Circulation

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Competition winner!

Congratulaations to
Andrew Cox





Photography Competition

Over the summer we ran a photography competition to help gather images for our new dynamic website site. We received 36 entries, all of which will appear on the website.

We gave first prize to **Andrew Cox** for his delightful view of a waterfall taken in 2007 in the Brecon Beacons. (shown on the front cover*). Second prize went to **Lisa White** for 'Hydrology in stasis' — taken from Dollywaggon Pike in the Lakes looking towards Fairfield during the wonderful winter of 2010 when temperatures on our upland monitoring sites dipped to –20°C for a prolonged period.

Andy Keen has the third prize for this shot of tumbling water, one of two he sent us.

* Slightly cropped to fit the format (apologies to Andrew)

Impact of blockage on flood risk

A blockage in a culvert can be very difficult to remove and likely to result in a severe flood risk. For these reasons the provision of a debris screen at the entrance to the culvert is often considered. Such a screen can reduce the risk of a blockage inside a culvert, but introduces a significant maintenance obligation (to ensure that the screen is kept clean) which far exceeds the typical maintenance requirements of an open watercourse. The build-up of trash can be rapid, and the consequences can be severe in terms of flood damage to local properties and infrastructure. Many more problems have been caused by blocked screens than have resulted from blocked culverts. Flood warnings manage the residual flood risk but often ignore the impact of blockage.

The BHS SW Regional meeting on "Impact of blockage on flood risk" — 31st July 2012 — included four presentations on the various aspects of managing the flood risk due to blockage. The first presentation by **Nik Walley**, Hydro-Logic Consultants, explored the use of real-time technology such as webcams to monitor flood blockages. The second presentation (**Matt Balkham**, Royal Haskoning DHV)took a broad look at good practice in the inspection, maintenance and operation of culverts and referred to the latest guidance provided in CIRIAs recently produced *Culvert Design and Operation Guide*. The third presentation described the use of the Jscreen asset blockage modelling tool which simulates flooding caused by 100% blockage of a culvert and defines the flood extents for a chosen range of storm events (**Gary Deakin**, JBA Consulting). The final presentation, by **Chris Whitlow** of Edenvale Young Consultants, used a case study from Ashton Vale, Bristol, to provide an update on how to design operational flood forecasting models to take account of blockage rather than ignore it.

The presentations can be found under the following website: http://www.bris.ac.uk/civilengineering/research/water/bhssw/bhssw.htm.

Oliver Pollard
Environment Agency, SW Region

[*Note:* tthe contents of this site will be transferred to a Regional page on our new BHS site shortly — *Ed.*]

New Members

Ioannis Boskidis...Independent Consultant, Northampton
Neill M Brauders.....Mott Macdonald, Cambridge
Robert Hooper.....JBA Consulting, Newcastle upon Tyne
Christina McLeman.....University of Aberdeen
Adam John Parkes.....Halcrow Group Ltd, Warrington
Andrew Peacock.....Leeds
Simon Stoate.....Clarke Bond Ltd, Exeter
Cecile Vuilleumier.....University of Aberdeen

Editorial

After the dramas of this year's 'water scene' it seems good to be settling down now into autumn routines: clocks gone back, Christmass to look forward to (!). But its never quiet for long in BHS affairs: the new personal challenge to face is launching the re-vamped web-site. We are aware that there are a few 'niggles' remaining with the new design but that the best way to deal with these is to let members give feedback about what they find are weakness (or strengths!). We look forward to your input.

A sad fact to report is that - so far - we have not managed to attract a replacement Hon. Sec. Claire will be an extremely hard act to follow but surely someone wants to have a go.....

Celia Kirby

New Committee Members



After completing an Msc in Hydrology and Water Resources at Imperial College London, **Neill Brauders** now works as an engineering consultant in Mott MacDonald's Integrated Water Resources Management team. With a background in Civil Engineering (University College Dublin) Neill currently works on a range of hydrology projects, such as; National Environment Programme (NEP) low flow studies; Source Reliable Output studies; Environmental Impact Assessments, including HS2; and water quality Risk Assessments. Neill also works on a range of Civil Engineering projects and is currently progressing towards Engineering Chartership with ICE.

Adam Comerford, our new CIWEM representative, is Group Hydrology Manager for the Canal & River Trust, which until July this year was British Waterways. He leads their Water Management team, who are responsible for all aspects of strategic water resources management and flood risk management across the 2000 miles of canals and navigable rivers, plus 75 reservoirs, that the Trust looks after in England & Wales. He originally joined British Waterways in 2001, and (apart from three years working for the Environment Agency managing water abstraction licensing — which gave him a useful insight into the regulator's view of the hydrological cycle), he has been based in the Water Management team ever since. Adam has a PhD in Fluvial Geomorphology from the University of Exeter, and sits on the National CIWEM Water Resources Panel. He has been a member of BHS since 2001. He lives near Warwick in the Midlands, with his wife Helen and their two young daughters, Saskia(3) & Isabella(4).



When asked about what Daddy does for a job, they both know that it is "to make sure there is enough water in the canals for the ducks. And the swans".

IUGG Joint Assembly, Gothenburg, 22-26 July 2013 – Exeter Grant Applications

July 2013 may seem like a long way off but the call for papers will no doubt soon be hitting your Inboxes! When it does, and you're trying to work out how to afford attendance at this prestigious event, don't forget that the Exeter Fund exists to support members in attending IUGG assemblies.

This budget is not unlimited but, hopefully, given the shorter distance than Melbourne 2011, BHS should be able to support more in attending. Please submit your application to the Hon Treasurer (using the standard Travel Grant form available from the web site at http://www.hydrology.org.uk/travelgrantform.doc) as soon as possible and certainly no later than **31 April 2013**.



Matt James is a Lead Hydrologist and Project Technical Lead at consultants MWH in High Wycombe. He is a chartered member of CIWEM and has been working in hydrology in the UK and overseas for twelve years. He also lived and worked as a hydrologist in New Zealand for two years and is still an active member of the New Zealand Hydrological Society (NZHS). His main interests and activities are in hydrological, hydraulic and sediment transport modelling. He also recently organised the UK leg of a European hydrological study tour for members of Brunei's National Hydrology Centre.

Jennine Jonczyk is a Postdoctoral Research Associate working within the School of Civil Engineering & Geosciences at Newcastle University. She specialises in proactive catchment management and mitigation of diffuse water pollution from agriculture. She is also actively involved in the 'Eden Demonstration Test Catchment' project (http://www.edendtc.org.uk/) which aims to reduce the effects of diffuse pollution on ecological status of waters without negatively impacting on rural livelihoods and providing a platform for other research.



BHS-JBA 2012 MSc Studentship Competition

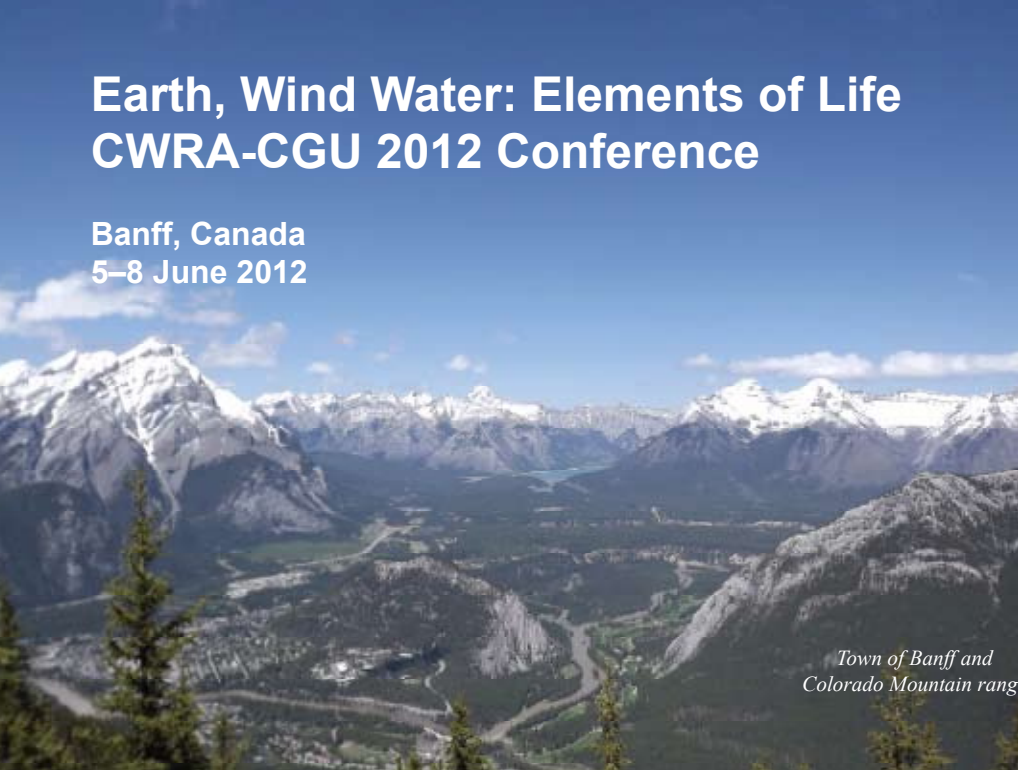
This year we offered a number of MSc studentship awards, made jointly by the Society and Jeremy Benn Associates, with six awards going to those starting master's degree courses in September/October 2012 at a British University in which hydrology represents a significant proportion of the degree.
The awards contribute towards supporting the tuition fees for the courses taken and include BHS membership for the year. 25 applications were received; these were ranked based on the CV and on a brief statement explaining the motivation for the proposed course. The award winners and the courses being undertaken for 2012 are:

