Circulation

No. 98
August 2008

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Circulation is published quarterly. It is free to members of the British Hydrological Society and costs £25 to nonmembers on annual subscription.

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Circulation is indexed in *Geosystems' Hydrotitles* & *GeoArchive* and *NISC HydroROM*.

The PITT Review

Following the flooding of June and July 2007, the Government established an independent review under Sir Michael Pitt into the lessons learned from the 2007 floods in the United Kingdom. An interim report was published in December 2007 which provided initial findings following discussions with the public, businesses, emergency response teams, local authorities and many other stakeholders. This interim report has now been replaced by the final report published at the end of June 2008. The principal conclusions focus on the need to ensure that the Environment Agency assumes full control of Flood Risk Management and expands its responsibilities into the pluvial and flash flooding arenas. In addition, Pitt strongly recommended that the local authorities assume a much greater role in flood risk management than they currently provide. However, this is unlikely to be provided on the basis of the £34.5M of extra government money pledged by the Environment Minister over the next three years. For further information go to:

www.cabinetoffice.gov.uk/thepittreview/final_report.aspx

[and be prepared for a long read - Ed.]

New members

Matthew Barnes.....Lancaster University
Samantha Broadmeadow.....Forest Research,Farnham
Chris Bromley.....SEPA, Stirling
Claire Aarti Browne.....Halcrow Group Ltd, Edinburgh
Adam Cambridge.....Atkins, Birmingham
Lucy Clarke.....University of Exeter
Daniel Collins.....URS Corporation Ltd, Manchester
Richard Croft.....RSK Group, Bristol
Grieg Davies.....University of London (Queen Mary)
Doris Duethman.....ADAS, Wolverhampton
Stephen Evans.....Jacobs Engineering, Reading
Chak Fai Fung.....Oxford University Centre for the Environment
Josie Geris.....University of Newcastle
Ian Guymer.....University of Warwick
Jim Griffiths.....SRK Consulting Ltd, Cardiff
Heather Haynes.....University of Glasgow
Gemma Harvey.....University of Nottingham
Christian Hetmank.....Millard Consulting, Norwich
Judith Homewood.....Atkins Limited, Warrington
Laura Jones.....Hydro-Logic Ltd, Bromyard
Clare Jeffers.....Kings College London
Leon Kapetas.....University of Edinburgh
Rui Ferreira.....Instituto Superior Technico, Portugal
Jennifer Lannon.....University of Reading
Karl-Erich Lindenschmidt.Mott MacDonald, Cambridge
Sylvia Maclaren.....Enviros, Edinburgh
Rosemarie Moss.....Environment Agency, Oxfordshire
Helen Murray.....University of Glasgow
Neil Nutt.....Halcrow Waterman Ltd, Edinburgh
Loannis Papanikos....G. Karavotyris & Partners, Greece
Juergen Peter.....Independent Consultant, Bodmin
Carrie Price.....Independent Consultant, Lancashire
Simon James Price.....British Geological Survey
Cary Randall.....British Board of Agrement, Garston
Rachel Rees.....Mounchel, Derby
Hywell Roberts.....Hyder Consulting Ltd, Cardiff
Mathieu Roy.....University of Montreal, Canada
Michael Spencer...Environment Agency, Haverfordwest
Imogen Sollway.....CEH, Gwyned
Niko Taktikos.....University of Cranfield
Vesna Tripkovic.....University of Newcastle
Laura Trodden.....University of Cardiff
Helen Urquhart.....Waterman Group, Edinburgh
Nilesh Vyavahare.....University of Edinburgh
Imran Younas.....MWH Global, High Wycombe

Food for thought

I guess we'd all assume that now we have online databases not only is it much easier when searching the scientific literature to get all the relevant references, it's also likely that you'll pick up others you didn't know about. Apparently, though, according to a recent item in *The Economist**, James Evans, a sociologist at the university of Chicago, has found that this is not what happens. As more journals become available online, fewer items are being cited in the reference lists, and those that do get mentioned tend to be recently published themselves.

Why this is happening is not clear. One explanation could be that when indexing works on titles and authors alone, as happened with printed journals, it forced readers to cast at least a cursory glance at work not immediately related to their own and thus integrate more past results.

Is this supposed paucity of references good or bad? The article feels that electronic searching means that no relevant paper is likely to go unread, but narrowing the definition of 'relevance' risks reducing the cross-fertilisation of ideas.

Meanwhile, back to the Evans study, which found that over every additional year of back-issues of a journal available online, the average age of the articles cited from that journal fell by a month. He also found a fall, once a journal was online, in the number of papers in it that got any citations at all. He predicts that for the average journal today, five extra years' worth of online availability will cause a massive drop in the number of articles receiving one or more citations — from 600 to 200 a year!

Celia Kirby

The Economist*, vol. **388 (No. 8589), p. 94.

President's piece

The main forthcoming event for BHS is our tenth National Symposium to be held at Exeter, where BHS was conceived some 25 years ago. I hope that many of you will be attending what promises to be an excellent event, and I look forward to seeing many of you there.

Why should you come to Exeter for this event? Well as you call yourself a 'hydrologist' it is a wonderful opportunity to hear a range of up-to-date papers on many current hydrological topics. The symposium also gives you the chance to visit either the Met Office, Boscastle (to see the effects of the August 2004 flood) or Venford reservoir. Finally, and perhaps most importantly, it provides a wonderful networking opportunity; meet up with old friends and make new professional contacts — you know it makes sense! A large number of papers and posters has been submitted, and it looks as though we may have to lay on some parallel sessions to enable all of these papers to be presented. If you haven't already registered, could I urge you to go to the website and see what is on offer: http://www.events.ex.ac.uk/bhs2008/index.php/bhs/index/index.

Following last summer's flooding, two government reports have been published. The first in May was by the House of Commons Select Committee on Environment, Food and Rural Affairs (EFRA): (http://www.publications.parliament.uk/pa/cm200708/cmselect/cmenvfru/49/49.pdf). I acted as one of two technical experts on this committee and tried to ensure that hydrological issues were recognised at each stage of the process. This committee concentrated primarily upon institutional aspects — which organisations did well, which did badly, does government (central and local) have appropriate responsibilities, powers and resources to deal with such flooding, and is Treasury, through DEFRA, allocating sufficient funding for this topic, etc.

This report fed into perhaps the more important report published in June by the committee led by Sir Michael Pitt: (http://www.cabinetoffice.gov.uk/~/media/assets/www.cabinetoffice.gov.uk/flooding_review/pitt_review_full%20pdf.ashx). Over half the members of the Pitt committee might be called 'hydrologists', or who worked sufficiently closely with hydrologists to have a good knowledge of the issues, so again hydrological issues were covered. However, the final Pitt report (462 pages) contains 92 Recommendations to Government, of which the majority focused on institutional rather than technical issues. Of the 92 recommendations, I have assessed only about 17 to 20 have a significant hydrological focus, with many others concentrating on how local authorities, the emergency services and those responsible for critical infrastructure (water, electricity, roads and telecommunications) should address the flooding issue in future. Nevertheless, these two reports have reminded the public and government of the importance of good hydrological data and sound interpretation of such data and helped to raise the profile of hydrology over the past year. I would encourage those of you involved in flood risk management to look at the Pitt report in particular.

