contaminated sediment than many other industrialised countries, even those with recent widespread contamination. The majority of the heavy metals are associated with fine sediment and concentrated in river channels and floodplains. In the session 'Sediment transfer and transit time across scales: tracing, budgeting and modelling", two presenters discussed the challenges of monitoring cohesive sediment transport with tracers. Kate Spencer (Queen Mary, University of London) questioned whether cohesive sediment tracers transport like natural suspended sediment, citing laboratory experiments that showed tracer particles forming unnatural floc morphologies. Adrian Collins (ADAS) presented a novel method to label and track cohesive sediment from the field to, and within, rivers, using fluorescent-

magnetic tracers. The tracers are treated with xanthan gum, a proxy for extracellular polymeric substances, to foster realistic floc morphologies, and sediment yields are monitored in the river using high-strength magnets. In the final session of the day 'Measuring and modelling sediment transport in small and large streams', I presented a summary of my PhD research on cohesive sediment dynamics within vegetated river channels. From my field study, I demonstrated that key sediment properties, such as erodibility, vary significantly over space and time. I stressed the need for more empirical research in this area, and presented a methodological development that could facilitate such work.

Robert Grabowski

Yi He, from King's College London, is concerned with the practical applications in ensemble hydro-meteorological forecasting, a relatively new interdisciplinary research area. He notes that if getting people together to present their work is a difficult task then to maintain the contacts one has established so as to cultivate and expand research ideas can be almost insurmountable. He gives details of a WiKi site that has been set up to try and overcome this limitation.

Towards practical applications in ensemble hydro-meteorological forecasting

Ensemble hydro-meteorological forecasting is a relatively new interdisciplinary research area. Ensemble forecasting techniques have made significant progress in recent years and proved to be essential in hydrological forecasts. There is an ever increasing expectation for good forecast quality as many more organisations, including basin authorities, water managers and emergency response authorities, adopt ensemble forecast systems. The value of ensemble forecasting becomes even more apparent when one considers its potential socio-economic benefit for public safety, flood control and reservoir management. The session 'HS11.4/AS1.22/NH1.12 'Towards practical applications in ensemble hydro-meteorological forecasting' is the second consecutive one revolving around the theme on ensemble forecasting.

The EGU conference offered an excellent opportunity to bring together scientists and engineers from hydrology, meteorology and the social sciences, as well as practitioners and stakeholders to evaluate the potential of ensemble forecast techniques in pre-operational and/or operational forecasting systems. Unlike other scientific workshops or conferences specialized in a particular topic, EGU is a general assembly of people with various background, responsibilities and research experiences. Hydro-meteorological ensemble forecasting studies with different hydrological and climatic regimes that can lead to a reliable assessment of the ensemble techniques

Considerable effort has been put into the upper chain of ensemble forecasting techniques, i.e. meteorological forecasts, coupling and setting up hydro-meteorological forecasting. What are the methods or standards to assess or benchmark its entire performance, e.g. combine ensemble Spaghetti plots with weights when multi-models are used? I hope answers can be presented or explored in the future research projects and meetings.

turnout

An unexpected large number of audience participated in both the oral and poster presentations. The lecture room Nr. 38 was nearly overwhelmed as every single seat was occupied with a packed crowds standing at the back of the room. Time passed by so quickly and unnoticedly. There was never sufficient time for discussions, suggestions or debates.

I briefly recall three talks and attach a full session oral programme in the annex. **Sébastien Nober**t kicked off the session brilliantly and set the scene for problems related to using ensemble forecasts in operational flood risk management and communication with the end users. Our first solicited speaker, **Massimiliano Zappa,** fed the audience with his beloved spaghetti plots. He presented his experience in the past three years in implementing, maintaining, verifying and explaining operational hydrological ensemble prediction systems. **Steven Weijs** presented his information theory which exposed the audience to a new way of evaluating reliability and resolution of ensemble forecasts. But of course, there was plenty of room and time for discussion after the session. EGU always presents something for everyone.

To improve future communcations, a WiKi site, http://ensemble.nmpi.net, was set up prior to the event and is being constantly updated after the event as a follow

up of the session as well as a platform for sharing and exchanging knowledge. Many session participants have been willing to share their presentations in the online wiki. So far, 18 presentations have been collected and uploaded.

Yi He

Fredrik Wetterhall, from the Department of Geography, King's College London, throws a spotlight on the session on large scale hydrology.

The session on large-scale hydrology was convened by **David Hannah** from the University of Birmingham and **Hannah Cloke** and **Fredrik Wetterhall** from King's College London. It started with a solicited talk from **Thorsten Wagener** from Penn State University on how to assess hydrological model's credibility in terms of climate change. He showed a case study in Olifants Basin, South Africa and how to evaluate hydrological model's under non-stationary conditions to assess the parameter uncertainty for climate impact studies. The next talk was from **Kerstin Stahl** from University of Oslo who presented a study within the EU Watch programme where they analysed spatial and temporal runoff dynamics on a pan-European scale by calculating percentiles to produce time-series of non-parametric anomalies. The results can be used for evaluating model performance in both temporal and spatial scale, and preliminary results showed good agreement with modelled and observed anomalies, and the main area of improvements were during drought periods.

Chantal Donnelly from the Swedish Meteorological and Hydrological Institute presented results from the calibration of the new global hydrological model HYPE over Europe. The presentation focused on results from the Baltic basin, where input maps of soil classes were used in a step-wise technique to estimate model parameters. The result showed improvements in the runoff both in calibration and validation and has implication on model calibration in both gauged and ungauged basins. The second solicited talk came from **Chong-Yu Xu**, also from University of Oslo. He gave an overview of where large-scale runoff modelling and the main challenges for the future. Historically, two approaches of large-scale models have emerged: one where the hydrology within a global meteorological model is developed and the other where a small scale hydrological model is developed into a global model. The models deviate mainly in how evapotranspiration and the routing of runoff are described. There are still research gaps in coupling of these models and more research is needed to overcome this.