We would like to thank the contribution made by Jeremy Benn Associates through the JBAT. The Society will run the competition again next year and seeks to encourage further companies and bodies to contact the Society if they feel they could contribute towards supporting the competition: please contact the BHS directly for further details.

Scott Dawson	Catchment Dynamics and Management	University of Leeds
Audrey Penanhoat	Water Management	Cranfield University
Sarah Underhill	Sustainable Water Management	Lancaster University
Julie Pepworth	Flood Risk Management	University of Newcastle
Faye Jackson	Catchment Dynamics and Management	University of Leeds
Gordon Falconer	Sustainable Catchment Management	University of Dundee

Earth, Wind Water: Elements of Life CWRA-CGU 2012 Conference

Banff, Canada
5–8 June 2012



Town of Banff and Colorado Mountain rang

With over 60 sessions on water resource monitoring, conservation, sustainability and management, the 2012 CWRA-CGU conference in Banff, Alberta, provided a forum to share and explore innovations in water resources and geoscience, recent policy developments, and contributions to the wider research community. The symposium explored several key themes, with a central 'hydrology' research aspect, and brought together hydrologists, climate modellers, biogeochemists, ecologists, glaciologists and remote-sensing scientists from around the world to discuss the most novel advances in hydrological research.

The conference comprised three days of presentations and a day of workshops, interspersed with ice-break receptions, poster sessions and dinners. The conference was designed to ensure maximum integration and participation from attendees, with a cleverly organised system of meal tickets directing delegates to separate dinner halls on different days, and a daily breakfast held at the conference centre encouraging attendance even at the earliest sessions.

Proceedings began with a talk from a First Nation's representative of Banff, who delivered a moving speech on the impacts of oil drilling upon water quality in the local area. He explained how over the past 50 years the groundwater in many areas has ceased to be potable, driving residents to purchase drinking water from local stores. This set the scene for the conference "Earth, Wind and Water – Elements of Life" –demonstrating to the delegates the purpose of their visit, and what it is they are striving to protect.

Keynote Speaker **Terry Prowse** opened the scientific presentations with a very interesting talk on the significance of lake and river ice, in terms of its physical, ecological and socio-economic value. He reviewed its role in the climate system, future projections, satellite-based monitoring techniques, and its

influence on hydrology, biological productivity, trace gas sequestration and emission, contaminant capture, transport networks and industrial development.

There were a multitude of concurrent sessions and talks, which were all of such high standard that it was difficult to choose which to attend. Of those I picked, five sessions made a particular impact on me: water quality and habitat indicators; predictions of ungauged basins; modelling tools and applications; and hypothesis-driven science — linking field observations to earth surface processes. These sessions highlighted some of the key issues in hydrological science today, and were particularly relevant to my own research area.

The session "Water quality and habitat indicators", was especially relevant to my own studies in hydroecological modelling. **Shanel Raney** gave a very thought provoking demonstration of how frequency of sampling in water quality monitoring regimes can significantly influence long term estimates of exports. **Ashley Warnock** also demonstrated some pioneering research into intra-species variability in mercury uptake in small-bodied fish, which are used as a tool for monitoring changes in exposure in aquatic ecosystems. This variability over a relatively small geographic region may cast a shadow over the concept of reference sampling locations or populations.

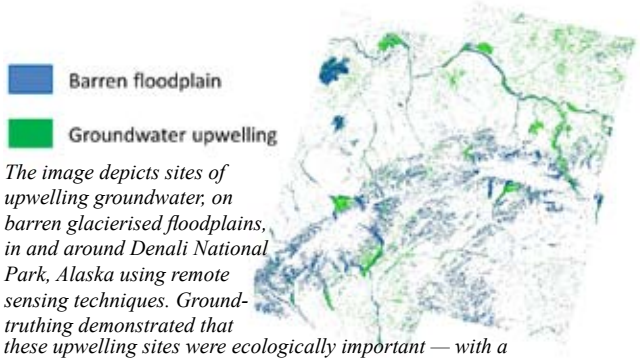
"Predictions of Ungauged Basins" was a stimulating session, where **Dr Ilich** presented work on developments in stochastic hydrology. He highlighted the shortfalls in observed datasets (limited length, failure to incorporate long-term extreme events, incorporation of multiple flow duration curves), followed by a discussion of the recent breakthroughs in generation of hydrologic time series using algorithms, with are statistically similar to historic natural flow series. **Graham Sextone** went on to give a memorable presentation on how biological and topographic variables influence the distribution of snow at the basin scale, and of his use of snow depth as a surrogate for surface water equivalent.



Mount Norquay from Banff town centre.

The session "Modelling Tools and Applications" offered a diverse range of presentations, from habitat classification, through hydrological modelling to nutrient analysis. Particularly notable was a presentation by **Camille Dallaire**, an MSc student at McGill University who is working to develop a high resolution global framework for river reach classification. Her framework for classification includes hydrology, physiography and climate, geomorphology, water chemistry, ecology and human alteration.

In the session "Hypothesis-driven science: linking field observations to earth surface processes" **Holly Buehler** described the remote sensing techniques she is adapting to determine river depth, to be used in investigating morphological changes resulting from a hydro-peaking dam. It was in this session that I presented my paper on determining the ecological significance of groundwater upwellings at the landscape scale. I outlined the remote



The image depicts sites of upwelling groundwater, on barren glacierised floodplains, in and around Denali National Park, Alaska using remote sensing techniques. Ground-truthing demonstrated that these upwelling sites were ecologically important — with a significantly greater biodiversity than glacial-fed rivers of the surrounding floodplain. Model accuracy was 94%.

sensing methods I had used to isolate glacierised floodplains (see image), identify groundwater fed streams within them, and quantify them across the state of Alaska. These streams were identified as 'hotspots' of biodiversity. The presentation was well received and introduced me to others conducting work in a similar field, with whom I will now be collaborating.

The trip to the CWRA-CGU 2012 conference was an extremely valuable experience for me. The presented research helped to develop my understanding of process interactions which I am working to model in my own study catchments. It also gave me an opportunity to connect with experts working in my field, with whom I was able to discuss my ideas and develop collaborative relationships. My attendance at this conference was made possible by the kind support of the British Hydrological Society, for which I am extremely grateful.

Jill Crossman
School of Geography and the Environment
University of Oxford

Postscript
Jill says she took photographs on the two good days ... "we also had two blizzards, a tornado down the road that cut us all off from civilisation for a little while, and a couple of gales....."

Site Visit: Beckton Desalination Plant

5 July 2012

This visit was organised by BHS and facilitated by Thames Water, with presentations by **David Cash**, the Production Manager, and **Adel Sharif**, Professor of Water Engineering and Process Innovation at the University of Surrey.