This then leads on to my final topic, that of professional development, careers in hydrology and the issue of chartered status for hydrologists. In previous President's Pieces, I have talked about how the committee were trying to develop a guideline document to advise members about the possible routes to chartered status for hydrologists, and had unfortunately admitted that the idea of 'Chartered Hydrologist' was a non-starter, partly because we were too small a profession as far as the Privy Council were concerned, but mainly because the Privy Council believes that there are already too many chartered bodies and, in the longer term, hopes to reduce these.

As I said in the last PP, we set up a small working group on this topic, and I must express my thanks to Rod Hawnt who, despite retiring as President last September, continues to contribute fully to this group. The working group will have a draft of the promised Guidelines Document ready for a launch during the Exeter Symposium, where I aim to explain to those who are interested why they might wish to become chartered, and how they might do so. Although the document will only be available in draft form by the time we get to Exeter, the hope is that a number of hydrologists thinking about

becoming chartered will be willing to 'test drive' the document and see whether or not it describes adequately the various steps necessary to become chartered.

Of course this process begs the question "why should I bother to become chartered; what's in it for me personally?" I would suggest that one reason would be purely for self-esteem; if you believe yourself to be a good hydrologist, why not obtain a formal recognition of this through chartership? For those hydrologists working for consultants, becoming chartered is often an essential pre-requisite for promotion, so although you may not be working in the consulting field at present, it may be worth working towards chartership to allow for a possible future career change.

Another, more altruistic reason, might be to raise the profile of hydrologists with employers. If an increasing proportion of hydrologists become chartered, it may in the longer term encourage employers to take hydrologists more seriously and to pay higher salaries (and I emphasise the 'may' here!). I became a chartered civil engineer because my first employer, Thames Water, demanded it. In the event, I left them long before I actually became chartered, and my subsequent employer, the Institute of Hydrology (now CEH) was not interested in this qualification. However, now I am a self-employed hydrological consultant, the CEng addition to my qualifications is extremely useful. So for those of you coming to Exeter, why not come along to my presentation of the draft Guidelines Document, and hear what BHS has to say while those who will not be able to participate in Exeter, please watch the website for further information.

Frank Farquharson
President

Editorial

Time for an update on the BHS web pages. As outlined a couple of issues ago, we plan to make current and back issues of *Circulation* available electronically (and probably much else besides).

To do this, we need to set up a 'Members only' slot but have a hit an administrative difficulty over how to safeguard such access to fully paid up members only. We are working on this wee problem so please be patient while we sort things out.

Celia Kirby

Travel grants

Travel grants are awarded from the Society's general funds to help BHS members whose travel expenses to attend scientific meetings are not met by an employer. Applicants should have been members of the Society for at least six months. The amount will depend on the nature and location of the meeting and the case put forward.

Priority is given to members under 35 or retired from employment, who are presenting papers and who have not previously received support from BHS. Successful applicants will be expected to write a short report for *Circulation*. Travel grant applications should be made to the Hon Treasurer at least two months before the conference or meeting.

The Society also administers the Exeter Fund, income from which is used to support members' attendance at international assemblies of the IAHS or its parent body the IUGG. The next biennial IAHS Symposium is in Hyderabad in September 2009; applications for support from the Exeter Fund should be made to the Hon Treasurer by **30th November 2008.**

To apply, use the form at *www.hydrology.org.uk/about_awards.htm* or contact **Peter Ede**, Mott MacDonald Group, Demeter House, Station Road, Cambridge, CB1 2RS *(tel 01223 463690, email peter.ede@mottmac.com).*

European Geosciences Union General Assembly

Vienna, Austria, 13th – 18th April 2008

The European Geosciences Union (EGU) General Assembly brought together several thousand scientists working in the Geosciences through the presentation of a vast number of oral and poster sessions on a wide range of themes.

Over the week-long conference, we attended several oral and poster sessions discussing recent advances in hydrological science research. We present here a summary of the highlights from these sessions in relation to our own areas of interest, but more detailed information on conference presentations and abstracts can be found at meetings.copernicus.org/egu2008.

Precipitation modelling

M. Kigobe (Imperial College London) presented work from his PhD on 'The use of Generalised Linear Models (GLMs) to analyze spatial and temporal precipitation patterns in Kyoga basin, within the upper Nile'. Preliminary finding of a GLM modelling framework to the Kyoga basin were discussed. This involves fitting logistic and gamma models to precipitation data. Relationships of spatial and seasonal covariates are used to describe large scale climatic systems such as the ENSO.

C. Onof (Imperial College London, UK) presented a paper focusing on the fact that rectangular pulses are not suitable for the reproduction of sub-hourly precipitation features of the precipitation signal and by replacing this coarse representation by another Poisson process, the generation of instantaneous pulses, leads to a three-tiered model.

A. Bardossy (Universität Karlsruhe, Germany) presented the underlying interdependence between daily rain-gauge readings to assess the dependence structure of many hydrometeorological data sets, both spatial and temporal. His results reveal that the dependence is more complex than that modelled by conventional correlation of the multivariate normal.

Advances in statistical and numerical approaches to rainfall-runoff modelling

I. Pechlivanidis presented work on the ability of the distributed Probability Distributed Moisture (PDM) hydrological model to improve model performance as compared to its lumped counterpart. Regression relationships between known catchment characteristics and parameters of the PDM were developed and applied to estimate parameters at ungauged subcatchments. The analysis revealed that a well calibrated distributed PDM can perform at a level comparable to or better than a calibrated lumped one, particularly when the spatial variability of rainfall is taken into account.

J.A. Vrugt, C.J.F. ter Braak, M.P. Clark, J.M. Hyman, and B.A. Robinson presented and demonstrated a novel Markov Chain Monte Carlo (MCMC) sampler entitled Differential Evolution Adaptive Metropolis, DREAM, designed to estimate the posterior probability density function of parameters in high dimensional sampling problems.

S.J. Cole and R.J. Moore presented preliminary work on developing initialization and assimilation schemes for the Grid-to-Grid distributed model with the aim of increasing forecast accuracy by updating in real-time the model states using available flow observations.

R. Woods, R. Henderson, J. Hendrikx, J. Schmidt, M. Clark, R. Ibbitt, D. Rupp and A. Tait compared five methods for estimating mean annual runoff in several New Zealand catchments. The methods varied in sophistication and are described as empirical, similarity index and time-stepping methods. The main motivations for developing such methods are to gain understanding of the underlying processes and also to make predictions which are outside the calibration conditions (e.g. impacts of land use and climate change on catchment hydrology).

D. Balin, J. Goetzinger, H. Lee, H. Sbaitha, M. Robe and A. Bardossy presented an application of a Monte Carlo Markov Chain (MCMC) algorithm to estimate parameters and

uncertainty of the WASIM-ETH in a small catchment with and without prior consideration of the rainfall spatial uncertainty. Several series of field realizations of rainfall which show the same variability as the observations were created and considered in the modelling.

B. Renard, M. Thyer, G. Kuczera, D. Kavetski and St. Franks approached the regionalization problem through Bayesian total error analysis. The sources of uncertainty in the hydrological modelling were addressed using the BATEA methodology which is built on Bayesian hierarchical methods constructing explicit error models for forcing/response data and structural errors.