There was a dominance of Norway in the session since the Young Scientist talk was given by **Anne Fleig**, also from the University of Oslo. She presented a study on how droughts in Great Britain can be associated with large-scale weather types and sea surface temperatures in the Atlantic Ocean. Preliminary results showed how cool SST anomalies south of Greenland combined with warm anomalies in the extra-tropical eastern Atlantic could be associated with droughts in Great Britain. **Eric Wood** from Princeton University closed the session with a presentation on a GEWEX-project to quantify changes in the global water cycle in the last 50 years. Global datasets, including in-situ observations, remote sensing data, reanalysis-driven hydrological models and weather model reanalysis were used to create a new global dataset. The focus was to close the water balance, and the results showed how discharge for the main rivers in Northern Eurasia, the Amazonas and Africa could be corrected.

The session was very well attended (with many delegates standing) and the presentations showed the width of research in large-scale hydrology and pointed to some interesting research areas in the future. Large-scale hydrology is a very important tool to assess the existing water resources today and how these may be affected by a future climate change. High quality datasets, calibration and validation of models and the coupling of these models with climate models are all areas where future research is needed.

***Fredrik Wetterhal*l**

Water in a changing climate

BHS National Meeting
University of Birmingham
19 May 2010

This conference at the University of Birmingham featured papers and posters from a broad disciplinary background, with the underlying theme of highlighting recent advances in understanding of hydrological response to climate change and identifying key knowledge gaps that remain to be addressed.

The opening presentation by **Chris Kidd** (University of Birmingham) outlined how some of the historical limitations of measuring precipitation through observational surface networks and weather radar systems have been overcome through the use of Earth Observation satellites, which can provide frequent data at scales suitable for hydrological applications. Through combined observations and methodologies, the satellites have not only improved understanding of the precipitation processes within the atmosphere, but also the occurrence, distribution and accumulation of precipitation across the globe.

Moving from the global to UK scale, **Christel Prudhomme** (Centre for Hydrology and Ecology) presented a novel framework for undertaking climate change impact studies based on sensitivity analyses of catchment responses to a plausible range of climate changes. The method involves separating the climate change projections (the hazard) from the catchment responsiveness (the vulnerability) expressed as changes in peak flows. The framework is scenario-neutral, enabling rapid appraisal of any new set of climate change projections as soon as they are available without the need for undertaking a new climate change impact analysis.

Arguing that high magnitude floods across Europe within the last decade have increased the need for a detailed understanding of seasonal variability in flood magnitude and frequency, **Neil MacDonald** (University of Liverpool) explored spatiotemporal patterns in the timing and length of flood seasons across Wales using river-flow records from 1973 to 2002. Regional variations in flooding are evident, with flooding occurring earlier in small catchments draining higher elevations in north and mid-west Wales. Patterns obtained from data demonstrate their effectiveness and use in analysing regional patterns in flood seasonality, but catchment-specific determinants are also important factors in flood seasonality.

UK water companies have considered climate change in their long term water resources plans for more than a decade. **Steven Wade** (HR Wallingford) discussed the headline impacts of river flows as predicted by UKCP09 and their immediate implications for water company Water Resources Plans. Reductions in winter refill and recharge in these projections suggest that central estimates of Deployable Output for the end of the planning horizon (2035) will change marginally, although uncertainty is higher as the range of results from UKCP09 was greater than those from previous studies.

Although the majority of papers focussed on UK issues, **Declan Conway** (University of East Anglia) added an international dimension to the proceedings with an examination of how climate change may alter water availability and food production in China. By integrating crop and water simulation models with two scenarios of climate and socioeconomic change, he suggested that while water availability plays a significant limiting role on potential cereal production, changes in production are also highly dependent on socioeconomic adaptive development pathways. In particular, the effects of CO_2 fertilization on crop yields may almost wholly offset the decreases in production derived from future decreased water availability.

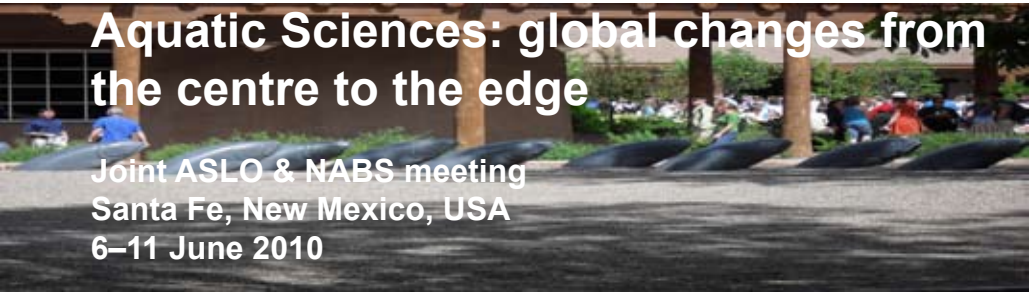
Glenn Watts (Environment Agency) discussed the already

noticeable climate change impacts in the UK; for example, two-thirds of water temperature sites showed a positive trend from 1990–2010. The case was made for future research efforts to focus on identifying appropriate options for decision-makers to deal with climate change, even when the effects of climate change are poorly understood. In a similar vein, **Rod Wilkinson** (Severn Trent) then suggested partitioning the impacts of climate change into natural climatic variability and human-induced global warming. This approach was thought to be more capable of informing the water industry for the future allocation of water resources.

The final presentation by **Mike Keil** (OFWAT) firstly gave an overview of the work undertaken by OFWAT. This was followed by the discussion of challenges for the water industry. A key challenge identified was the need for consumers to put a value on water: however, the most appropriate way of doing this is still not agreed. Also, it was proposed that future efforts need to be spent on having a seamless process from scientific research through to user applications.

On behalf of the 50+ delegates who attended this meeting, we would like to thank the University of Birmingham for hosting this timely and relevant meeting, and the conveners, **David Hannah** and **Chris Bradley**, for organising it with such success.

