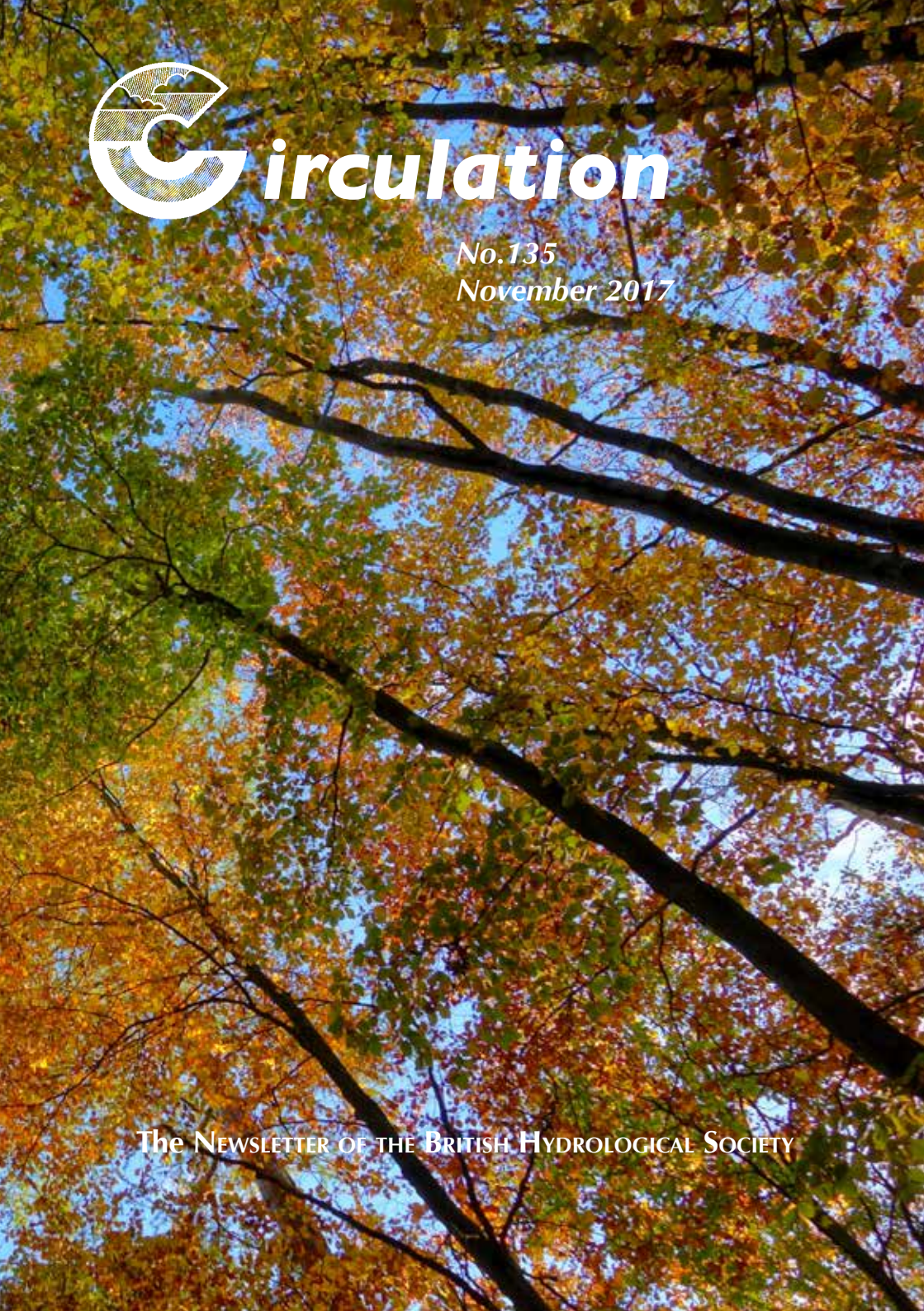


Circulation

No.135
November 2017

The Newsletter of the British Hydrological Society

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Editorial

Good news to report: we now have a Communications Sub-Committee. There are lots of ideas to improve the service the Society should be giving to members, not least better communications. I am delighted therefore with the assistance now available from Lucy Barker and Matt James and we hope we can build on the existing outlets – this newsletter, our web site and links with social media as well as exploring more novel outlets.