Hydrological modelling and uncertainty estimation

K. Beven (Lancaster University, UK) defined the concept of equifinality of models (structures and parameter sets) for physically based models and also the concept that *"all models are wrong"* but some are useful and can be used to gain understanding of reality. Allowance should be put in place to assess refinement and model results are only useful in providing coherent guidance. For example, summary information of the flow duration curve, and the frequency characteristics of flood discharges and snow water equivalent can be used to model result diagnostics.

Other presentations by Keith focused on (1) event classification approach to the identification of hydrological change in another presentation and (2) an introduction to a real time flood forecasting algorithm incorporating data assimilation as a means of extending warning lead times, while maintaining accurate real time level forecasts and providing an indication of forecast uncertainty.

T. Wagener (Pennsylvania State University, USA) presented several issues regarding hydrological predictions in ungauged basins. Work towards Prediction in Ungauged Basins (PUB) aims at reducing the uncertainty of hydrologic predictions at ungauged locations.

D. Kavetski (University of Newcastle Callaghan, Australia) discussed the improvement of conceptual rainfall-runoff models using Bayesian total error analysis. Several ways of incorporating vague prior knowledge of input corruption were discussed including the Bayesian total error analysis (BATEA) framework for hydrological modelling that explicitly accounts for sampling and measurement uncertainty in both forcing and response data.

J.A. Vrugt (University of Amsterdam, The Netherlands) discussed several issues related to parameter uncertainty and ways to conduct sensitivity analysis and uncertainty estimation. A Multi-Algorithm Genetically Adaptive Multi-objective optimization method (AMALGAM) for Single Objective optimization (AMALGAM-SO) has been developed to conduct optimization and uncertainty assessment of hydrologic model parameters.

Satellite derived data sets

P.J. van Oevelen (International GEWEX Project Office, Silver Spring, MD, USA) presented **t**he Global Energy and Water cycle Experiment (GEWEX), the core project in the World Climate Research Programme (WCRP). The presentation focused on the framework of GEWEX, where many global data sets related to the energy and water cycle have been developed and are still being developed. The presentation outlined the historical data sets that are available and plans for new data sets

K. Smettem (University of Western Australia) presented issues related to interannual variation in satellite-derived estimates of leaf-area index reflected measured changes in annual catchment water balances.

N. McIntyre (Imperial College London, UK) presented the results of a comparative study using five satellite-based products (TRMM 3B42, CMORPH, TAMSAT, RFE 2.0 and PERSIANN) in four different climatic regions in Uganda, to identify differences between products and the results reveal that there is no single best product because each product was stronger for replicating a particular statistic.

Linking catchment hydrological and biogeochemical processes across spatial scales

K. Bishop (University of Uppsala, Sweden) presented work on 'aqua incognita' – the water we don't know about. In Sweden, catchments >15 km^2 are routinely sampled. However, a recent survey has shown that around 95% of stream waters are in catchments <15 km^2 – therefore, most freshwaters in Sweden are in

small headwater catchments that are highly variable and unquantified. This raises questions about whether research efforts should be focused at this small, headwater scale where most of the stream waters are, or at a larger landscape scale.

D. Tetzlaff (University of Aberdeen) drew attention to the hydrochemical dynamics that occur during periods of low flow, particularly during droughts. Their study of 22 tributaries in the Dee showed that base-flow periods were not static, reflecting variable source areas during these periods. The importance of headwaters were also noted, as these upper areas covering around 50% of the catchment were responsible for providing over 70% of the baseflow lower down the catchment.

C. Evans (CEH Bangor) discussed scaling issues relating to providing national scale estimates of the impact of acid deposition on all UK waters when data is only available for limited spatial and temporal extent. Particular issues arise from up-scaling plot based runoff response to catchment scale response. However, perhaps one of the most surprising (or reassuring) things shown was the similarity in the mean response of nitrate leaching from field plot studies with actual catchment response.

Wetland ecohydrology, peatlands and biogeochemical cycles

M. Waddington (McMaster University, Canada) presented novel work on the impact of water table draw-down on peatland carbon dynamics. Climate change scenarios for northern peatlands suggest increased evaporation and greater water table draw-down will reduce methane fluxes and increase carbon dioxide fluxes, potentially providing a positive feedback to global change.

S. Grover (La Trobe University, Australia) introduced the European audience to little known (and studied) Australian peatlands in the southern Australian Alps where she is using ^{13}C NMR to characterize the organic matter fractions released from decaying peat.

A. Lloyd (Durham University) presented work on intensive field studies showing differences in soil CO_2 flux based on eddy flux and static chamber measurements. Standard static chamber methods typically involve inserting a solid ring into the soil to isolate an area. However, insertion of this ring cuts plant roots, which in turn reduces the measured CO_2 flux. As these methods are standard, CO_2 flux estimates from peatlands (and other soils) used in global climate models could be significantly underestimated.

J. Rowson (Durham University, UK) presented work on trace gas fluxes from degraded peat in the Peak District. He outlined a new standardized method for presenting CO_2 flux data in relation to temperature and also water table draw-down, which gives a bench-mark parameter to allow site based comparison.

K. Knorr (University of Bayreuth, Germany) demonstrated the impact of drought on biogeochemical cycling on methane fluxes peatlands. The impressively detailed set of experimental data clearly showed suppression of methane fluxes as sulphate reduction dominated redox reactions during initial periods of water table recovery.

J. Clark (University of Leeds) presented findings from drought simulation experiments carried out on six different UK peats. Earlier work had shown a link between the decline in dissolved organic carbon (DOC) concentrations and increase in acidity and solute strength driven by oxidation of reduced sulphur to sulphate. The sulphate-DOC link was demonstrated at all sites, although the data showed the difficulty in distinguishing between DOC decline due to chemical precipitation and biological consumption and subsequent respiration on the basis of mass balance calculations alone.

Overall, presentations at the EGU 2008 highlighted the importance of spatial variability of rainfall in rainfall-runoff modelling. The general shortage of good quality data for hydrological modelling, and hence the need for development of data assimilation techniques and improvement on uncertainty analysis procedures to validate hydrological simulation/analyses, was a running theme through many sessions.

Ilias Pechlivanidis
Imperial College London
Max Kigobe
Imperial College London
Joanna Clark



Surface water quality: modelling, monitoring and management

BHS National Meeting
University of Birmingham, 7 May 2008

This very stimulating was convened by **Damian Lawler, Andy Baker** and **Chris Bradley** (University of Birmingham, School of Geography, Earth and Environmental Sciences). The total number of 80 delegates represented 14 universities, environmental research institutes, water industry, consultancies, Environment Agency, NERC, DEFRA and the Met Office. The central theme was the three significant aspects of the quality of surface water, namely monitoring, modelling and management (also referred to as the '3Ms').

Damian Lawler, in his introductory talk, stressed that the main aims of the meeting were to evaluate the state of the art in surface water quality understanding, to identify recent advances in methodologies, and to assess management implications, including implementation of the EU Water Framework Directive. This meeting was especially timely, given that we are now halfway towards the Water Framework Directive (2000) target date of 2015 for inland and coastal waters to reach good ecological status. So this event acted also as a half-time 'team talk'!