Phil Blaen, David Lavers and Chris Mellor
University of Birmingham
and Laura Gangi, Freiburg University



Aquatic Sciences: global changes from the centre to the edge

Joint ASLO & NABS meeting
Santa Fe, New Mexico, USA
6–11 June 2010

The joint summer meeting of the American Society of Limnology and Oceanography (ASLO) and the North American Benthological Society (NABS), was attended by over 1700 delegates from 40 countries and featured over 1400 papers. Spread across several modern and historic venues in the beautiful city of Santa Fe, the conference offered a packed schedule including plenary talks, concurrent sessions, interactive workshops and social events. Participants were able to roam between sessions and the following report therefore comprises some personal highlights from the event.

An environmental history of the Santa Fe river
The Monday morning began with a fitting plenary talk from **Tara Plewa** (U.S. Army National Guard), describing how anthropogenic activities have changed the local Santa Fe River. Tara described her work reconstructing the past hydrology of the river using tree-ring data, using this to establish how human exploitation of scarce water resources in this arid region has affected river flow over the past four centuries.

Delegates mingle outside the Santa Fe Convention Centre

As a result of such exploitation, the flow regime has been substantially altered, with naturally perennial reaches becoming ephemeral where abstractions occur and the reverse situation arising downstream of inputs from the municipal water treatment works. Tara ended by discussing the challenges of restoring the river's hydrological regime, noting the impossibility of returning the river to a natural state due to ongoing human pressures.

USGS science: making a difference in the wake of the Gulf oil spill
This topical presentation on the current Gulf oil spill was given by a colleague from the United States

Geological Survey on behalf of **Marcia McNutt**, who was unable to attend due to commitments related to the ongoing disaster. Whilst the oil spill is indisputably an unparalleled event with appalling ecological, economic and public health consequences, scientists from the USGS and other agencies are starting to plan for long-term recovery in coming months, years, and even decades. The success of this recovery operation requires a truly interdisciplinary approach, with those involved keen to draw from lessons learnt in the wake of previous events such as the Exxon Valdez oil spill.

Ecosystem size: a fundamental driver of processes in freshwaters

This session, convened by **Angus McIntosh** and colleagues at the University of Canterbury, New Zealand, included a number of particularly interesting presentations. **Michael Doering** (Eawag Research Institute, Switzerland) discussed his work on the influence of the direction of hydrological exchange on ecosystem processes at multiple spatial scales. This research has found significant differences in hyporheic respiration, periphyton biomass and physico-chemical variables in gaining and losing river reaches. Upwelling areas were characterised by higher periphyton biomass, whilst respiration rates were greater in downwelling zones; patterns were particularly apparent at larger (i.e. reach) spatial scales.

Pete McHugh (University of Canterbury, New Zealand) then described research into the effect of flow reduction, and therefore ecosystem size, on food web structure in stream reaches with contrasting flow permanence regimes. As discharge and habitat size declined, so did food web size and complexity, as well as community vulnerability to predation; Pete highlighted the implications of this for river management.

When rivers run dry

This session, convened **Thibault Datry** (Cemagref Research Institute, France), **Vincenç Acuna** (Catalan Institute for Water Research, Spain) and colleagues, focussed on processes and communities in temporary streams. The session was dominated by research from Mediterranean and arid climates but also included reports of work conducted in temperate regions, where streams with intermittent flow regimes are surprisingly common.

Thibault Datry discussed changes in benthic and hyporheic invertebrate communities along a 20 km flow permanence gradient in the Albarine River in eastern France. Intermittency was found to explain a greater amount of variation in invertebrate community composition than either longitudinal or temporal variability. Thibault noted that few taxa were restricted to sites with intermittent flow, these communities instead consisting of subsets of the species found at sites with greater flow permanence.

Rachel Stubbington then described how benthic invertebrate use of the hyporheic zone differed at sites with intermittent and perennial flow. During a flow recession, the amphipod *Gammarus pulex* became increasingly abundant in the hyporheic zone as habitat availability declined and biotic pressures increased in the surface sediments. However, this refugium effect was moderated by the direction of hydrological exchange,



Exposure of benthic sediments as discharge declines on the River Lathkill.

with the hyporheic zone failing to act as a refuge where perennial flow was maintained by strongly upwelling water.

In summary, the ASLO NABS summer meeting was a great success, providing an opportunity for aquatic scientists from around the world to share results and discuss future collaborations in the historic surroundings of Santa Fe.

Rachel Stubbington
Loughborough University



This International Symposium will provide a forum for the exchange of experiences and ideas on the use of weather radar in hydrology, especially its application in flood forecasting and water management. Participation from consultants, water utilities and environment agencies is particularly encouraged. The aim is to promote a strong interchange between researchers, practitioners in the water industry and those making advances in weather radar technology.
The following theme topics will be covered in relation to weather radar application:

Weather radar theory, technology and systems
Rainfall estimation and quality control
Rainfall forecasting (nowcasting and NWP)
Storm and flood event case studies
Uncertainty estimation
Use in hydrological modelling and flood forecasting
Hydrological impact and design studies
Water management and urban applications

The **Call for Papers** and further details of the Symposium are available at: www.wrah2011.org

Submission deadlines:
Abstract submission: .....4 October 2010
Acceptance of abstract:..... mid-November 2010
Symposium Proceedings, 6 page paper: ..8 February 2011
Invited papers for journal Special Issue:....31 March 2011