The Thames Gateway Water Treatment Works is built on the wastewater treatment site at Beckton on the Thames estuary. It was established to provide additional treated water supplies in London and provide a contingency resource in drought and emergency situations. The plant has been subject to long-running planning issues, with planning permission refused following a Public Inquiry in 2006, principally on the grounds of high energy consumption, and the requirement to consider potential for other options including demand management. The incoming Mayor removed the objection of the GLA and permission was granted enabling the plant to be built and finally opened in 2010.



The plant's maximum capacity is 150 Ml/d, sourcing brackish water from the estuary toward the end of ebb tide. The abstraction is designed to to minimise salinity and reduce power costs, ensure treated effluent from Beckton wastewater treatment works is not abstracted and minimise fish entrainment or impingement into the 3 mm screens which include acoustic and bubble deterrence.

The plant was used during 2012 as a drought measure, and in later summer at 25 Ml/d to keep it operational.

The capital cost was around £250 m, while operational costs at £340 per Ml are significantly higher than for a conventional surface water works, largely due to energy use and maintenance, but this does include pumping into distribution.

The water treatment process is in multiple stages, including oxidation, coagulation, flocculation and

clarification, high pressure filtration, ultrafiltration and reverse osmosis (RO) at 85 bar.

Salinity at low water in this part of the Thames is about 33% of sea water, but to even out varying concentrations the raw water is stored in decommissioned concrete tanks, originally constructed for sewage treatment. The open clarifiers can suffer from algal growth in summer but covers are planned in future to exclude sunlight.



Clarifiers

The water produced in the plant is remineralised for taste and domestic pipe protection purposes and then disinfected prior to supply. Over 90% of raw water is sent to distribution and the brine is discharged close to the outfall from the sewage works. Using treated effluent would be less energy intensive than brackish water but it is felt that this is not yet acceptable to customers.



High pressure filters

Following the tour of the site, Adel Sharif, Professor of Water Engineering and Process Innovation at the University of Surrey described new innovations in manipulated osmosis processes that he is working on through the Centre for Osmosis Research & Applications (CORA) The work aims to reduce the energy use and hence costs in building and running desalination plants and is at the stage of pilot plant production.

Professor Sharif asserted that such innovations will mean that operational costs for an RO desalination plant should reduce to under four times those of a conventional works. Although 50% of the costs are due to the energy demand, it should be possible to produce 1000 litres of potable water for 40p which could be a cost-effective resource in some situations. Pumping water long distances into distribution adds to the cost, and there are also relatively high maintenance costs including labour, always an issue in the UK economic and regulatory climate.

Desalination technology is still developing so costs should fall in the future as efficiency improves. It is likely that in the UK effort put into water conservation and encouraging efficient use will be more cost-effective than desalination for some time to come.

Rod Murchie
Environment Agency

RO racks



Section through RO tube



11th NCCR Climate Summer School

Ascona, Switzerland
9–14 September 2012

The 11th International Climate Summer School, organised by Switzerland's Centre for Excellence in Climate and Climate Impact Research (NCCR), was held in Ascona on the shores of Lake Maggiore in southern Switzerland during September 2012. The week-long course, which takes place annually, provides doctoral and early-career researchers with an exciting mixture of keynote lectures, workshops and poster sessions led by leading researchers in the fields of climate science and hydrology. The theme for this year's Summer School was "the water cycle in a changing climate", a topic of particular relevance to my current work in extreme precipitation at regional scales.

Following an enjoyable journey through the picturesque Swiss Canton of Ticino, students and teachers alike were greeted with a warm welcome at Centro Stefano Franscini, the ETH Zurich-owned conference centre situated at the historic site of Monte Verita. The Summer School kicked off with a rousing talk from **Thomas Stocker**, the Co-Chair of Working Group I for the IPCC's Fifth Assessment Report (AR5), which is scheduled for publication in September 2013 and will include contributions from 258 authors and review editors from 44 countries. Prof. Stocker outlined the key questions that the AR5 will address, with much of the discussion focusing on the 'accelerating' global water cycle that will accompany a future climate (i.e. wet regions are expected to become wetter, and dry regions drier) and the role of ocean salinity in driving these changes.

Further keynote lectures were given throughout the week, amongst which were some particular highlights. **Dennis Hartmann** (Department of Atmospheric Sciences, University of Washington) provided a brief introduction to observed variations and trends in the water cycle, with particular focus given to evaporation, water vapour, clouds and precipitation. **Isaac Held** (Geophysical Fluid Dynamics Laboratory, Princeton University) discussed the relationship between latent heat release, atmospheric moisture content and general circulation. **Reto Knutti** (Institute for Atmospheric and Climate Science, ETH Zurich) spoke in detail about the concepts of global climate modelling and the challenge of quantifying uncertainty of climate change projections. I found each of these lectures highly relevant for my current research interests.

I particularly enjoyed **Christoph Schär**'s (Institute for Atmospheric and Climate Science, ETH Zurich) summary of the challenges in producing reliable projections of extreme events associated with a changing climate. Prof. Schär was keen to stress that there is significant spatial and temporal variability in the response of the hydrological cycle to anthropogenic forcing, and that there is growing evidence that changes in the characteristics of extreme events may be greater than previously anticipated.

Amongst the most important challenges in projecting extremes is climate model representation of convective processes, which typically vary on scales of only a few kilometres. Future developments may focus on kilometre-scale resolution cloud-resolving models nested within climate change models. Although at present this is extremely computationally intensive, such an approach is feasible for process studies and has potential to be applied in climate change studies.

There were a number of poster sessions throughout the week. I presented a summary of my current research work relating to statistical downscaling of extreme European precipitation. This forms part of the international project PLEIADES, funded by the Volkswagen Foundation. PLEIADES aims to develop state-of-the-art statistical models to downscale both the core and extreme tail of simulated precipitation distributions from regional and global climate models. The project is also linked to the EU COST action ES1102: VALUE (Validating and Integrating Downscaling Methods for Climate

Change Research), upon which I am involved as a Working Group member. The poster session provided an excellent opportunity to receive useful feedback on my work from learned colleagues, particularly the representatives from MeteoSwiss and ETH Zurich.

The final keynote of the Summer School is traditionally reserved for a special guest speaker. This year, **Wolfgang Kinzelbach** (Institute of Environmental Engineering, ETH Zurich) delivered a well-received and thought-provoking talk about the links between water resources and sustainable development. Prof. Kinzelbach showed that, whilst water resources will increase for a small portion of the world's population, the vast majority will experience a decrease. Water is most likely a sufficiently large resource to meet the world's needs; the greatest challenge is to how to justly distribute this resource to the world's people.

I was extremely grateful to British Hydrological Society for the award of a travel grant that supported my attendance at the Summer School. The event was very enjoyable and beneficial in furthering my own understanding of the hydrological cycle in a changing climate. It is also of great value to know how leading experts perceive today's key issues and burning questions. I would thoroughly recommend future NCCR Schools to other doctoral and early-career researchers.

Jonathan Eden
University of Birmingham

9th International Symposium on Ecohydraulics

University of Natural Resources and Life Sciences, Vienna 17–21 September 2012

Ecohydraulics, the study of interactions between hydrological/hydraulic and biological/ecological realms, has come a long way since the first international symposium held in Trondheim in 1994. As an applied discipline, it seeks to mitigate the ecological impacts of human modifications to the aquatic environment, balancing the needs of society with those of aquatic biota. How fitting, then, that the conference should be held in Vienna where the River Danube has undergone extensive engineering works to reduce flooding, maintain navigable conditions and provide hydroelectric power over the past 150 years.

The Danube flows through 10 countries and covers 25% of Europe's land surface. The opening keynote speaker, **Birgit Vogel** (RBMsolutions/Fresh-Thoughts Consulting), highlighted the challenges associated with managing such large river basins. Transboundary cooperation was identified as a major factor in the effective management of these systems: case studies presented from Europe, Asia and Africa exemplified the range of approaches taken, depending on socio-economic and political factors, which continue to constrain the application of ecohydraulic knowledge in river basin management. This ecohydraulic knowledge can be reduced to four main areas of research around which the conference was broadly organised, namely: pure aquatic biology/ecology; habitat modelling; the ecological effects of flow regime alteration; and river restoration. Here I present selected highlights from each of these areas.