In particular, the meeting was expected to address the following issues:

- The identification of the knowledge gaps and operational mismatches in surface water quality data collection (monitoring), existing models, understanding of the processes, and effective water management.
- The adequacy of the existing methodologies for water resources monitoring, modelling and management, and for less predictable environmental changes.
- The potential of newly-developed ideas and methodologies.

The first oral session focused on long time-scale and large spatial-scale investigations in surface water quality studies. **Tim Burt** (Durham University) presented the example of the changing behaviour of catchment nitrate response to the intensive agriculture practices in the Slapton catchments in south Devon. The importance of having long monitoring data sets in the environmental management was emphasised. **Roger Falconer** (Cardiff University) demonstrated the hydro-environmental impacts of the selected locations of the Severn Barrage. He suggested that reduced tidal currents may reduce suspended sediment loads and increase light penetration in the estuary. Modelling studies also suggested a significant improvement in the benthic bio-diversity and water quality (assessed by the background bacterial level).

In the second session, dedicated to water quality science, **Gilles Pinay** (Birmingham University) spoke on the importance of small stream water quality monitoring. He argued that successful water quality management is dependent on the policy decisions conducted at the sub-basin scale, e.g. those affecting the nutrient fluxes as a result of the varying land use.

James Rothwell (Manchester University) *et al*. demonstrated the potential of the extensive Environment Agency water chemistry database in water quality assessment, and outlined some common pitfalls and practical measures of EA data incorporation within water quality analysis. The last paper of the session, by **Magdalena Bieroza** (Birmingham University) *et al*. included

preliminary results on fluorescence analysis of freshwater organic matter at water treatment works in the West Midlands. The method provides a simple and sensitive tool for organic matter characterisation and removal assessment, which are significant for predicting the presence of carcinogenic disinfection by-products in water.

In the third session '*Managing water quality issues*', the invited speakers covered practical issues relating to implementation of the Water Framework Directive. **Bob Harris** (Sheffield University) stressed the importance of the development of the holistic, integrated and risk-based approach to basin management. Any successful Integrated Catchment Management scheme should integrate the researchers, policy makers and community stakeholders and combine the bottom-up and top-down approaches for achieving WFD goals. The practical aspects of monitoring and modelling at catchment scales were discussed by **Dan Evans** and **V. Jones** (WRM, Atkins Ltd.), including combined baseline water quality assessments and 'event driven' sampling. Next, **Bob Crabtree** and **Sarah Kelly** (WRc plc, Swindon) used the SIMCAT model to apportion sources of pollution load across the Ribble catchment and to identify the water quality co-benefits of point source and diffuse pollution. The session was concluded with a thorough description of the SIMCAT model, along with an evaluation and example model outputs by **Tony Warn** (Environment Agency).

The last paper session focused on future prospects. **Louise Heathwaite** (Lancaster University) presented NERC science strategy and priority areas in the Theme Action Plan for 'Sustainable Use of Natural Resources', very pertinent to BHS community interests. **Adrian Collins** (ADAS) *et al*. outlined results of current and target losses of suspended sediment from diffuse agricultural sources across England and Wales, indicating that further reduction in losses would be inevitable for complying with WFD regulations. The final talk by **Alex Elliot** (CEH Lancaster) *et al.* demonstrated the use of the integrated approaches for effective lake management, based on the phytoplankton community model PROTECH. The importance of the fourth 'M' — Mechanisms — and deeper understanding of fundamental processes, was stressed as a necessity for providing robust and accurate models.

The scientific and applied value of the paper sessions was expanded by excellent poster sessions, focusing on freshwater organic matter, urban river sediment transport dynamics, compliance with WFD, climate impact assessments, models in freshwater quality monitoring, influences of riparian zones on river temperature, lake water quality monitoring and nutrient source apportionment.

In the closing discussion led by **Damian Lawler**, several key issues were addressed to highlight knowledge gaps, research needs and management challenges, including implementation of the EU Water Framework Directive. The dialogue was helpful in discerning the strengths and weaknesses of current approaches. The main questions were:

- How strong is our understanding of the processes and dynamics of surface water quality change, and is spatial and temporal data resolution appropriate for future investigations?
- What are the likely impacts on surface water quality of expanding global urban population proportions (currently 50%, but likely to be 60% by 2020)?
- How best to make the arguments for continued/enhanced water quality monitoring (e.g. to properly document environmental change impacts; validate and improve models; define system dynamics robustly)?
- What are the challenges in understanding the interactions between surface and ground water and their impacts on water quality, and how are these best met?

Moreover, the importance was emphasised of integrating water quality models at catchment and reach scales with high-resolution monitoring to quantify short- and long-term variability and impacts of climate change.

The final programme and all paper and poster Abstracts are available for on the BHS website Past Meetings page at:
http://www.hydrology.org.uk/meetings/AbstractsandprogWQMeetingBham.pdf

Magdalena Bieroza
University of Birmingham)

‘Thames Gateway’

BHS South East Section
Visit to the Thames Barrier, 11th June 2008

This event, limited to 30 people, provided an ideal opportunity to learn about flood risk management and the Thames Estuary 2100 (TE 2100) project in the Thames Gateway, and about recent developments with the ‘Super Sewer’ project. A tour of the Thames Barrier was held in the afternoon.

Sarah Lavery, TE 2100 Project Manager from the Environment Agency, reviewed the key phases of the TE 2100 project to develop a flood risk management plan for London and the Thames Estuary for the next 100 years. The area covered by this plan stretches from Teddington in the west to Sheerness in the east. A variety of flood risk management methods will be considered to reduce both the risks of flooding and the effects it has.

The Thames Barrier and other defences in the Thames Estuary will continue to provide an excellent level of flood defence until the year 2030, but to defend against future predicted sea level rise and climate change, there is a need to research, design and build a major flood management system, now in preparation. The condition of the existing structures will be assessed as well as the future role they have in both protecting London’s ever increasing population and infrastructure and their contribution to reducing flood risk.

Alternative options that could reduce long term costs include:

- allowing some floodplain areas to flood naturally;
- moving back defences so that they are more easily maintained or raised in the future;
- avoiding development in the highest risk flood areas.

These options may also provide opportunities to create space for leisure and recreation, and improve the natural environment.

Following extensive consultation and research and a number of interim reports, the first draft of the flood risk management plan will be published in 2008. The production of the final plan and submission to the government is planned for 2009.

Vicki Kidney from the Environment Agency gave the second presentation on the Thames Tideway Strategy. This strategy includes the design and construction of the Tideway Tunnel or ‘Super Sewer’ and the Lee Tunnel and extension of Beckton Sewage Treatment Works.

Currently, much of the storm sewer overflow is discharged into the River Thames via combined sewer overflows (CSOs) and this equates to 32 million tonnes entering the Thames Tideway each year. The route of the Tideway Tunnel follows the River Thames from Hammersmith to Beckton STW and it is proposed that the tunnel will collect the waste from 32 of the most polluting CSOs and transfer it to Beckton STW.