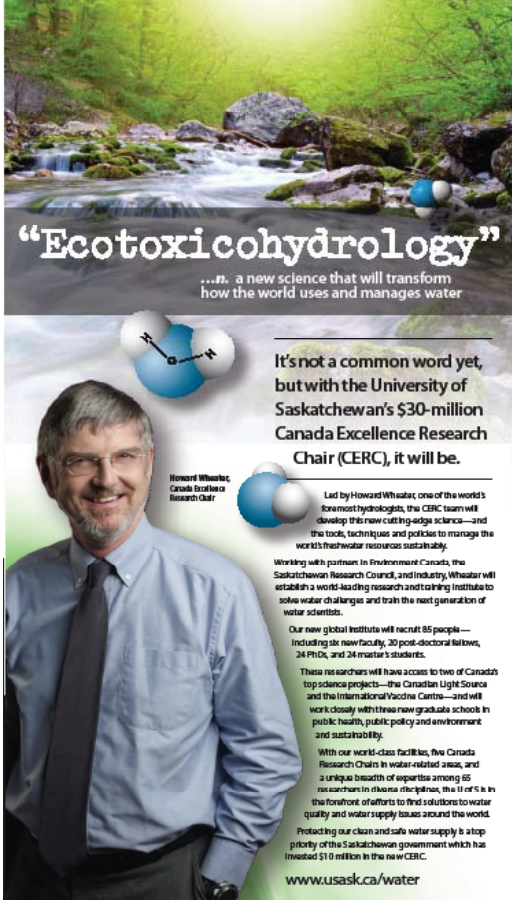
The Symposium Programme includes the opportunity to see the new Met Office dual-polarisation weather radar and to visit the seaside village of Lynmouth, scene of the August 1952 devastating flood that impacted on subsequent flood defence policy, with discussions on how weather radar now helps us mitigate against such flood disasters.

Bob Moore, *Chair, Scientific Committee*
Centre for Ecology and Hydrology

Anthony Illingworth, *Vice-Chair, Scientific Committee*
Dept of Meteorology, University of Reading

Past President Howard Wheater moves to Canada

2010 has been a memorable year for me. Following the award of a Fellowship by the American Geophysical Union, and an appointment as Vice-Chair of the World Climate Research Programme's GEWEX Steering Group, I have been awarded a Canada Excellence Research Chair in Water Security at the University of Saskatchewan, which comes with CD$30million support from the Federal and Provincial Governments and the University. So, after 32 years at Imperial, I am moving in October to take up this unique opportunity. Having been part of British Hydrology for such a long time, I shall miss the close network of friends and collaborators, and the family that is BHS, but plan to keep a foothold at Imperial, to continue existing research projects, including FRMRC and FREE, and to explore new areas for transatlantic collaboration. I leave behind a terrific team at Imperial, and, having been described by Peter Wolf (who started Imperial's Hydrology postgraduate programme in 1955) as his 'grandson', hope that my departure will a springboard for his 'great-grandchildren' — Imperial's next generation of academics and researchers.



At a time when the water environment is facing unprecedented challenges, it is impressive to see Canada being prepared to invest in the science needed to meet these. I look forward to working at large scales and high latitudes, very much at the forefront of global warming (which I'm relying on for the winters). I also look forward greatly to working with my new colleagues in the University (John Pomeroy et al.) and at Environment Canada, as well as closer contact with others in Canada and south of the border. UofS is in many senses the birthplace of Canadian Hydrology, and there are, remarkably, 67 academic staff (including 5 research chairs) in water and closely-related disciplines. A major challenge for water science, and a major goal for me at Saskatoon, is to achieve the integration of disciplines needed to address current management issues, and to understand societal, policy and management interactions. We have identified a set of thematic challenges: climate change and water security; land-water management and environmental change; sustainable development of natural resources. These are world-wide issues, but also of fundamental strategic importance for Canada. In the prairies, the Saskatchewan river is reaching limits for abstraction, pollution is creating eutrophication, and climate change is changing Canada's land and its water. Glaciers are retreating, permafrost is melting. And one of the largest land use changes Canada has seen has been associated with warmer winters - forest death due to beetle infestation. Our ambition is to develop the integrated science and tools needed to address these, within a new Institute for Water Security. Saskatoon may not have the warmest climate, but does offer a very warm welcome, and I will hope to have the opportunity to extend Canadian hospitality to many friends and colleagues in my new role.

To melt or not to melt?

Operational challenges in forecasting snowmelt floods

Prompted by the Presidents Piece in the May 2010 Circulation and a call for articles in a recent editorial, **Richard Cross**, from the Environment Agency, has a few thoughts on flood forecasting for snowmelt events.

Having been the location for one of the worst snowmelt floods in recent times in 1947, Midlands region of the Environment Agency has been trying to model snow accumulation and melt in its rainfall runoff models for many years. I say 'trying' as this remains a challenge for all involved. Our attempts often end up with feeling as if we have had to work more at validating our snowmelt forecast outputs than manually correcting forecasts running with no knowledge of the snow.

The theory has it that as our raingauges are fitted with heaters to melt snow, the region's temperature gauges can then be used to convert the recorded precipitation back to snow. This water equivalent will be held as a snowpack within our models. As temperatures rise, the models melt the snowpack and the inputs are released into the forecast of river flow.

Practical difficulties

That is the theory. In practice, things are quite different. The duty forecaster has a number of challenges to overcome. In addition, the infrequency of snowmelt flood events means it can be many years before forecasters gain the skills and experience to fully rise to these challenges when they occur.

Firstly, practical difficulties mean that the heaters in our raingauges are sometimes not up to melting the snow as it falls, either due to the volume of snow or the temperature at which it accumulates. Typical of this scenario is either no record of snowfall at the gauge or a steady 0.2 mm drip of melted snow through our gauges as the heaters struggle to melt it at time of fall. Although the snow will subsequently melt at the 'right' time, we have no estimate of what is lying and thus no ability to forecast the flood threat until the snow finally melts.