Ecohydraulics has strong foundations in pure biological and ecological research and the basic knowledge underpinning the discipline is continually developing. Keynote speaker **Claudio Meier** (Universidad de Concepción) set the scene for a number of stimulating debates on progress in pure aquatic ecology with his evaluation of models describing the establishment of riparian vegetation along gravel-

bed rivers. The decline of key fish stocks around the developed world has often been linked to interruptions in the river continuum due to obstructions such as weirs and dams. This problem has called for extensive basic biological research on the swimming behaviour of migratory fish in response to altered flows around such obstacles (e.g. **Paul Kemp**, University of Southampton).

Other pure research presented at the conference ranged from exploring the microbial loop using stoichiometry (**Yu Li**, University of Western Australia) to the behaviour of reintroduced lake sturgeon (*Acipenser fulvescens*) (**Frédéric Burton**, Environnement Illimité). Such a diversity of topics serves to highlight one of the major challenges in applied ecohydraulics — the need to incorporate knowledge from a wide variety of sources.

Habitat modelling has always been a major theme of ecohydraulics symposia as it plays a key role in environmental impact assessment and the evaluation of flow management scenarios. Much discourse has recently focused on the relative merits of one- versus two-dimensional hydraulic models.

Ian Jowett (AQUHA, Jowett Consulting) added to this debate with a comparison of model performance on a braided reach which found a one-dimensional model slightly more accurate and easier to calibrate than two-dimensional models which were, on the other hand, better capable of extrapolating simulations beyond the calibrated range of flow conditions.

Habitat models no longer rely solely on the PHABSIM-type approach pioneered in the 1980s. Multivariate (e.g. **Bernhard Zeiringer**, University of Natural Resources and Life Sciences, Vienna), fuzzy (e.g. **Rafael Muñoz Mas**, Universitat Politècnica de València) and mesoscale methods (e.g. **Paolo Vezza**, Politecnico di Torino) are now well developed alternatives. Even these newer modelling approaches, however, are based on relationships between flow and biota which are merely correlative or based on subjective 'expert' knowledge.

The lack of papers describing more mechanistic models — linking bioenergetic, individual-based and demographic processes — was disappointing. An exception to this was the SALMOD II model presented by **Thomas Hardy** (Texas State University) which incorporates density dependent mortality, growth and disease susceptibility, among other factors, for each life-stage of the Chinook salmon (*Oncorhynchus tshawytscha*).

Flow regime alteration due to damming, hydroelectric power generation and abstraction was the topic of much discussion at the conference. Simplistic approaches to mitigating the effects of flow regulation have traditionally focused on defining minimum flow requirements for key biota. Though some at this year's symposium focused on minimum flows (e.g. **Helmut Mader**, University of Natural Resource and Live Sciences), the agenda has now moved on to encompass the development of ecologically acceptable flow regimes which attempt to capture essential features of the natural hydrograph (e.g. **Robert Milhous**, Torries Peak Analysis). **Diego García de Jalón** (Universidad Politécnica de Madrid) presented results from regulated rivers in the Mediterranean that emphasised the need to address the alteration of sediment transport regimes, as well as water flow regimes, below dams.

In his keynote speech, **Atle Harby** (SINTEF) described the research being undertaken by the Centre for Environmental Design of Renewable Energy (CEDREN). Much of this work involves assessing the ecological effects of hydropeaking — a term used to describe the rapidly fluctuating flow regimes below hydroelectric power plants. Subsequent sessions explored the effects of hydropeaking on benthic macroinvertebrates (**Tania Zakowski**, Norsk Institutt for Naturforskning), fish communities (**Hervé Capra**, Cemagref, Lyon) and habitat dynamics (**Roser Casas-Mulet**, NTNU, Norway). Mitigating these effects will require a pragmatic approach based on limiting factor analyses to identify major bottlenecks for key biota at critical periods of the year.

Habitat restoration is seen as the acid test of ecological understanding and, as such, river restoration should be seen as the pinnacle of applied ecohydraulic knowledge. Despite decades of management interventions intended to rehabilitate river habitats, however, the question still remains: why do some projects work whilst others do not?

Teppo Vehanen (Finnish Game and Fisheries Research Institute) attempted to answer this question when he presented the results of a rare Before-After-Control-Impact (BACI) study on six forest streams.

The addition of woody debris was found to be more effective in improving fish abundances than adding cobbles and boulders but detectable success in all cases could only be detected after a considerable time period (>10 years).

A major activity in river restoration is the removal or bypassing of barriers to fish migration such as weirs, tide gates and dams. Delegates attending one of the technical tours got a chance to see fish bypasses recently constructed on the Danube (see pictures). **Henrik Hufgard** (Institute of Applied Ecology, Germany), **Vincent Cornu** (Université de Poitiers) and **Jukka Jormola** (Finnish Environment Institute SYKE) all provided perspectives on the relative merits of nature-like and technical bypass channels. **Eva Enders** (Fisheries and Oceans Canada) presented some particularly interesting work on methods (e.g. velocity gradients, ultrasound) for diverting fish away from hazardous obstacles, such as hydroelectric turbines, and towards such bypass channels. Finally, **Martin Lucas** (Durham University) highlighted the immense challenges involved in ensuring passable conditions for a whole range of diadromous and potadromous species.

I would like to thank the BHS for the grant which made my attendance at this important conference possible. It allowed me to take part in some productive debates and to present my own work, entitled "Hydrodynamic variability in the habitats of a trout stream", which proposed a new classification of mesohabitats (i.e. pools, riffles, glides) based on turbulent flow characteristics and discussed the potential implications for juvenile salmonid habitat quality. The next International Ecohydraulic Symposium returns to Trondheim where I hope to present the results of recent laboratory work assessing the habitat selection of Atlantic salmon (*Salmo salar*) parr in relation to turbulence.



Technical (vertical slot) fishway bypassing the Melk hydropower plant on the Danube.

Martin Wilkes
University of Worcester



Alternative 'nature-like' fishway associated with the Melk hydropower plant.

Ecohydraulics - II

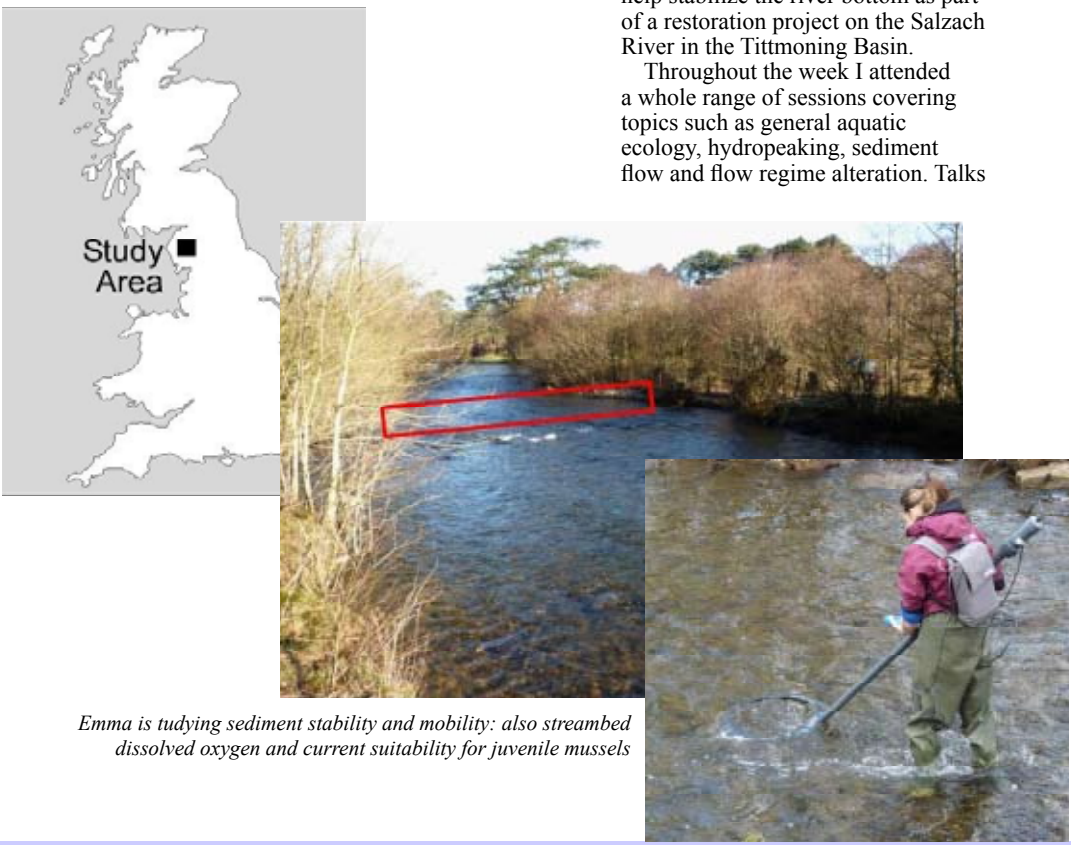
Emma Quinlan, University of Aberdeen, also attended this meeting and sent this Overview.