In addition, the Lee Tunnel will run from Abbey Mills to Beckton STW, a stretch 6.9 km. The tunnel will capture the discharge of storm sewage from a single CSO into the Abbey Creek which runs into the River Lee and ultimately the River Thames, and will be transferred to Beckton STW to be treated. In capturing this single overflow, the Lee Tunnel will halve the total volume of storm sewage entering the tidal River Thames from the most polluting storm overflows.

Considerable improvements at Beckton STW are required to cope with the extra capacity of waste from the Tideway and Lee Tunnels and to meet more stringent Urban Waste Water Treatment Directive (UWWTD) water quality standards.

The planning application for the Lee Tunnel and Beckton STW extension was submitted in May 2008 and a planning decision is hoped for by September/October 2008. The aim is for the construction of the tunnel shafts for the STW to start in the autumn of 2009 and the tunnel boring in 2011. The completion of the Beckton STW extension is planned for March 2014 for a fully operational system in June 2014. The Tideway Tunnel is programmed to be constructed from 2012 to 2020.

Some of the main issues with the proposed Lee Tunnel scheme include:

- Disposal of the waste excavated from the tunnel (the total volume

of excavated material for shafts and tunnel will be 1 153 783 m^3);
- protection of the Chalk aquifer through which the proposed route of the tunnel will go;
- reducing the risk of saline intrusion;
- protecting against the derogation of existing abstraction licences;
- reducing the ecological impact along the foreshore to saltmarsh and mudflats.

The presentations were followed by an extremely informative tour of the Thames Barrier detailing its construction, operation and management.

Helen Procter
Atkins Ltd



100th Thames Barrier Closure

News from members

New publications

River Basins : from Hydrological Science to Water Management IAHS Publ. 323 (June 2008) ISBN 978-1-901502-69-5, 154 + xii pp. Members price £30.00, Full price £40.00 (includes postage)

Note that IAHS Press will provide, FREE OF CHARGE, a copy of one of the previous Kovacs Colloquia volumes with orders placed before 31 October 2008. When ordering Publ. 323, please indicate your preference for either:

Scales in Hydrology and Water Management
Publ. 287 (2004) ISBN 978-1-901502-62-6
or
Frontiers in Flood Research
Publ. 305 (2006) ISBN 978-1-901502-63-3

Streamflow Measurement by R. W. Herschey published by Taylor and Francis, June 2008. ISBN 978-0-415-41342-8 Price £140.

This is the third edition of Reg's masterly work, bringing together existing methods of measurement to the state of the art and in accordance with the international standards of ISO and CEN. A new chapter on the Acoustic Doppler Current Profiler (ADCP) is included and the chapter on uncertainties has been redrafted to reflect the growing importance of this topic. There is a new section on flood flows.

Members on the move

Newcomers to Hydro-Logic

David Evans joined in June as a Senior Hydrologist at their Stirling office. His previous experience includes work with the Environment Agency and the British Antarctic Survey, so he feels well placed to handle assignments in Scotland.

Alastair Morriss joins in August as a Senior Scientist at their Exeter office, (which has recently relocated to Tiverton). With professional experience in river and wetland restoration, flood forecasting, 1D and 2D ISIS and TUFLOW hydraulic modelling, GIS, hydrology and hydrometry, Alastair brings a wealth of skills, knowledge and experience to the growing south-west team.

GPRG's 10th Birthday Bash

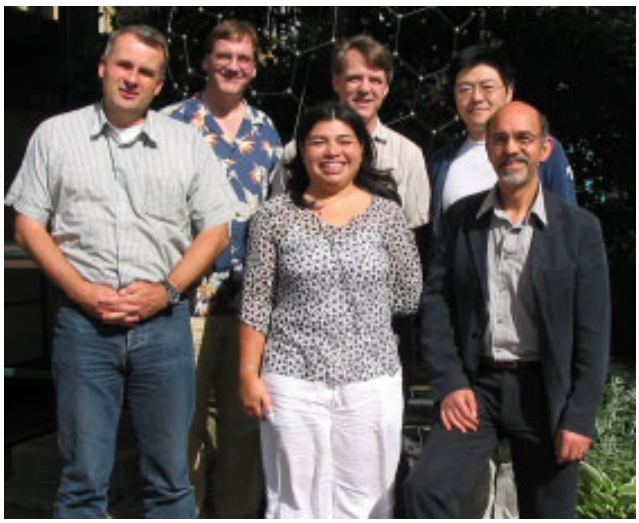
The Groundwater Protection and Restoration Group (GPRG) at the University of Sheffield recently held a one-day symposium to celebrate the first 10 years of activity since it formation in January 1998. Old friends, alumni, current students and curious contacts first listened to a keynote talk from **Paul Younger** (Newcastle). Paul delivered a wonderful combination of lecture and pantomime under the title *Groundwater: Cinderella, Ugly Sister or Fairy Godmother?*, and had the audience singing a specially composed song — the words are on the GPRG's website.

All six academics in the group (**David Lerner**, **Steve Banwart**, **Steve Thornton**, **Ryan Wilson**, **Maria Romero-Gonzalez** and **Wei Huang**) gave talks about the research they had done in the last 10 years, and a look forward to the future. They reminded everyone how dependent they have been on the PhD students, postdocs and collaborators that had worked in and with the group. The review made it clear how much the remit of the group has expanded. In 1998, the projects were about point source pollution of groundwater (plus one on modelling adits and another on treatment of minewater discharges). Now the group continues to research groundwater pollution, underpins the Cell-Mineral Research Centre with its own network of projects and collaborators, and also leads the Catchment Science Centre (CSC). GPRG is now home to about 65 researchers in Sheffield, working at scales from bacterial cell surfaces to river basins.

The afternoon talks were from various friends of the group. **Phil Morgan** (Sirius, representing industry) gave an upbeat assessment of the value of GPRG's work to end-users, citing the relevance of their projects and papers, production of user-oriented guidance, and their short courses. **Hugh Potter** (Environment Agency) discussed whether university research could influence environmental regulators. Fortunately he decided it could, and cited GPRG's work on natural attenuation and DNAPLs, and Newcastle and others' work on minewaters. **Terry McMaster** (Bristol, representing academic colleagues) showed how his work with atomic force microscopy was contributing to a joint project on Weathering Science. The day was closed by **Mike Spence** (Shell, representing alumni) who showed what fieldwork and conference attendance could be like in GPRG. He also argued that doing research in GPRG had been a ticket to enjoyable and interesting careers for all the alumni.

We all look forward to the next decade in Sheffield – visit our website **`www.shef.ac.uk/gprg`** if you'd like to know more!

David Lerner
University of Sheffield



The GPRG academics looking relieved after the symposium to celebrate the group's 10th birthday. From left: Steve Thornton, Steve Banwart, Marie Romero-Gonzalez, Ryan Wilson, Wei Huang, David Lerner

Hydrogeology meets hydroecology

The Geological Society, Burlington House, London
22nd May 2008

Described by the Geological Society as "considering the interactions between groundwater and wetland ecosystems", this one-day meeting provided an opportunity to share research at the groundwater–surface water interface. The day was organised by **Daren Gooddy** (British Geological Survey) and **Anna Wetherell** (Natural England).