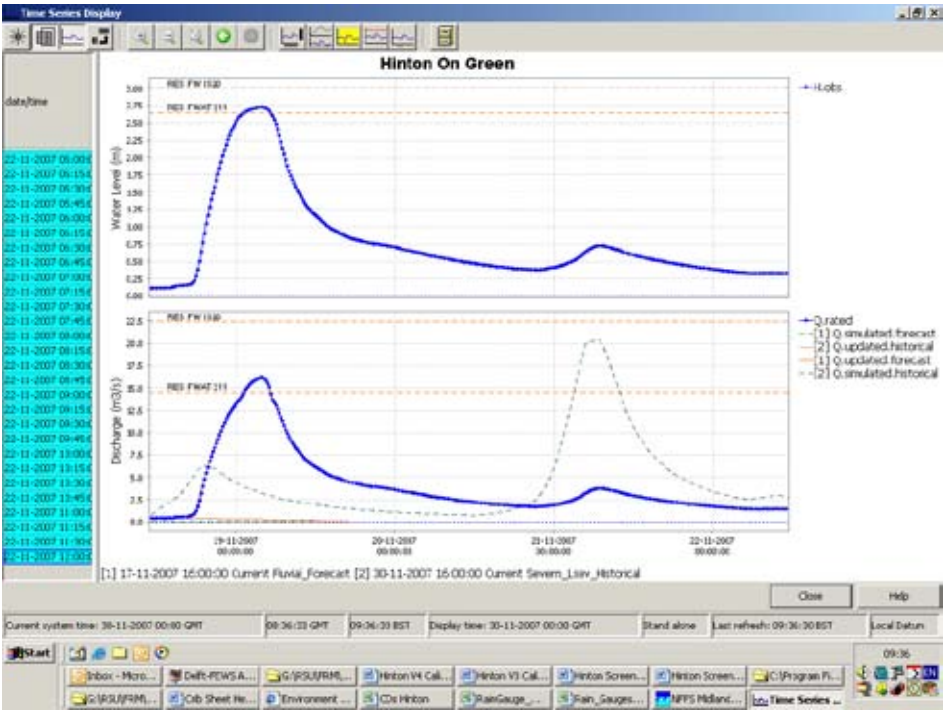
Backing up our gauge records are a network of snow observers. Primarily used to provide a monthly record of daily precipitation, the volunteer observers are phoned on a daily basis for their snow observations whenever snow is lying. Their data are used to edit the model snowpack wherever it is judged to be more representative of a particular catchment's snow cover. Infrequent calls to these observers means that they do not always have the correct equipment to hand or have no recall of how to use it correctly: melting snow in kettles is not yet a part of the approved measurement method as far as I recall. Worse still, we sometimes find that we have not been informed that the observer has moved and the new householder has no knowledge of the required task.

Where are these observers and which observation do we use to update which gauge reading? We only have around 15 observers across the region so some subjectivity in snowpack estimation in each of our 130 modelled subcatchments is inevitable. Adding to this list of observers is currently underway, but how much effort should be put in to recruiting observers and retaining their skills for the occasional use as a back-up measurement service?

Modelling issues

Right, so we have a snowpack sitting in the model waiting for the first signs of melt. Temperature gauges are interrogated and, if conditions have warmed up, the model's snowpack will begin to melt and our forecasts will predict the impact. However, only a fraction of the 130 modelled catchments are covered by a local temperature gauge so the models calculate an average catchment temperature based on the nearest gauges. The forecaster has to ask if this reflects the local temperature; a question which is often only answered after flow data has been collected, allowing the accuracy of the modelled flows to be judged.

Does the model have access to forecast temperature data? No it doesn't. At present the latest hour's temperature data is used for all subsequent hours of the forecast. Model forecasts therefore depend on the time of day that the last temperature data are collected. As a consequence, we can forecast



Model simulation showing incorrect accumulation and subsequent melt of snow (dashed line). The solid line shows the actual river response 48 hours earlier with little simulated response. Snow was falsely registered in the model due to non-representative temperature estimates caused by gauge location or sometimes temperature data errors. In this case the snowpack should have been edited out of the model before the simulated melt.

too much melt where temperatures will actually fall overnight or too little where current temperatures are too cold to start the melt off over the period of forecast. Our work plan includes using Met Office forecast temperature profiles in our models on the National Flood Forecasting System (NFFS). However, placed against other improvement priorities, this item of work seems of low importance — until the next heavy fall of snow.

When temperatures do rise and melt actually starts, snow remaining un-melted in our raingauges begins to melt and starts to tip the buckets. If we inadvertently accounted for this snow in our observation-based edits, we can end up with too much melt and an over-forecast. Where we have too little snow, we don't melt enough and miss the flood!

Here starts the nowcasting, watching the catchment model performance and ensuring our model updating (based on observed flows) keeps pace with the differences between raw model simulations and reality. The forecaster digs out the notes that they haven't used for two years and tries to understand where the differences may be originating from. Heavy snowfall is usually an infrequent occurrence, certainly a lot less frequent than heavy rainfall. Therefore, all duty officer skills in dealing with snowmelt and its associated problems are not readily practised. What priority should training and exercising of snowmelt scenarios take, compared with all the other training requirements a forecaster has to undertake?

Luckily it is not all doom and uncertainty. We have a good chain of catchment and routing reach models

that swiftly correct forecast errors from most sources, including snowmelt, but in doing so can sometimes cut down the forecast lead time that we can deliver.

We do the best with what we've got. Can we do any better? We are planning to try but without the aid of a safety net. Will a region-shaped snow pillow catch our fall?

These thoughts are those of the author and do not necessarily represent those of the Environment Agency. They are submitted to initiate discussion and the sharing of good practice across the BHS fraternity.

ICE's State of the Nation Report on Infrastructure 2010

These reports are compiled each year by a panel of recognised experts drawn from the various fields of expertise across ICE's membership. The aim is to stimulate debate and to highlight the actions that are needed to improve infrastructure. Both written and oral evidence is considered on a range of issues important to different sectors of society.

This is a comprehensive document — see www.ice.org.uk/Information-resources/Infrastructure-policy-and-reports/State-of-the-nation — and is well worth perusal, The section of particular interest to BHS members are the pages on Water and Wastewater. These do no pull any punches, as demonstrated by the following key points identifying where action is needed:

- Reform the regulatory regime to drive the long-term investments necessary to address climate change, population growth and sustainability and avoid stop–start investment
- Reduce demand for drinking water by changing the pricing structure, reducing leaks and using low-fow fxtures, supported by water metering
- Reduce the volume of water treated at wastewater works by separating fows of sewage and surface water

On investments planned for 2010–15, the panel consideres that not enough is to be done to address the effects of climate change. ".... do not adequately take into account future population growth. They don't reduce demand. They don't allow for environmental regulation such as the Water Framework Directive. And they don't fully include the 25-year plans prepared by the water companies before the recent price review. Although there is much uncertainty in these areas, we need action and regulatory changes now if long-term investments are to be accepted in the next price reviews."