One particular plea from me is that I would love to have access to better photos/diagrams relating to BHS events. This quarterly jig-saw puzzle that I laughingly call 'editing' often includes less-than-informative shots of presentations (particularly obvious in this issue) which are there because of the print limitations of working with multiples of 4 pages. Yes, we could (and do) use stock material on ocassions but it would be better still to use our own material.

Celia Kirby

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President's Piece

There has certainly been no slowdown in hydrological "events" in recent months. The most publicised was the flooding in Texas and other US states associated with Hurricane Harvey. The immense rainfall quantities were a reminder of one certainty in the distinctly uncertain field of hydrology, namely that one day there will be an event worse than anything previously recorded. Bear this in mind in your design flood assessments! The contrast in terms of publicity between the flooding in the USA (death toll less than 100) and the events around the same time in south Asia (well over 1000 dead) was stark. Sadly, when you see the extent of TV and press coverage of a pet rescue in Houston there may not be much we can do, but if any BHS member has first-hand experience of this year's Asian floods maybe you could write an article for *Circulation*?

From my own experience I wonder about the situation in Bangladesh, even though it is now 25 years since I spent some time there as a small part of the Flood Action Plan that followed the devastating floods of 1988 when over 60% of the country was underwater. This was a large internationally-funded programme that is said to have received particular impetus when the wife of the French President was temporarily delayed in Dhaka because the airport was flooded. I'd like to hope that at least some of the Flood Action Plan work, including significant input from BHS members, may have helped to contain the impact severity of the recent floods; it would be good to hear from any member who has been in Bangladesh this year.

It has been a pleasure to return to the Main Committee, to see some familiar faces from my earlier stint, and many new ones. This year we have three new Ordinary members (see elsewhere in this issue), and we welcome back Ian Littlewood as Hon Treasurer. As well as previously being on the committee as CEH representative, Ian was the first BHS Editor of our Journal and I'm sure his broad experience will be a great benefit to us in the coming years. I would like to thank the outgoing Treasurer Claire Samuel for her considerable service to the Society.

At my first committee meeting as President-elect a year ago it was a little disappointing to discover that the BHS membership total reported by the Secretary was precisely the same as that at the last meeting of my previous period on the committee some 7 years earlier. I do think we should be a growing society, and I urge you to encourage any non-member colleagues to join us.

It is an honour to be your President, especially when I look at the list of distinguished predecessors, and I hope to meet a good number of you during the coming two years, particularly at the next Symposium in London in September 2018. I am delighted that Geoff Petts is leading the planning for that event, having completed his two years as President. Following a review of previous symposia, and notably that at Cranfield last year, the committee decided to reduce the duration from three to two days, with the hope that a greater number of members will be able to attend the whole

event. A downside of that is that we lose the opportunity to include a field trip in the programme (I remember in particular the trips to Boscastle in 2008 and the Tyne Valley in 2010), but I am confident that it will be an event to remember.

The rest of our meetings programme, both national and regional, has been a little thinner in recent times than in some years past, but there are positive signs for the future, including the renewed vigour of the Pennines group which has a full programme for the coming winter. Organising meetings takes a lot of work, and we want to know that they are covering subjects of interest to our members, so if you have thoughts on this do please contact me or our Hon Secretary Ian Pattison. And even better if you would like to contribute to the organisation of a meeting.

Peter Ede
President

35th Annual General Meeting
13th September 2017
Loughborough University

This year's AGM was held at the University of Loughborough during the "Whither Engineering Hydrology" National meeting on the 13th September.

The outgoing President, Geoff Petts, opened the meeting by welcoming the ~25 members attending and thanking them for their interest. Apologies for absence were noted from Claire Samuel and Celia Kirby.

Report of the 34th AGM
The report of the 34nd AGM held on 1st September 2016 was published in Circulation No 131 (pages 8–10). The report was approved by Peter Ede and Ian Littlewood.