Anna Wetherell chaired the morning session and introduced the day's first speaker, **Stefan Krause** (Keele University). Stefan considered the importance of the hyporheic zone in nitrogen transport and transformation against the backdrop of the 'nitrate time bomb'. Noting the heterogeneous nature of hyporheic controls on nitrate transformation, Stefan called for more detailed research to be conducted in this complex area. On a similar theme, **Mark Trimmer** (Queen Mary, University of London) examined seasonal changes in hyporheic nitrate processing in chalk rivers. Mark stressed that conditions favouring nitrate reduction and attenuation were also ideal for methanogenesis, and highlighted that chalk rivers produce comparable quantities of methane to some UK peatlands.

Helen Moggridge (King's College) then discussed rivers as dispersal agents for plant propagules. Reporting on research conducted in two UK groundwater-fed rivers, the River Tern in Shropshire and the River Frome in Dorset, Helen noted the importance of high flows in remobilising propagules previously deposited in the river channel, and thus in promoting floristic diversity in the riparian zone.



Photo: Chris Proctor

Niphargus glenniei, *a subterranean shrimp of conservation importance*

Next, **Tim Johns** (Environment Agency) introduced the subterranean groundwater fauna of England and Wales. Tim highlighted that UK groundwater ecology is under-researched, particularly considering the new Groundwater Directive, the addition of a subterranean well shrimp (*Niphargus glenniei*) to the UK Biodiversity Action Plan priority species list, and the vulnerability of such organisms to anthropogenic disturbances.

Rachel Stubbington (Loughborough University) then considered the response of aquatic invertebrates to hydrological extremes in the ephemeral headwaters of the River Lathkill, a karst river. Rachel discussed research indicating that many aquatic taxa were able to survive in the desiccated sediments overlying the epikarst following streambed drying.

Closing the morning session were two complementary presentations on the status classification of groundwater ecosystems under the Water Framework Directive, by **Tim Besien** and **Mark Whiteman** (Environment Agency). Tim described the tests required to establish the chemical and quantitative status of a groundwater body, and presented an initial draft of the results for England. Mark then discussed this groundwater status information in relation to threats posed to wetland ecosystems, noting that there are insufficient data currently available for these sites in terms of both chemical monitoring and ecological surveys.

After lunch, Daren Gooddy chaired the afternoon session and first welcomed **Heather Musgrave** (Entec UK Ltd). Flow accretion profiling is commonly employed to improve the understanding of river surface water-groundwater



Hydrological extremes in the River Lathkill Head Cave during summer 2007

interactions, and Heather described the additional use of this method in characterising hydrological processes in floodplain wetlands.

Next, **Don Ross** (Atkins Ltd) explained the applications of a modelling methodology linking hydrological and hydrogeological processes to ecological effects in wetland ecosystems. The model predicts wetland water level changes in response to anthropogenic activities, including abstractions, making it a potential tool for the Water Framework Directive's 'programme of measures'.

Andy Brooks (Entec UK Ltd) then discussed the balance between hydroecological requirements and groundwater abstraction in the Environment Agency's Anglian region. Andy described the application of a strategy combining groundwater modelling and hydroecological site characterisation, which has been designed to aid the EA in making decisions regarding groundwater resources.

The session ended with **Simon James** and **Harriet Carlyle** (Grontmij) describing Geostatistical Vegetation Monitoring, a vegetation survey method that provides greater objectivity than traditional approaches. Simon described the successful application of this method to assess the influence of abstraction pressures on the vegetation of three wetland Sites of Special Scientific Interest.

The final session began with an introduction to the hydroecology of wet dune slacks by **Kevin Hiscock** (UEA). Kevin emphasized the sensitivity of these ecologically important wetlands to anthropogenic pressures, including water abstraction, recharge variation and water quality changes. Further research is required to aid restoration of impacted wet dune slacks such as Winterton Dunes National Nature Reserve, Norfolk.

Next, **Charles Jones** (Mott MacDonald) and **Tim Kohler** (Natural England) described the restoration of Hatfield Moor Special Protection Area. This large lowland raised peat bog was severely impacted by peat stripping but is now the subject of a significant recovery programme, including intensive water level monitoring to assess the impact of local abstraction pressures.

The final presentation was by **Rob Low** (WMC-SWS, Shrewsbury), who described the development of a conceptual model to advance understanding of the hydroecological functioning of wetland sites, and the application of this model to Cors Bodeilio, a fen wetland forming part of the Anglesey Fens Special Area for Conservation.

The day was brought to a close with the presentation of the Whitaker Medal, awarded in recognition of an outstanding contribution to hydrogeology. Chairman of the Geological Society's Hydrogeological Group, **Willy Burgess**, presented the award to a very worthy recipient, **John Chilton**, whose work has included research into the sustainable exploitation of groundwater resources as a safe source of drinking water in developing nations.

Rachel Stubbington
Department of Geography,
Loughborough University

Peter Wolf Young Hydrologists Symposium

Edinburgh University
5-6 June 2008

This important event in the BHS calendar was hosted by the School of GeoSciences, University of Edinburgh, and organized by Stephen Carr and Kate Heal with support from research postgraduate students across the University. Sponsorship was provided by BHS, the Scottish Environment Protection Agency (SEPA) and Halcrow. The Symposium attracted 26 young hydrologists, including postgraduates and those working in industry. It provided a good platform to exchange new hydrological ideas, and to establish networks among researchers in hydrology. The conference day was opened with an impressive keynote presentation from **Paul Jowitt** (Heriot Watt University and Vice President of the Institution of Civil Engineers), followed by a series of talks and a poster session. The field trip to the Tay catchment was a good opportunity to explore water resources management issues.

The talks consisted of four sessions, covering a wide range of research including modelling, water resources, process hydrology and hydrological application. There were 12 oral presentations during the day, starting with **Christian Birkel** (Macaulay Institute/University of Aberdeen), who applied conceptual rainfall-runoff models to optimising sampling strategies. His approach was tested on the Girnock catchment, showing that it is possible to identify the most useful field data and improve the linkage between experimental and modelling activities. **Deepak Bhimrao Kharat** (Heriot Watt University) detailed his research on comparison of a 1D model with flood storage cell and integrated 1D–2D computer models for inundation prediction, to identify their respective advantages and disadvantages in terms of different aspects, such as the cross-section extents, flooding mechanism, run time and set up time.

There were three talks in the water resources session. **Imran Younas** (MWH Global and Imperial College, London) spoke in detail about the application of wavelet analysis for the regionalization of conceptual rainfall run-off models. The results revealed that partitioning of catchments relative to the nature of their response yielded a set of new relationships that could possibly be used for the purpose of regionalization. However, the physical significance of these relationships was still uncertain and required further analysis. **Penny Lloyd** (Centre for Ecology and Hydrology) introduced a macro-scale hydrological model called Global Water Availability Assessment which could be used as a tool for water demand prediction across trans-boundary basins, regions and countries. The model was used to assess domestic, agricultural and domestic sectoral demands based on South American water resources availability. **Jo Robinson** (South West Water) gave a thought-provoking presentation entitled "South West Water Experiences of Pumped Storage", a detailed explanation of pumped storage technology which could make use of higher winter river flows to aid reservoir refill, thereby maximising the effective catchment area. Various issues in relation to pumped storage operation were also discussed, such as when to stop pumping. It was concluded that pumped storage was a more effective use of an existing asset and could secure reliable supplies, but needed careful operational management to minimise pumping costs and adverse environmental effects, such as its carbon footprint.