Ofwat's Future Regulation programme is welcomed but it needs to be much faster. For example, climate change is expected to reduce groundwater yields and summer river flows. At the same time, the Water Framework Directive means that abstraction licenses and effuent discharge permits granted by the Environment Agency will become much more restrictive. Some parts of the country earmarked for population growth – particularly areas in the South East – will be hard hit.

Combined with a lack of funding for further leakage reduction and little emphasis on demand management, the result will be water shortages in times of drought. The report also notes that "the water sector will need all the experience and talent at its disposal to address the challenges of sustainability and population growth. Current efforts are inadequate."

Job market looking good, then? – Ed.

Omission

In Peter Dempsey's excellent write-up of our joint meeting with the RMetS 'Some new perspectives on climate change' (*Circulation* **105**, page 8) we forgot to acknowledge James Dent as the Meeting Organiser. Our sincere apologies to James.

Managing land use and water resources in Indonesia

Matt Horritt

Climate change, deforestation, population growth and globalisation are issues which affect much of the developing world, with implications for water resources, sanitation and health. There are often conflicting pressures on the availability of land for farming, maintaining water resources, and economic development.

Managing land use is therefore a key aspect of sustainable development. Biodiversity and the effects of land use change on global climate add further pressures to manage land sustainably.

I'll be exploring some of these issues in a 2-year placement, funded by Voluntary Service Overseas, working with the district Forestry and Plantation Office in South Sulawesi, Indonesia. I'll be helping to ensure that the systems and skills are in place so they can map current land use and manage their forests and water resources sustainably. Mapping land use will involve GPS survey in the field, satellite data and GIS.

The Jeneponto district of South Sulawesi has suffered from increasing frequency of droughts in recent years. Unlike other areas of Indonesia, the district has a dry climate, with an average annual rainfall of between 400 and 1000 mm, and a dry season lasting 7–10 months of the year. The variation in these figures illustrates two of the difficulties in understanding the hydrology of the Jeneponto district: reliable data are difficult to obtain and hydrological variables are highly heterogeneous, varying strongly with topography and coastal aspect.

This dry climate leads to some atypical crop patterns, with maize being grown in preference to rice in some areas. Despite the dry climate, there are still problems with floods and landslides. This is illustrated most dramatically by the collapse of part of Mount Bawakaraeng, the caldera of an extinct volcano in South Sulawesi, following heavy rainfall in 2004. This landslide released 200 million cubic metres of rock and debris along 7 km of the valley, killing 10 and displacing 6000 people.

The project I'll be working on will make a real contribution to supporting sustainable livelihoods in Indonesia, allowing local communities to balance their needs for land and water. It is one of many development projects supported by VSO worldwide.

To find out more about VSO visit their website at vso.org.uk

You can follow my progress in Indonesia via my blog and twitter:

matthorritt.blogspot.com
twitter.com/matthorritt

I'll also be raising money for VSO by walking from Paddington Station to Bristol Temple Meads; find out more at

justgiving.com/matthorritt

Brief biography:
Matt Horritt was until recently a BHS national committee member, and specialist modeller with Halcrow. He is a chartered engineer and member of CIWEM, with 15 years experience working in flood risk management for consultants and in academia. He will be working with VSO in Indonesia for two years from September 2010.

Photo shows the mountains of South Sulawesi. © Copyright Achmad Rabin Taim and licensed for reuse under the Creative Commons Attribution 2.0 Generic licence."

G.J. Symons remembered by meteorologists

At lunchtime on July 15th about 30 invited guests gathered at Kensal Green Cemetery, NW London, to mark the restoration and rededication of the family graves of George and Eliza Symons, forever to be known for George's life's work of founding the British Rainfall Organisation and raising it to the zenith of its strength by the end of the nineteenth century. That doyen of weather commentators, Philip Eden, has posted a beautifully written tribute to Symons at www.weatheronline.co.uk/cgi-app/reports?ARCHIV=0&LANG=en&MENU=Estra&FILE=extra_pe.tit&DAY=20100715

Dr Paul Hardaker, as Chief Executive of the Royal Met. Soc., welcomed those who had gathered in the restored Dissenters' Chapel, and drew attention to the display of Symons' medals and the remarkable illustrated testimonial volume which the Society had given Symons towards the end of his working life. After a splendid buffet lunch organised by the Friends of Kensal Green Cemetery, everyone adjourned to the graveside for a short ceremony. The engraved slate had been given by Mark Weir, owner of Honister slate quarry at the head of Borrowdale, remembering that Symons publication of central Lake District rainfall measurements had shown that locality to be Britains's wettest zone. [Both annually and now the wettest single day too, as of Nov 19, 2009]

Bravely the Society had set the rededication date deliberately on St Swithins Day but rain held off for the ceremony. The stones were unveiled by Prof Tim Palmer FRS, President–elect of Roy. Met Soc., commending the current value to climate change science of the long rainfall time series that Symons collated from well over 3000 volunteers.

Then followed an excellent overview of Symons' life by Stephen Burt. The public side of that life is well known to historians of science but it was good to hear of Mrs Eliza Symons who was a major support and would occasionally attend Met. Soc. Meetings with her husband. Sadly, their only child died when young and I was left wondering whether he/ they could ever have produced 39 volumes of British Rainfall if there had been lively offspring in their Camden house (with its meteorological station garden). In a nice touch, Canon Paul Williams of Tewkesbury Abbey had been invited to carry out the rededication of the graves, knowing of the proximity of his church to the frequently swelling River Severn. Prayers of gratitude for Symons, his family and fellow meteorologists were rounded off with one for rain, the exact wording of which I wish I had written down to check the outcome!