I presented my paper in the River Restoration session (20-S8-A) which was held on the 20th of September 2012 and chaired by Helmut Habersack. The paper, "Morphological adjustment and ecological response to tributary reconnection in an upland river" (co-authored by C.N. Gibbins, R.J. Batalla, D. Vericat and I.A. Malcolm), was based on the first two years of my PhD research. The talk covered my research objectives, the methods used to address these and the preliminary results. Afterwards, I enjoyed an informal discussion about some of the technical aspects of my project with a number of the delegates.

This particular session included numerous talks relevant to my PhD. **Weigelhofer** *et al*. presented a paper investigating whether stream restoration measures can reduce nutrient and soil inputs from agricultural catchments. Following this, **Liedermann** *et al*. discussed the impact of vessel-induced waves on different bank types and bank-near habitats. **G. Holzapfel** *et al*. discussed the shading effects of riparian vegetation, with particular focus on the relationship between the density and spatial distribution of riparian vegetation biomass.

From further afield, **T. Okamoto** *et al*. (Kyoto University) presented a paper on the effect of the limited length of a vegetation patch. Most interesting from my perspective was a paper by **Sattler** *et al*. (again from the University of Natural Resources and Life Sciences, Vienna) who described an alternative method to help stabilize the river bottom as part of a restoration project on the Salzach River in the Tittmoning Basin.

Throughout the week I attended a whole range of sessions covering topics such as general aquatic ecology, hydropeaking, sediment flow and flow regime alteration. Talks



Emma is tudying sediment stability and mobility: also streambed dissolved oxygen and current suitability for juvenile mussels

were very insightful and I enjoyed the experience of learning about other research areas within ecohydraulics. Posters were divided into two sessions during the week, covering an array of issues such as sediment interactions on habitats, habitat modelling and again river restoration.

Technical tours were organised on the 19th of September. One tour involved a visit to a Life Nature Project situated in the Wachua valley. The project involved improvements to the natural habitat of the Danube with objectives such as structuring the main channel with gravel embankments and islands while also reconnecting old tributaries. The tour also included a visit to the new fish passage facility at the Melk Hydropower plant which was also situated along the River Danube.

I am very grateful to the British Hydrological Society for their financial support so that I could participate in this major international conference. As a PhD student, I found it to be a great experience meeting researchers from all over the world. It was hugely informative and a valuable opportunity to present my work. I learnt a great deal in terms of freshwater ecological theory and methods, as well as applied ecology related river restoration. By listening to the many well-respected researchers who were giving talks at the conference, I also learnt lots about how best to communicate science. It has been an important milestone in my career.

Emma Quinlan
University of Aberdeen

BHS 30th Annual General Meeting

The 30th AGM of the British Hydrological society was held on 26th September 2012, in Newcastle upon Tyne

President's Report

President **Bob Sargent**, welcomed those in attendance and presented his President's report, beginning by stating that membership of the Society has been steady over the year at around 1050 and stressed that we continue to seek ways to increase membership.

The biennial Hydrology Symposium was held in Dundee in July and was attended by 150 delegates. Though smaller scale than the international symposium in 2010 there was a good friendly atmosphere and some very interesting presentations on new work — and some rather wet field trips! Extended versions of some papers will be published in a forthcoming special edition of *Hydrology Research*.

BHS continues to award travel grants to members who wish to travel to conferences they could not otherwise afford. We have been able to continue the MSc award scheme, started last year, and have just awarded six grants to students starting MSc courses in hydrology this year (see page 5). The support of JBA is gratefully acknowledged — and we would welcome the assistance of other employers in the future.

Bob showed the test version of the new website design which will replace the existing one in the next month or two. The site will have a completely fresh look and offer increased functionality. One potential function would be to have a member's area, where we could share information within the Society. We want to avoid becoming exclusive, though, and would welcome your views on what a member's area could usefully contain.

Following the IAHS meeting in Melbourne last year there has been an initiative to create links between the various national hydrological associations that now exist. BHS is quite a senior member in this group, with many national associations being established only recently and keen to learn from us. BHS is happy to help where it can, and is trying to encourage the more academic-based groups to establish links with practitioners in their countries, which we think adds a lot to the value of BHS to its members. The German and Italian Hydrological Groups have also asked if they may adopt *Hydrology Research* as their official Journal. The details of this are still being worked out, but should be to the benefit of the Journal.

Student Prize Award
For this year's undergraduate dissertation prize we had 11 entries from various Universities, covering a range of hydrological aspects. Many of the contributions were of an extremely high standard and once again the judges had a difficult task to choose a winner and two runners-up. The winning dissertation was judged to be that by **Amanda Green** from UCL whose dissertation was titled, 'Quantifying uncertainty in projections of river discharge in the Mekong River Basin under climate change'. Amanda will be starting a PhD at UCL this autumn.

Two runners-up prizes were awarded to: **Tom Greenwood**, University of Southampton for 'The impact of large woody debris dams upon flow resistance in the highland water' and **Simon Hodgkinson**, University of Birmingham for 'Spring precipitation variability and its affect on river discharge over the East Anglian region of Great Britain'. Abstracts from all of our winners will appear on the website as well as in this issue (see page 20).

The minutes of the 29th AGM were approved by Nigel Goody (SEPA) and Bob Sergeant.

Honorary Secretary's Report

Claire Walsh began her report by announcing the winners of the photography competition that was held this year. First prize was award to **Andrew Cox**, second prize to **Lisa White** and third prize to **Andy Keen**. All the entries will be posted on the new website.

This year has seen a wide range of National and Regional BHS meetings.

The AGM in September 2011 was held during 'Hydroecological tools for river basin management'. Since then, there have been five further national meetings, including this one today on 'Hydrological challenges and emerging solutions in urban areas'. Other topics have included: 'Droughts: research and management', 'Living with floods', held here in Newcastle which invited school children amongst other communities and experts to sharing their experiences of flooding, 'Applied flood hydrology', Harnessing emerging technologies for environmental science' held jointly with Environmental Virtual Observatory, British Ecological Society, Royal Meteorological Society, Royal Geographical Society & British Society of Soil Science, 'Managing water locally' was jointly organised with WaterAid and Oxfam.

In addition, the 11th National Symposium took place in Dundee, which attracted 140 delegates over the three days and from which, as with the international symposium in 2010, there will be a special issue of *Hydrology Research*, edited by **Andrew Black** and **Ian Littlewood**.

The Peter Wolf Early Career Hydrologists' event continues to be hugely successful. This year it was held at University of Birmingham, with over 60 early career hydrologists attending and presenting their work. Next year this event will take place on 25 and 26 March at Imperial College, London.

On behalf of the Society, Claire thanked all of those involved in organising, speaking at, chairing and administrating meetings and also those who produce write-ups for *Circulation*. It is only through their efforts that the Society is able to continue to offer its large and varied programme of meetings each year. The meetings programme for 2012–13 is becoming populated with planned national meetings on ecohydrology, surface and groundwater interactions, wetlands and hydrometry. Members are encouraged to offer suggested topics for meetings as we wish to offer a programme of meetings that satisfies and benefits our whole membership.

The Society has responded to a few requests for consultation during the year and I'd like to thank those who have put views forward. Claire thanked **Celia Kirby**, our Technical Secretary who has led our responses.

Finally, Claire personally thanked all of those who have supported her in her role of Hon. Secretary over the past four years and said she had thoroughly enjoyed her six years on the main committee.

A formal vote of thanks was noted to Claire for her considerable commitment and efforts to BHS.