President's Report
Geoff Petts provided his President's report reflecting on the last year:
In 2016–17 membership has been sustained at over 1000 with new student members exceeding retiring members by about 20%. However, there has emerged a pattern in the changing interests of our membership. A survey in 2016 described a diverse membership of practitioners (52%) and academics and researchers (35%) and strong representation from the Environment Agency, SEPA and Natural Resources Wales. A majority of members identified with core sub-disciplines: catchment hydrology, flood hydrology, water resources and hydrometry: other areas of strength involve links with the traditionally associated disciplines, especially hydrometeorology/ hydroclimatology, hydrogeology/geohydrology, fluvial geomorphology, and water quality/biochemistry. However, the area of major growth has been in the rapidly emerging field of ecohydrology/ hydroecology. Indeed, over the past 40 years there has been a shift away from engineering hydrology and hydrogeology towards hydrology embedded with the environmental sciences. This shift was reflected by the success of the 7th International Conference on Hydrology and Ecology – HydroEco2017 – at Birmingham University from

18–23 June, which we co-badged, thanks to efforts of our Midland Region. This trend and its implications for hydrology as a technical specialism will be debated at our Loughborough meeting in September, 2017 (see also my President's Piece in Circulation, May, 2017).

During 2016–17 there was also another particularly successful Peter Wolf Symposium for early career hydrologists. The year began with the 4th BHS International Conference 'Hydrologists make the water go round' hosted by Cranfield University. This demonstrated the centrality of hydrology to many contemporary societal challenges. Professor Charles Vorosmarty (City University New York, USA) focused on the role of intact environmental services in protecting global water systems; Professor Ximing Cai (University of Illinois, Urbana-Champaign, USA) explored the challenges of sustainable water resources management; and Professor Elias Fereres (University of Cordoba, Spain) reviewed the management of water limitation in agriculture under future food demand scenarios. These were complemented by papers highlighting other important contemporary themes including: flood risks; hydrology in cities; and river restoration.

The Society retains its 'special' relationship with its founding partners the Centre for Ecology and Hydrology (CEH) and the Institution of Civil Engineers (ICE). BHS is now a 'Specialist Knowledge Society' of the ICE, and during the year there have been initial discussions about how the Society might engage with the Institution's 'Thought Leadership' programmes. We are also active in maintaining links with a range of other organizations*.

In 2016 we undertook an effectiveness review of the Main Committee based on the standard 'governing body' review format. In response to the review, during the past year we have reviewed our Statutes, Main Committee structure and mode of operation. Two widely held concerns within Committee and among the membership were, first, the need to strengthen our planning of the annual programme of national and regional meetings, including joint meetings with cognate societies and associations, and, secondly, the need to review our policy for distributing funds to support the range of activities promoted by the Society. A new sub-committee structure will drive these and other issues forward. Our next two-day National Symposium will be held in central London on September 12th-13th, 2018.

I should like to thank Tim Fuller, our ICE Secretary of two decades who retired this year, and the members of the Committee, especially our Treasurer, Claire Samuel, for their many contributions. I look forward to supporting our new President, Peter Ede, during 2017-18 in moving these changes forward.

*Links with other organizations:-

CIWEM Water Resources Panel,
IUGG UK Panel,
UK Surface and Groundwater Archives Committee (UK SAGA),
UK Committee on National and International Hydrology,
All Party Parliamentary Water Working Group,
Solid-Earth Geophysics Forum
IWAP 'committee' overseeing publication of *Hydrology Research*.
The BHS as a Society also has 'representation' (from the membership) 'nominated' to British Standards committees that work on open channel flow measurement.

Honorary Secretary's Report

Ian Pattison reported on the Society's activities over the last 12 months. He started by outlining the range of technical meetings and symposia convened over the last 12 months as these continue to represent a key area of activity for the Society. Douring the year BHS had held four National meetings. Firstly, a joint BHS-BSG meeting on 'Hydrogeomorphology of Flood Risk' was held after the annual BSG conference on the 7th Sept, which was particularly well received and attended. CEH organised a meeting on the 22nd of November on 'UK Flood Hydrology: 40 years after the Flood Studies Report'. BHS was an organising partner of the HydroEco conference from the 18th-23rd June 2017, entitled "Ecohydrology on the edge: ecology-hydrology-human interactions in a changing world". Finally, the BHS organised the "Whither Engineering Hydrology" meeting in Loughborough on the 13th September. In addition to these National meetings, there were four regional meetings organised by the Society's six current Sections covering topics such as Water Temperature, Resilient Cities, and Drought and Agriculture.