From my standpoint it is remarkable to think of the immense correspondence that Symons managed to edit into *British Rainfall* each year, normally getting it out to subscribers by the July following. B.R. lies behind over 3400 entries of the nearly 8500 events on the web-based BHS Chronology of British Hydrological events, a living acknowledgement by us of how much we owe to GJS. I valued the opportunity to be there representing BHS and was delighted that two other hydrologists who know their meteorology were present, Chris Collier and Ian Strangeways.

Frank M Law
[Past President]

Where are they now?

From time to time we get mail returned or emails that fail. If anyone has details of the following, members Tim Fuller would much appreciate further information

Karen Hersshens, joined BHS 27 March 2007
Dr Bethanna Marie Jackson, joined BHS 9 November 2005

Promoting International Hydrology

A perspective on the 19th Session of the Intergovernmental Council of UNESCO's International; Hydrological Programme, 5 to 9 July 2010

The International Hydrological Programme (IHP) of UNESCO is the prime intergovernmental programme of the UN system devoted to water research, water resources management and water education and capacity building. Started in 1975 as the successor to the International Hydrological Decade, the IHP is now in its Seventh Phase – Water Dependencies: Systems Under Stress and Societal Responses (2008-2013).

To review progress and to plan the coming Eighth Phase, the 36-member Council gathered at UNESCO for five days, along with observers from nations not currently members of the Council, such as the UK. Representatives of a number of NGOs and UN bodies were also present, some 200 participants in total. At the start of the 15-point agenda, the newly-appointed Assistant Director General for Natural Sciences (Ms Gretchen Kalonji) addressed the Council, stressing the strength of the IHP. However she raised questions about its strategic focus, its need of industrial partners and the incorporation of education into the research agenda.

As a component of UNESCO, the IHP and the activities of its Secretariat, the Division of Water Sciences, are necessarily tailored to the administrative and budgetary framework of the Organization. These are determined at the meetings of the Executive Board and the General Conference of UNESCO. Faced with a decline in funding for the IHP for the current biennium, the Council agreed a resolution addressed to these bodies asking for funding to be restored to the previous level and expressing concern at the level of staffing in the Secretariat.

In contrast to this decline, during the last decade over 15 UNESCO water-related centres have been established around the globe, supported largely by national funds, three more being endorsed during the session. These Category Two centres tackle specific global and regional issues, the UNESCO Centre on Water Law, Policy and Science at the University of Dundee being one. The need for a strategy for these Centres and how to ensure their activities are integrated with the Programme were two matters concerning the Council, which also considered a report on the Category One Centre, the UNESCO-IHE Institute of Water Education at Delft. This was presented by Prof. Andras Szollosi Nagy, the new Rector of the Institute, who was appointed last year on leaving UNESCO, Paris.

Activities underway within the current phase of the IHP were reviewed by the Council, but more attention was given to the plans for IHP-VIII. A concept note produced by a Task Force envisages four broad themes (see Box) along with a number of cross-cutting areas to provide a framework for the activities of the programme from 2014 to 2019. This framework will, as before, feature contributions from the hydrological communities of the UNESCO Member States, transmitted by their IHP National Committees. Through FRIEND[1], HELP[2], G-WADI[3], ISI[4] and similar initiatives, the UK is expected to contribute as strongly to the IHP-VIII as it has to past phases.

Discussions in the Council ranged across the Concept Note, with many delegations highlighting the need for studies of hydrological extremes, drought and water scarcity being of intense interest amongst delegations from Africa. The UK, in general, welcomed these ideas, pointing out that drought also has a significant impact in humid countries where rainfall is low and population density high, such as in south-east England. It called for the design of IHP-VIII to learn from evaluations of previous phases and to designate targets and deliverables so that the benefits of the Programme would be clear, particularly to the UNESCO General Conference and to the governments of Member States.

However, from experience of planning previous phases it may be anticipated that means for measuring achievements will be glossed over and unless there are radical changes, IHP-VIII will be shaped by the

Key Elements of the Concept of IHP-VIII

- Water related disasters and hydrological change
- Water and human settlements of the future
- Groundwater in a changing environment
- Ecohydrology, engineering harmony for a sustainable world

Cross-cutting areas

1. IWRM in adapting to global changes
2. Transboundary or shared waters
3. Human dimension and governance
4. Water education

variety of expressed national needs, rather than by the direction of the sharp cutting edge of global freshwater science. But this dilemma is common to the planning of earlier phases.

Of course, the IHP is only one of the natural science programmes in UNESCO, the Council receiving reports from others, MAB (Man and the Biosphere), for example. It was also informed of progress with several other activities involving UNESCO in UN system-wide cooperation, the World Water Assessment Programme, for instance. The parallel programme of WMO in the field of hydrology and water resources was reported to the Council and there were calls for closer collaboration between the two. Non- governmental bodies, such as IAHS and IAH, also presented reports on their activities.

Throughout its successive phases the IHP has stimulated progress in hydrology and water resources. However it is facing more and more competition for the attention of hydrologists and other scientists and engineers from initiatives under other international banners. These may be funded, whereas the IHP has few funds. The projects may be more attractive and directly relevant than those of the IHP, with better outlets for disseminating results. The systems of governance may be simpler than UNESCO's.

This structure — and therefore the success of the IHP — relies heavily on National Committee participation, but many of these are currently inactive, especially in Africa. For example, before each Council meeting National Committees are asked to submit a report detailing recent hydrological research contributing toward the goals of the IHP, the UK providing an extensive one for the 19th Session. Unfortunately, only 26 other National Committees responded, just three from Africa. Strengthening committees in those nations where they are weakest would bolster the IHP and foster national activities where the need is greatest. Such moves would also help in achieving the water-orientated Millennium Development Goals by 2015. Indeed, 2015 can be a crucial year for water internationally and it also marks 50 years of UNESCO programmes in hydrology and water resources.