Changes to membership of main committee
We see a number of changes to the committee this year. Claire Beloe, Hannah Cloke and Simon Palmer step down as elected committee members. Following nominations for ordinary committee members, I am pleased to welcome **Jennine Jonczyk** (Newcastle University),

Neill Brauders (Mott Macdonald), **Matt James** (MWH) to the main committee. Earlier in the year, **Adam Comerford** replaced Colin Fenn as the CIWEM representative (see page 4)

Claire Walsh steps down from her second term as Honorary Secretary as of today, as of the AGM a replacement has yet to be found. We are pleased to announce Nigel Goody, as President-elect for the next year, and President from 2013–2015.

Honorary Treasurer's Report

Nigel Goody presented the accounts for the financial year. Reserves have been reduced by £26 600, mainly through expenditure for developing the new website, the studentship scheme and awarding an increased number of travel awards. Subscriptions will remain at £25 per year.

No AOB was received.

Claire Walsh, Honorary Secretary

Hydrological challenges and emerging solutions in urban areas

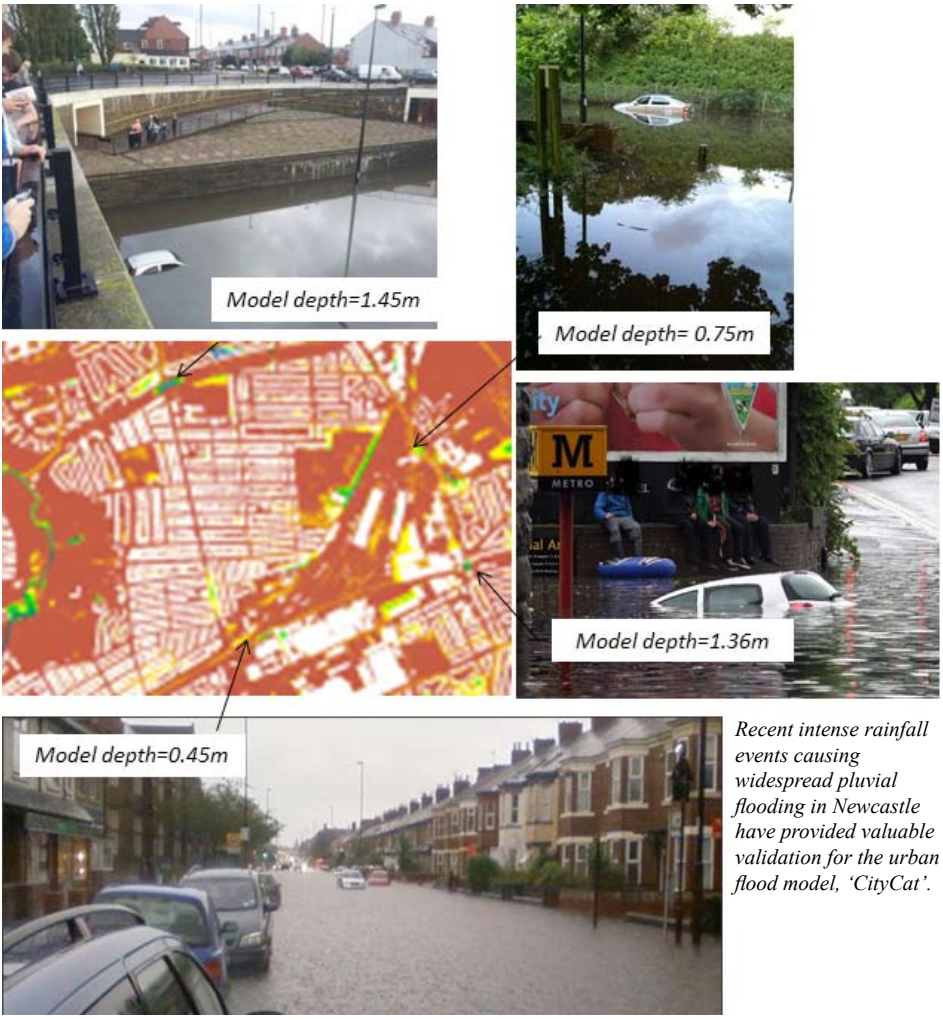
Newcastle upon Tyne
26 September 2012

Ironically, this national meeting was held the day after the third pluvial flooding event the city of Newcastle had witnessed since the end of June this year. Despite substantial flooding elsewhere in the country affecting speakers and delegates attending, an informative and lively meeting still went ahead.

This meeting's first presentation was given by **David Balmforth** (Vice President of the ICE/MWH), who introduced the issues of managing flood risk and pollution in urban areas. David argued that in order to meet the drainage objectives of flood risk reduction, improving water quality, economic development, habitat improvement and integrated investment planning, there is a need to fully integrate storm water management with urban design and to address the future impacts of growth, economy and climate change. David presented a number of examples of good practice from around the world of solutions that tackle issues of water quantity and quality at the source, receptor and pathway.

The second presentation was given by **John Robinson**, who has responsibility for surface water flooding at Newcastle City Council, and who was kept very busy the day before the meeting! John focussed on the 'super cell' event that extensively affected Newcastle upon Tyne on 28 June 2012. The event, which was between a 1 in 100 and 120 year event impacted homes, businesses, roads, light rail, mainline rail. In order to get a better representation of which areas of the city were affected by this event, the Council have distributed a questionnaire to residents around the city. John concluded by describing a range of adaptation options that could be deployed in particular areas of the city, specifically those that may be due for development.

The next two talks were given by **Chris Kilsby** and **Stephen Blenkinsop** from Newcastle University (many thanks to Steve who stepped in at very short notice). Chris described the advances that have been made to the UKCP09 Weather Generator. The latest urban Weather Generator provides spatial fields of realistic rainfall, temperature and potential evapotranspiration for cities and regions. This version incorporates sources of anthropogenic heat:— through the effect of heat capacity of built-up areas and the direct effect of power usage. Chris outlined some of the remaining limitations of climate models not providing information on sub-daily rainfall at sites or even as area-averages and the fact that fixed



Recent intense rainfall events causing widespread pluvial flooding in Newcastle have provided valuable validation for the urban flood model, 'CityCat'.

relationships of hourly to daily rainfall are used which are not likely to be applicable in future scenarios.

However, Stephen Blenkinsop described a new project funded by NERC, 'Quantifying Robust Changes in Extreme Precipitation: The CONVEX project' which will assess high resolution climate model potential to reproduce intense rainfall alongside addressing some of the other current deficiencies of Regional Climate Models. Specifically the project will:

- explore observed precipitation datasets to understand and identify the spatial-temporal characteristics of extreme rainfall;
- assess the deficiencies of model parameterisations when simulating extreme rainfall;
- assess the influence of model resolution on the representation of extreme rainfall;
- develop a process understanding of the relationships between large-scale predictors and extreme rainfall on different spatial and temporal scales;
- assess the strengths and limitations of uncertainty estimates and to

provide new seasonal estimates of change to extreme rainfall to help inform future adaptation strategies for flood risk management.

Testing adaptation strategies for surface water flooding is a capability of the City Cat Analysis Tool (CityCAT) presented by **Vedrana Kutija** (Newcastle University). CityCAT is unique software tool for modelling, analysis and visualisation of surface water flooding. It enables rapid assessment of combined pluvial and fluvial flood risk and effects of different flood alleviation measures. It uses standard, readily available datasets which means it can be set up for any location, and is efficient to run at a range of spatial resolutions.

Vedrana presented results from the model for Newcastle upon Tyne, whereby a storm event lasting 60 minutes, which had a return period of 50 years, was applied to the model. The model indicates through time water level depths and velocities. The capability of the model is such that different features such as roof storage and permeable surfaces can be added to the gridded datasets so to test their effectiveness. Following recent flooding events in the city, photographs have been sourced that provide valuable validation of the modelled results.

Brighid Ó Dochartaigh from the British Geological Survey presented a project (conducted in collaboration with Glasgow City Council) that aims to gain a better understanding of shallow groundwater in Glasgow and is exploring the use of 3D geological information to do this. An improved understanding of groundwater in urban areas is needed to support effective sustainable drainage options, better manage soil and water contamination and better understand groundwater's role in flooding.

The project has established a borehole network to monitor groundwater levels and chemistry; existing data were typically found to be in paper format from site reports. Subsequent modelling will test the conceptual understanding of groundwater flow and storage and explore potential impacts of SuDS on shallow groundwater.