Four talks contributed to the Process Hydrology session. **Babak Mishahi** (Imperial College London) presented the application of Generalized Linear Models to spatial-temporal daily rainfall simulation in a semiarid area in Iran. **Imogen Solloway** (Imperial College London) analyzed the impacts of upland land management on flooding, particularly the effects of tree shelter belts on soil moisture content and runoff generation in a



Symposium delegates at the end of the field trip day at Edradour Distillery

multi-scale experiment. **Carolyn Mills** (Newcastle University) described her study of the relationship between sediment yield and catchment area, which aimed at a full process understanding and management information through investigation at the catchment scale. **Mark Speed** (University of Aberdeen) explored the multi-scale nature of the hydrological and biogeochemical functioning of larger catchments, using tracers to examine how the sources of runoff vary spatially and temporally.

Presentations in the hydrological application session included the effectiveness of willow spiling in erosion control and wildlife protection (**Lenka Anstead** University of East Anglia), evaluation of the interdependencies between different developments associated with the application of sustainable drainage systems (**Nicolas Bastien**, Heriot Watt University), and the mitigation of methane emissions from constructed wetlands using the addition of alternative-electron acceptors (**Sunitha Rao Pangala,** University of Edinburgh). The presentation by Sunitha generated a lot of discussion. In her research, field and controlled laboratory incubation studies were conducted to determine the effects of iron ochre and gypsum, both of which could potentially reduce methane emissions from wetlands. The relationships between methane emissions and sulphate- and iron-reducing bacteria under varying temperatures, different modes and combination of electron acceptors, and presence of vegetation cover were also considered.

The closing comments for the oral presentations were made by Frank Farquharson, President of the British Hydrological Society, followed by a poster session consisting of 11 posters. The posters were judged by Dr Pascal Lardet (Halcrow) and Nigel Goody (SEPA). The prizes for the best talks were presented to **Sunitha Rao Pangala** (University of Edinburgh) and **Jo Robinson** (South West Water), while the prizes for the best poster were awarded for "Quantifying and upscaling surface and subsurface runoff and nutrient flows under climate variability" (**Vesna Tripkovic**, Newcastle University) and "Hydrological aspects of wind farm developments: a case study at Drumderg, Perthshire" (**Helen Gibbs** and **Sylvia Maclaren,** Enviros). Discussions after the poster session continued during the evening at the Symposium dinner.

The one-day field trip to the Tay catchment included three stops: at Perth, Pitlochry and the Edradour Distillery. At Perth, **Andrew Black** (University of Dundee) gave a detailed explanation of flooding in the Tay catchment. His introduction covered various issues associated with flood events, including protection structures and the measures taken by the local authorities. At Pitlochry, dam and fish ladder delegates discussed hydropower generation and ecological flows with **Alastair Stephen** (Scottish and Southern Energy), mainly on the issues of salmon conservation. A range of experiments has been carried out to observe the behaviour of salmon to identify the optimal solutions to safeguard this valuable resource.

The field trip finished successfully with a sip of tasty whisky and an explanation of how it is produced at the Edradour Distillery.

Guoting Geng
School of Engineering and Electronics, University of Edinburgh)

Uncertainty in climate predictions

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Royal Statistical Society/BHS/Royal Meteorological Society
RSS, 12 Errol Street, London, 24 June 2008

It is widely acknowledged that climate change is one of the major challenges facing humanity in the 21st century. There is currently substantial interest in determining how best to quantify the uncertainty in projections of future climate, both from a scientific viewpoint and for purposes of stakeholder communication. This was the topic of a joint meeting of the Royal Statistical, British Hydrological and Royal Meteorological Societies, held at the RSS in London on 24th June with generous sponsorship from the Willis Research Network (**www.willisresearchnetwork.com**).

The scene was set by **Roger Street**, technical director of the UK Climate Impacts Programme (UKCIP) which, with the support of the Met Office Hadley Centre, is in the process of making available a set of 'probabilistic' climate projections for the UK (see **www.ukcip.org.uk**). The projections are derived using Bayesian methods, applied to an ensemble of climate model simulations in which uncertain model inputs are sampled from expert-elicited prior distributions. Roger described an impressive programme of stakeholder engagement that has informed both the information provided and the way it is presented; and he emphasized the need for clear communication to ensure that users understand how to interpret the results. For example, the 'probabilities' provided are derived using a statistical framework that combines a perturbed physics approach with multiple models' outputs, and users must judge for themselves the extent to which the statistical population so described is relevant for their needs.

A series of technical presentations followed, each exemplifying a different approach to the problem. **Michael Goldstein** (University of Durham) and **Peter Challenor** (University of Southampton) described a Bayesian approach which represents all of the sources of uncertainty in a computer model of a complex system. Typically, such models are expensive to run, which makes it infeasible to obtain the large number of realizations needed for a full uncertainty analysis. This can be overcome using a statistical emulator to mimic the computer code in a specific problem of interest. The ideas were illustrated by considering projections of the probability — or 'best current judgement' — that the Atlantic Ocean circulation (Gulf Stream, to the lay reader) will collapse by the end of the 21st century.

After lunch (but unfortunately no coffee), **Reto Knutti** (ETH Zurich) described the handling of uncertainty in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). The projections in that report were derived from simulations of many different climate models under various scenarios of future socio-economic development, essentially treated as though the different models were independent and unbiased. Reto argued that this assumption is untenable and that, for a variety of reasons for which he provided convincing justification, uncertainty is underestimated in the IPCC projections.

The final technical presentation was from **Myles Allen** (University of Oxford), who argued forcefully and entertainingly against the use of Bayesian methods to handle uncertainty in climate projections. His objections were rooted in the fact that in a Bayesian framework, experts with different prior beliefs can arrive at different conclusions if the available data are insufficiently informative. He contended that judgements about uncertain events are more naturally based on the 'likelihood' of the available information given those events than upon the posterior probability emerging from a Bayesian analysis. He also suggested that users do not really need probability distributions for uncertain quantities, but would be quite happy with interval estimates.

Unsurprisingly, this sparked lively discussion, including two invited contributions from **David Spiegelhalter** (University of Cambridge) and **Hayley Fowler**

(BHS). David admitted to being "almost convinced" by Myles' presentation style but, in common with most if not all of the statisticians in the audience, disagreed with the view that interval estimates are adequate. Hayley concentrated on the need for uncertainty assessments that are relevant for users of climate projections, and argued that the concerns of climate scientists in this regard (who want to understand the sources of uncertainty in their projections) are not necessarily the same as those of the users (who want to know what could happen). She argued that the user community, in general, requires information on (a) short timescales – seasonal/decadal prediction rather than end of the century, (b) at high resolution in time and space scales, (c) 'rare' extremes rather than the climate indices commonly chosen, (d) uncertainties due to natural variability, (e) evolving climates rather than stationary time slices, and (f) multiple consistent weather variables. She suggested that the big questions in the hydrological impacts user community at the moment are: (i) How to handle outputs from different climate models – probabilistic scenarios such as UKCIP08? (ii) How to assess how different uncertainties contribute to overall uncertainty in projected hydrological impacts? (iii) How to combine pdfs (such as those which will be produced by UKCIP08) within hydrological models to produce probabilistic projections? (iv) How to make adaptation decisions and communicate these effectively given the large uncertainties? She suggested to the climate modelling community that users within the hydrological community need clear guidance on how to use probabilistic scenarios/uncertainties to assess impacts — not just guidance on how not to use them, but also, importantly, the physical limitations of model outputs — but that it will still be a challenge to all involved to use the pdfs resulting from UKCIP08. All in all, the packed house had plenty to think about by the end of the day.