The UK has played a key role in the IHP since its inception, collaborating on research projects and aiding education and capacity development initiatives around the globe. Numerous UK scientists are currently involved in the IHP, contributing research, policy advice and expertise across the themes and focal areas of IHP-VII, as well as serving on the Steering Committees of initiatives such as FRIEND, G-WADI and ISI. The IHP offers hydrologists opportunities to foster international research links* and help further development and educational initiatives across a wide range of freshwater issues.

Harry Dixon, Alan Jenkins and John Rodda
CEH Wallingford

Footnotes:

* For further information on how to become involved in the IHP please contact, Harry Dixon, Secretary of the UK IHP National Committee at CEH Wallingford (harr@ceh.ac.uk).

[1] FRIEND: Flow Regimes from International and Experimental Data; initiated in 1985, has grown into a global network involving research institutes, universities and operational agencies from over 100 countries in eight regional projects.

[2] HELP: Hydrology for the Environment, Life and Policy; established in 1999, developing new approaches to integrated catchment management through

the creation of frameworks for water law and policy experts, water resource managers and water scientists to work together on water-related problems.

[3] G-WADI: Water and Development Information for Arid Lands - A Global Network; aiming to strengthen the capacity to manage the water resources of arid and semi-arid areas around the globe through a network of international and regional cooperation.

[4] ISI: International Sediment Initiative; an initiative to increase awareness and understanding of sediment dynamics and erosion issues in all spheres of water management.

Hydrology Research – Reviewers 2009

The contribution made by Reviewers of manuscripts submitted to HR is, of course, crucially important but it can go largely un-noticed and poorly acknowledged beyond the boundaries of the confidential editorial system. The following people (many are BHS members) kindly reviewed manuscripts for HR in 2009. If you are interested in reviewing manuscripts for HR, please do contact me.

Ian Littlewood
Editor (BHS) Hydrology Research

Adeloye, A.
Aksoy, H.
Amoozegar, A.
Arnbjerg-Nielsen, K.
Arst, H.
Ashkar, F.

Bain, M.
Bao, W.
Bardossy, A.
Barkwith, A.
Bates, P.
Beeton, B.
Bencala, K.
Bengtsson, L.
Berndtsson, R.
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Blenkinsop, S.
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Bogaart, P.
Bøgh, E.
Borga, M.
Borsányi, P.
Bradley, C.
Bras, R.
Braun, L.
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Buchberger, S.
Bulygina, N.
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Busche, H.
Butler, A.

Campolo, M.
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Chelmicki, W.
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da Silva, V.
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Draveniece, A.
Drogue, G.
Dunn, S.M.

Engesgaard, P.
Evans, A.

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Gallart, F.
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Goody, N.P.
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Gupta, H.V.

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Howden, N.J.K.
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Irmak, S.

Jain, S.K.
Jakobsen, R.
Janowicz, R.
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Kalma, J.
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Kirnbauer, R.
Kjaersgaard, J.
Kjeldsen, T.
Klavins, M.
Koistinen, J.
Koutsoyiannis, D.
Kriauciuniene, J.
Krysanova, V.
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Kumar, N.

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Li, L.
Liang, Z.
Lindroth, A.
Lindström, G.
Linnerud, K.
Littlewood, I.G.
Liu, Z.
Loredo, J.
Loukas, A.
Lundin, L.-C.

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MacDonald, R.W.
Madsen, H.
Marchand, W.-D.
Markus, M.
Marsh, T.
Martina, M.
Mattsson, T.
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Mishra, S.K.
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Moglen, G.
Moramarco, T.
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Naden, P.
Nassif, N.
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Nuetzmann, G.
Nunes, L.

Ojha, C.

Pagliara, S.
Papadimitrakis, I.
Papalexiou, S.-M.
Parsons, T.
Perrin, C.
Petersen-Øverleir, A.
Pierini, J.
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Pouget, J.C.
Povilanskas, R.
Prudhomme, C.

Qiu, G.

Rajagopalan, B.
Ranzi, R.
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Refsgaard, J.C.
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Reynard, N.
Rodrigo, F.
Rodriguez, J.
Roetting, T.
Rosbjerg, D.

Samuel, C.
Sargent, B.
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Savic, D.
Schertzer, W.
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Seibert, J.
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Serinaldi, F.
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Sharma, A.
Sharma, A.
Shuttleworth, W.J.
Singh, R.M.
Singh, V.P.
Snejana, M.
Sonnenborg, T.
Spence, C.
Srinivas, V.V.
Swancar, A.
Syvitski, J.

Thompson, J.
Thorsteinsson, T.
Tung, Y.K.

Uvo, C.

Valente, T,
van de Giesen, N.
van der Zee, S.
van Genuchten, M.
Vaughan, P.
Vaze, J.

Wade, A.
Wagener, T.
Wang, Q.J.
Wang, W.
Way, T.
Weatherhead, K.
West, J.
Wheater, H.
Whitfield, P.
Williams, R.
Woo, M.-K.

Xie, Z.
Xu, C.-Y.
Xu, Z.
Xunhong, C.

Young, M.
Yu, Z.

Zehe, E.
Zhu, J.

Diary

5th–8th Sept 2010
ERB - **Hydrological Responses of Small Basins to a changing environment**
Conference organised by Euromediterranean Network of Experimental and Representative Basins
Location: Seggau Castle, Leibnitz near Graz, Austria
Contact: Ian Littlewood (inanlittlewood505@btinternet.com

20th–23rd Sept 2010
Predictions for Hydrology, Ecology and Water Resources Management: Changes and Hazards caused by Direct Human Interventions and Climate Change
Conference organised by: HydroPredict'2010
Location: Prague, Czech Republic
Contact: Karel Kovar (Tel: +31 30 274 3360)

22nd Sept 2010
Urban Rivers: Emerging ideas and managment implications
BHS National Meeting
Organised by: BHS Midlands Section
Location: Birmingham
Contact: Chris Bradley
NB: meeting will include
BHS AGM
Further details on web site and flier enclosed with this issue

October 2010
'Forecasting for rapid response catchments'
SW Section meeting
Further details to be arranged.

Copy deadline for Circulation No. 107 22nd October 2010