The final presentation was kindly given by **Bob Sargent** who bravely stepped in to present a paper by **Fayyaz Memon** of Exeter University, (who was unable to attend the meeting) on 'Droughts, water efficiency and resilient infrastructure for the future'. This presentation touched upon the use of water footprints to enable a new assessment of global water scarcity and how we should be actively managing both demand and enhancing water efficiency to tackle growing demand for water. The presentation showed some of the carbon costs associated with water demand management measures: for example washing machines save less water but have high carbon cost, 'hippos' save considerable amounts of water but have limited energy consumption cost. A win-win situation is leakage detection and repair which has reasonably low carbon cost and considerable water saving. However, it is equally important to have a better understanding of user behaviour as many demand measurement options rely on changes in personal behaviour and attitudes.

Claire Walsh
Newcastle University

BHS Registers of Consultants 2013

Members are reminded that they can advertise their services on the BHS Web Site, whether as an Independent Consultant or as part of a larger company, with the opportunity to update the advertised information annually. For this service we charge the (very) modest fee of £15 and £100 respectively (incl. VAT). Further details can be obtained by contacting Tim Fuller […insert contact details…] who can also provide a template for your data entry.

This year's BHS Student Prizes

Here are the abstracts from the three winning entries, from a batch of extremely high standard submissions.

The winner, **Amanda Green** from UCL, is going on to start a PhD at UCL this autumn.

Title: **Quantifying uncertainty in projections of river discharge in the Mekong River Basin under climate change**

This investigation models the potential impacts of climate change on river discharge in the Mekong River Basin (MRB) and quantifies the uncertainty in these projections associated with (i) estimation of potential evapotranspiration (PET), (ii) hydrological model structure and (iii) global climate model (GCM) structure. This is achieved through the development of two coupled MIKE SHE/MIKE 11 models of the MRB, employing the same input data and, where appropriate, spatial distribution of these data as a model of the basin developed using an alternative modelling system (SLURP, Kingston *et al*., 2011). The SLURP model of the MRB was previously used to assess the potential impacts of progressive increases in global mean temperature above a baseline of 1961–1990 using the HadCM3 GCM, and the uncertainty associated with a 2°C prescribed warming using seven different GCMs. The same climate scenarios were employed in this study. For each GCM/scenario, two PET data sets were utilised; one derived using the Linacre method (PETLin), as this was the PET data set used to drive the SLURP model, the other (PETHarg) derived using the Hargreaves method. From an initial pre-calibration MIKE SHE model, two models were developed; one driven with PETLin throughout model calibration and scenario modelling, the other driven with PETHarg throughout model calibration and scenario modelling.

A comparative analysis of the scenario results simulated by the three hydrological models (MIKE SHE Linacre model, MIKE SHE Hargreaves model and SLURP) reveals that the greatest source of uncertainty investigated is GCM structure, with the spatial pattern, direction and magnitude of annual and intra-annual changes in river discharge being highly GCM-dependent, largely due to inter-GCM differences in projections of precipitation. However, the type of hydrological model used and the PET estimation method were also found to be considerable sources of uncertainty, affecting the magnitude and sometimes the direction of simulated changes.

Runner-up: **Tom Greenwood**, University of Southampton

Title: **The impact of large woody debris dams upon flow resistance in the Highland Water**

The presence of large woody debris (LWD) in fluvial systems can have major influences on hydraulic, geomorphological, hydrological and ecological processes. The effect of accumulations of LWD on flow hydraulics is now a key issue in fluvial engineering on the basis that wood is a substantial creator of form drag, and thus, it is a major contributor to total flow resistance. This effect is considered herein, with the study focussing on an empirical investigation of the Highland Water: a low order, gravel-bed stream in the New Forest, Hampshire. Total flow resistance is quantified by using both the Darcy-Weisbach friction factor and the Manning equation. Roughness components are then partitioned using a technique designed to measure the hydraulic importance of LWD. Debris in the Highland Water is found to have an overwhelming influence on the flow, which is shown by high resistance coefficients. Relationships between flow resistance and channel properties (discharge, slope and debris) show patterns which agree with the established theory in the literature.

However, it is shown that the partitioning technique is unsuitable for the channel and so a critique of the approach is presented. It is concluded that further work should focus on advancing a technique to more accurately partition roughness elements in debris-choked streams such as the Highland Water.

Runner-up: **Simon Hodgkinson**, University of Birmingham

Title: **Spring precipitation variability and its affect on river discharge over the East Anglian region of Great Britain**

This study investigates the geographic variability in spring (MAM) precipitation over East Anglia, at the daily timescale using rain gauge data from 125 sites. The precipitation data were collated for the ten springs of 2001–2010 for the English counties of Essex, Cambridgeshire, Norfolk and Suffolk. Principal Component Analysis (PCA) is used to determine the main spatial patterns of rainfall. The first three principal components (PCs) explain 74.9% of the variance in daily totals. Precipitation displays higher spatial coherence in spring than in summer, with the first three PCs of summer daily totals explaining 72.3% of the variance, but less coherence that in winter, where 80.2% of the variance is explained. The spring PCs display precipitation maxima in south Essex (PC1), northeast Norfolk (PC2) and northwest Cambridgeshire (PC3). The rainfall maximum over south Essex is more important in spring and winter than in summer. Lamb Weather Types, for the British Isles and East Anglia, along with synoptic charts are used to explain the causes of the precipitation patterns. A precipitation regionalisation of East Anglia is also produced through Cluster Analysis (CA), resulting in five distinct regions being identified. The main patterns of spring precipitation variability were related to discharge. Daily river flow data for 11 rivers in East Anglia were collated for the nine springs of 2001–2009. Discharge for 11 rivers in the region is then modelled as a linear function of the precipitation patterns (using the PC scores) through Stepwise Multiple Linear Regression. These models explain an average of just 9% of the variance, with PC2 being the best predictor of discharge for all models. For most rivers, discharge is most strongly related to precipitation that fell either one or two days previously on average. In general, East Anglian river flows show persistence over 11 to 14 days.

UK Hydrological Bulletin: August – October 2012

The UK climate is inherently variable and that variability has achieved an extreme expression in 2012. Dramatic drought terminations have occurred before, e.g. following the droughts of 1989, 1975/76 and 1959 but runoff and recharge recoveries sustained through the late spring and summer are extremely rare.

Cyclonic weather patterns continued to dominate well into the autumn and the associated very wet conditions contributed to the highest summer half-year (April–Sept) rainfall for England &Wales since the late eighteenth century. With soils remaining close to saturation, runoff response to the exceptional rainfall was similar to what would normally be expected in the winter and flood events, both fluvial and pluvial, were common particularly towards the end of September. Aquifer recharge, normally meagre at this time of year, has been very substantial and sustained through much of the last five months; water-table responses have, however, been spatially very variable reflecting, in large part, contrasting aquifer characteristics.

August was dry in much of north-west Scotland, where substantial rainfall deficiencies had built up since the early spring, but relatively dull and wet elsewhere — contributing to the wettest summer since 1912 for England & Wales. Correspondingly, soils remained very wet over wide areas through the late summer (see Figure 1) and, following the driest March soils on record, average soil moisture deficits through the April–August growing season were the lowest in a series from 1961.

This caused continuing problems for agriculture (e.g. reduced grain yields) but it is sobering to note that, prior to the 20th century, the impact of such seasonally wet soils on food production would have implied a widespread threat of famine. Near-saturated catchments ensured that

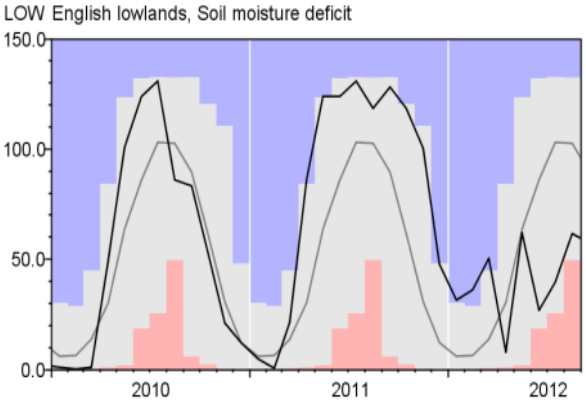


Fig 1 *Monthly soil moisture deficits with monthly max., min., and mean (based on the 1961–2010 record). Data source: MORECS*

many rivers responded rapidly to the August rainfall and moderate floodplain inundations were common; there was also a high incidence of flash flooding. Flood alerts were widespread e.g. on the 5th, 15–17th, 25–27th (when, in eastern Scotland, the River Earn exceeded its previous August peak flow) and the 29/30th (in Cumbria, the swollen River Ehen caused substantial damage at Egremont and flash flooding was severe in and around St Bees). August runoff totals were well above average in most index catchments but the residual impact of the drought was still evident in the below average flows in a number of spring-fed rivers and streams (e.g. the Winterbourne in the Berkshire Downs).