The Peter Wolf Symposium was held on the 3rd-4th June at CEH – many thanks to Lucy Barker, Olivia Hitt and Stephen Turner for organising this. This was the biggest Peter Wolf Symposium so far, showing that the future of our discipline is bright.

On behalf of the Society, Ian thanked all of those involved in organising, convening, presenting at, chairing, administering and reporting on meetings. The success of the programme is down to BHS members so their involvement is much appreciated. However, it has been increasingly difficult to put together a BHS national meeting programme, so suggestions and volunteers are needed as the 2017-18 programme is looking pretty sparse.

In relation to communication, the Society continues to seek ways to improve the ways it keeps in touch with Members. We have made improvements and developments to our website and we welcome any feedback or suggestions on its usefulness and appeal. Furthermore, we have developed our presence on social media, with 1549 (+118) members on LinkedIn and 1151 (+338) Followers on Twitter.

Ian extended special thanks to Tim Fuller at ICE, who retired this year, for his assistance with BHS administration and welcomed Moira Doherty as the new ICE BHS Secretarial support. Web support from Celia Kirby and John Griffin is greatly appreciated, along with Celia's editorial work on *Circulation*.

Ian concluded by noting the good health of the BHS with Membership of the Society pretty constant and the ability of the BHS to attract new Members from across the hydrology sector. The success of the BHS is down to its members and we welcome any thoughts, feedback or ideas.

Honorary Treasurer's Report

Peter Ede presented the Honorary Treasurer's report and annual financial statement which had been compiled by Claire Samuel.

A moderately active year has seen an operating profit over the 12 month period. Over the past few years we have looked to reduce our reserves at the request of the independent auditor, but we are now looking to stabilise our accounts and build towards operating on a break-even basis in the years to come. For a number of reasons we have made an operating profit for the year 2016/17.

Comments on Accounts:

Income:

Subscriptions: These have been almost static year on year.

Website Advertising: Income from website advertising has increased by over 50% on 2015/16. We hope that the positivity in the jobs market will continue, an area in recent years whose income has been volatile. (Job adverts cost £150, with a 50% discount for academic and charity posts).
National Meetings: Our meetings programme was not as full as we hoped, but those meetings we did operate were very successful.
BHS National Symposium: There was a small operating profit on the 2016 BHS Symposium.
Studentship scheme: We were fortunate to receive an additional £6,000 from the Environment Agency to support the Studentship Scheme, with ourselves and the JBA Trust. This income was received in 2016/17 and is accrued, but is being used to support the current awards which will fall in the 2017/18 financial year.
Donations: We wish to re-iterate our thanks for the generosity of the authors of "Progress in Modern Hydrology – Past, Present and Future", John C. Rodda and Mark Robinson. The authors requested the funds be allocated to the benefit of young hydrologists, and the monies will be used to continue the Studentship Scheme.

Expenditure:
Travel Awards: There was a very significant increase in demand for BHS Travel Awards in 2016/17. We are looking to update the way applications are assessed to ensure awards are fair and transparent as demands on this finite resource increase. Due to the uncertainty in income from our meetings programme, there was a decision to reduce the number of awards for the last financial year.
Newsletter: The newsletter remains one of our largest annual committed outgoings.
National Meetings: A reduction in expenditure due to fewer events.
BHS Symposium: One-off costs to support the meeting.

Changes to Membership of the Main Committee
Ian Pattison reported that a call for nomination to the Main Committee had been circulated to all Members.
Under the Statutes of the Society the following elected officers and members of the Main Committee were due to retire at this year's Annual General Meeting:
Geoff Petts, President
Claire Samuel, Honorary Treasurer
Richard Davis, Kathryn Pimble and George Woolhouse, Ordinary Committee Members and Michael Grocott, the Young Hydrologists Representative
Ian recorded the society's thanks to Claire, who had been Honorary Treasurer for four years, and Richard, Kathryn and George for their help on the main committee, particularly with George organising the 2016/2017 BHS Studentship scheme. Thanks were extended to Michael, as the first BHS Young Hydrologists Representative, a role which the BHS views as important. Peter Ede gave special thanks to Geoff Petts for his tenure as BHS President, although Geoff will stay on the committee for another year to assist transition.