Richard Chandler, RSS
Hayley Fowler, BHS

Clouds and Precipitation

Cancun, Mexico
7–11 July 2008

This conference is held every four years by the International Commission on Clouds and Precipitation (ICCP, http://www.iccp-iamas.org), which is part of the International Association of Meteorology and Atmospheric Sciences (IAMAS, http://www.iamas.org). The aim of the conference was to provide a venue for the presentation of scientific research on clouds and precipitation and to encourage the exchange of ideas within the international community. More than 400 delegates attended this event, the 15th such conference, held in the picturesque setting of Cancun, located on the Caribbean coast of Mexico. This report is by **Catherine Muller** who received a BHS travel grant to attend.

My area of research is clouds and precipitation, particularly over urban areas. I presented a poster entitled '*An assessment of cloud-pollution-precipitation interactions and variations over an urban area using vertically-pointing micro-rain radars, satellite remote sensing and chemical analyses'* in the session on 'Pollution-Precipitation Interactions'. Aerosols, especially water-soluble aerosols, play important roles in the atmosphere. They act as cloud condensation nuclei (CCN), changing the equilibrium size to which a droplet may grow at a given relative humidity and are therefore important in cloud and precipitation processes.

This has prompted atmospheric scientists to explore the impact of increasing anthropogenic activities on cloud and precipitation processes, especially over urban environments — a subject which is still scrutinised. Theories of suppression of precipitation caused by an increase in small CCN have been proposed. However, it has also been suggested that increasing CCN concentrations prolongs the lifetime

of clouds and ultimately acts to increase precipitation, in conjunction with other urban mechanisms.

This presentation summaried my doctoral research to date. It described how precipitation samples were collected for chemical analyses; how the Cloud-Aerosol-Precipitation Analysis Tool (CAPSAT) was used to assess cloud-top microphysics and spatial variations; and how an array of vertically-pointing micro-rain radars (MRRs) were used to assess the spatial variations in precipitation parameters over Birmingham.

In brief, contrasting temperature-effective radius curves for continental and maritime events were presented, and an explanation of how raindrop size distributions (RDSD) varied between four rural and urban sites. It concluded that CAPSAT was a useful tool for qualitatively and quantitatively assessing microphysics, especially in conjunction with MRR data, and that there appeared to be variation in both cloud microstructure and precipitation parameters over the Birmingham's urban area.

The key-note speech was given by **Prof. William Cotton** from Colorado State University, who described a modelling study investigating the '*Aerosol impact on deep convective clouds'*. In summary, it stated that simulations and observations show, to some extent, that increasing CCN concentrations results in suppression of collision and coalescence in deep convective clouds, with some storms showing that greater amounts of supercooled water is thrust into the upper levels of the clouds where freezing of larger amounts of water increases buoyancy of the clouds and intensifies updrafts. However, it also highlighted that the impacts of CCN on ground level precipitation are more difficult to understand due to the non-linear response of clouds to precipitation anomalies which depend on stability and mesoscale circulation, for example, and can therefore result in increasing or decreasing precipitation. Increasing our understanding of this still-scrutinised area appeared to be the main issue at the conference.

The bulk of the other presentations focused on the observational and modelling side of cloud microphysics, including a talk on the '*Influence of urban plumes on microphysics of precipitation stratocumulus*', by **Prof. Thomas Choularton** (University of Manchester) which presented the results from a flying programme to investigate the interaction of urban aerosol with stratocumulus downwind of the UK. A very informative '*Summary of the WMO/IUGG assessment on the effects of aerosol pollution on precipitation'* was also given by **Prof. Zev Levin** which highlighted the main issues in this subject area.

The conference was extremely inspirational: the beautiful setting, the uplifting atmosphere, interesting talks, and the opportunity to network with professionals in this field made this an extremely valuable experience for my future research career.

Catherine L. Muller
University of Birmingham

Consultations

Our lead story about 'The Pitt Report' picks up on the government intention to allow Local Authorities to play a much greater role in flood risk management than at present. In this context, therefore, members may be interested in the BHS response to the recent consultation exercise on '*Improving surface water drainage*'. In this document too, there was emphasis on local government being more active in ensuring effective surface water drainage, alongside the Environment Agency.

While generally endorsing the proposals, BHS made the point that "while we see this increased demand for hydrological expertise is to our professional advantage, we should like to take this opportunity to point out that we are currently in discussion with hydrological employers over the pressing need to encourage, train and improve the career prospects for potential hydrologists so that there will be a sufficient pool of qualified personnel to meet future staffing needs".

Putting it bluntly: where are all these flood risk experts going to come from? More power then to our current and past Presidents' elbows and the initiative on getting more BHS members to consider chartered status

Celia Kirby

Jobs

As well as this newsletter and our web site (hydrology-org.uk), BHS also operates the BHS-HYDROLOGY mailbase which we hope more and more BHS members will join. This is a most useful way to reach our hydrological community quickly and, as a result, we have carried quite a lot of job adverts.

We now want to refine these communication options, not least because of financial implications. Would members please note that from now on, the Mailbase may be used to advertise studentships and technical courses but we ask that job adverts go on the website. To advertise a vacancy (cost £100, £50 for academic posts, no VAT) please send your advert with full details (including closing date) to our Webmaster, John Griffin, by email (jhgr@ceh.ac.uk). John will circulate appropriate messages on the mail base to draw attention to new adverts on the web.

Diary

15-17th September 2008
BHS National Hydrology Symposium

Sustainable Hydrology for the 21st Century

Organised by: BHS SW Section/BHS National Committee

Venue: University of Exeter

Contact: Alix Slater (01392 263627)
or direct link to:
bhs_symposium_2008@exeter.ac.uk

17th September 2008
BHS Annual General Meeting
11.40 a.m.
Venue: Peter Chalk Centre, Exeter University, Streatham Campus - see www.exeter.ac.uk for travel routes.

29th October 2008
BHS/SHG meeting
"Recent Developments in Water Resources"
Venue: Dynamic Earth, Edinburgh
10:00 a.m.
Contact: Paul Hart (0141 222 5961)

17th Deccember 2008
BHS National Meeting
"Hyporheic hydrology: emerging ideas and management implications"
Organised by:
BHS Midland Section
Venue: Birmingham University
Contact: David Hannah (d.m.hannah@bham.ac.uk)

8th January 2009
BHS National Meeting
"Hydromorphology and the Water Framework Directive"
Organised by: Pennines Hydrological Group/British Society for Geomorphology
Venue: Liverpool University
Contact: Neil MacDonald (Neil.Macdonald@liverpool.ac.uk)

Copy deadline for* Circulation *No. 99
17th October 2008