The seasonally exceptional summer runoff was very beneficial in water resources terms, ensuring that stocks in almost all index reservoirs remained well above the seasonal average. For the end of August, aggregated stocks for England & Wales were the highest on record; more remarkably, average stocks through the summer of 2012 exceeded those for all but the wettest winters. Late summer aquifer replenishment was also very exceptional and groundwater levels in most index wells and boreholes were within, or above, the normal early autumn range.

September was a generally a cool but sunny month with limited rainfall over the first three weeks. Thereafter, weather patterns became very unsettled. From the 24–26th, the most intensive September storm for 30 years (spawned from the remnant of Hurricane Nadine) resulted in 2–3 day rainfall totals exceeding the monthly average in many areas. At Ravensworth (North Yorkshire) a 3-day total of 130 mm was recorded and 24-hr totals of 98.2 mm at Killyane (Antrim) and 66 mm at Rhyl (Denbyshire) were also reported. River flows climbed rapidly, floodplain inundations were very widespread and many river flows remained close to, or above, bankfull for a week or more. In Yorkshire, the Ouse recorded its third highest level at York in a series extending back to the 1880s and several rivers, including the Swale, recorded peak flows above previously recorded maxima. In a few, mostly southern, areas flood risk was accentuated by seasonally very high groundwater levels — the associated heavy spring outflows contributing to sustained spate conditions (e.g. in Dorset). The Environment Agency estimates that around 4500 properties were flooded over the late-April to September period; in the absence of flood defences this figure would have exceeded 50 000.

Provisional data suggest that September outflows from England & Wales were the second highest since 1968 and the exceptional runoff late in the month reversed a belated seasonal decline in reservoir stocks. Early October stocks for England & Wales exceeded the previous monthly maximum (the fourth successive month in which this has occurred) and stocks in the great majority of index reservoirs were within 10% of capacity — a remarkable circumstance for the early autumn. An index of the singular nature of the seasonally anomalous runoff patterns experienced over the last year is provided by Figure 2 which compares the April–September runoff from England & Wales with that for the preceding October–March: the magnitude of the reversal in the normal partitioning of runoff between the half-years has no close modern parallel.

A westerly airflow continued to bring Atlantic frontal systems across most of the country through the first half of October, triggering further, mostly modest, floodplain inundations. On the 11th, a very intense storm (reportedly around 50 mm in an hour) triggered severe flash flooding at Clovelly (which clings to a very steep catchment on the north Devon coast) and, in west Cumbria, a landslip closed the Sellafield to Whithaven rail link on

the 17th; the second such occurrence in six weeks.

Due to a combination of rainfall patterns, soil moisture conditions and, more particularly, aquifer storage characteristics, groundwater levels have presented a spatially variable picture through the autumn thus far. Early October groundwater levels in the generality of index wells were exceptionally healthy particularly in the western Chalk, e.g. at Tilshead where levels remained well above previous early autumn maxima (Figure 3a). By contrast, water-tables are still depressed in some of the slowest-responding aquifer units, particularly in the Midlands (Figure 3b) where surface infiltration in the Permo-Triassic sandstones outcrops can take many months to descend through the unsaturated zone. Nonetheless, overall water resources are very healthy for the time of year; a situation that could not have been envisaged during the early spring of 2012.

Terry Marsh
Centre for Ecology & Hydrology
tm@ceh.ac.uk
26/10/12

For more details please visit the National Hydrological Monitoring Programme website: http://www.ceh.ac.uk/data/nrfa/nhmp/nhmp.html

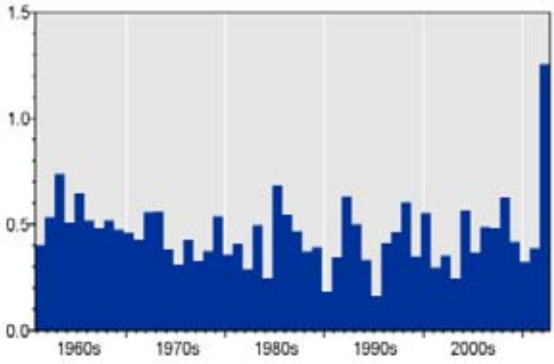
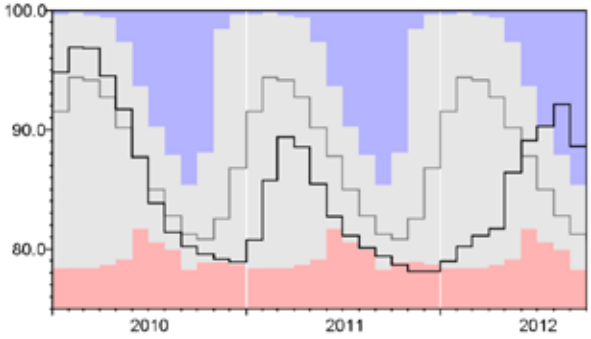
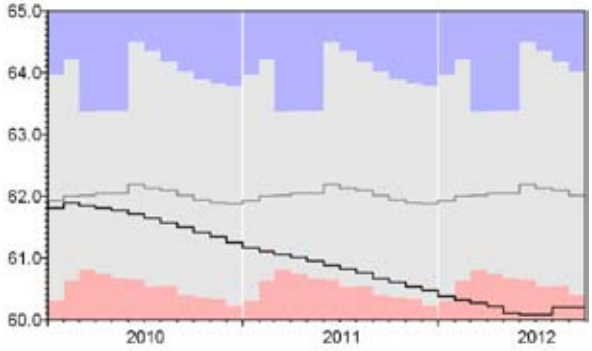


Fig 2 *Ratio of the April–September runoff from England and Wales to that of the previous October–March*



(a) Tilshead, Chalk



(b) Heathlanes, Permo-Triassic sandstones

Fig 3 *2010–12 Monthly groundwater levels (with monthly max., min., and mean based on the 1961–2010 record)*

Congratulations to IAHS for their 90th anniversary celebrated in Delft last month

We've only got another 71 years to go.....Ed.

Diary

14 November 2012
A really extreme event: Cumbria November 2009
BHS Pennines Group meeting
Time: 18.30
Location: Richard Fairclough House, Warrington
Contact: Peter Spencer (Tel: 01925 542133)

19 November 2012
Reflections on Water in the London 2012 Olympics
BHS South East Section meeting
Time: 18.30
Location: ICE, London
Contact: Jo Wakefield (Tel: 07803 258578)

24 January 2013
Integrating flood risk management
BHS South East Section meeting
Time: 18.30
Location: ICE, London
Contact: Jo Wakefield (Tel: 07803 258578)

28 February 2013
Environmental virtual observatories: managing catchments with wellies, sensors and smartphones
BHS South East Section meeting
Time: 18.30
Location: ICE, London
Contact: Jo Wakefield (Tel: 07803 258578)

7–12 April 2013
EGU General Assembly
Vienna, Austria
Note: Abstract submissions required by 9 Jan 2013.

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Peter Wolf Early Career Hydrologist's Event 2013

25th–26th March
Imperial College London

This informal conference is an opportunity for hydrologists in academia and industry to showcase recent work on any aspect of hydrology, hydrogeology or water resources through talks, micro-presentations and posters.
We are especially keen to hear from PhD/ EngD students, hydrologists at an early career stage in industry, and current and recent MScs. Relevant submissions from undergraduates and post-docs are also welcome.
Abstract submission deadline: 10th December 2012

For further information please see: www3.imperial.ac.uk/ewre/hydrologistsevent2013 or contact **Mike Simpson** (jms109@ic.ac.uk)

17 April 2013
Ecohydrology
BHS National Meeting
Location: University of Birmingham, B15 2TT
Contact: David Hannah (Tel: 0121 414 6925)

Copy deadline for* Circulation *No. 116
24th January 2013