A single nomination was made for Honorary Treasurer, with Ian Littlewood taking on this role for the next two years. Three nominations were made for the Ordinary members, Matt James, Jonathon Dick and Lucy Barker, who are all duly elected to the committee. The final change to the Main Committee this year is Peter Ede taking on the role of BHS President.

Any Other Business
No other business was received. Peter Ede closed the meeting.

New members to Main Committee



Lucy Barker – Young Members Representative

Lucy Barker is a Hydrological Analyst at the Centre for Ecology & Hydrology in Wallingford. I am lucky to work on an exciting range of projects national and international projects which at the moment focus on drought propagation and characterisation and improvements to drought monitoring and early warning systems. I also contribute to the National Hydrological Monitoring Programme as part of the author and production team for the monthly Hydrological Summaries and I am a regional representative for the National River Flow Archive for north-east England. I helped to organise the BHS Peter Wolf Symposium this year which was a great experience. I hope to encourage increased membership and continued participation of early career hydrologists in BHS activities going forwards.



Jonathan Dick

I'm a catchments hydrologist, and currently a Lecturer in Physical Geography at Liverpool John Moores University. My research interests centre on ecohydrological processes, both instream and within the landscape.



Matt James

I am a Principal Hydrologist in the water resources planning team at consultants MWH, now part of Stantec, currently helping UK water companies with preparation of their Water Resources Management Plans. My current interests and activities include water resources modelling and drought analysis, but over the past 15 years as a hydrologist I have also been involved in flood risk modelling, mine flood alleviation and sediment transport modelling. I have recently enjoyed introducing the next generation of hydrologists, whether they be recent graduates or work experience students, to the rather idiosyncratic world of water resources planning. I previously served on the BHS National Committee from 2012 to 2015 and look forward to continuing to contribute to the Society and the future of hydrology.

We welcome ***Ian Littlewood*** as our new BHS Treasurer. Ian is no stranger to the Society being an inaugural member of BHS. From 1999 to 2007 he was the CEH representative on the BHS and from 2007 to 2015 he was the (BHS) Editor of *Hydrology Research*. Ian began his career with NERC as a research catchment field hydrologist/ data analyst at the Hydrological Research Unit (precursor to the Institute of Hydrology, subsumed by the Centre for Ecology and Hydrology). He then worked for the DoE Water Data Unit (Surface Water Flow Archive); and then for Welsh Water Authority as an engineering hydrologist before moving back to back to CEH as an environmental hydrologist until 2007. Ian's ongoing research interests include: rainfall–streamflow modelling and prediction in ungauged basins (he was a leading participant in the IAHS PUB Decade 2003–2012).



Congratulations to the winners of our 2017 Student Prize

First place goes to **James Whitfield** of the University of Plymouth for his dissertation "The Effect of Land Use on the Aggregate Stability of Soils: A Study of the Bidwell Brook Catchment"

Our two runners up are:
Wilson Chan Chun Hei, UCL, for "Modelling the hydrological impacts of climate change on the Lake Eyre Basin" and **Laura Gledhill,** University of Cambridge, for "Spatial evolution of supraglacial lakes in response to climate change, Northwest Greenland, 1985-2016"

New members

Nathaniel Hillman
Magdalena Grabowiecka.....Peter Brett
Benjamin Jackson.....Lancaster University
Michael Scott.....Barnsley Bate
Michael Singer.....Cardiff University
Ella Hannay.....RPS
Duncan Chapman.....JBA Consultants
Sophie Pearce.....Univ of Worcester
Jeyakumar Arumugaram.....Applus Velosi Ltd
Nazimul Islam.....Leeds University

IAHS Scientific Assembly

Port Elizabeth, South Africa
10–14 July 2017

This Assembly of the International Association of Hydrological Sciences (IAHS), the first to be held in sub-Saharan Africa, brought together over 200 hydrological scientists from around the world to address the conference theme of "Water and Development: scientific challenges in addressing societal issues". Hydrologists always seem to materialise at times of extreme hydrological conditions and this event was no exception, with South Africa in the midst of a drought and exhortations to save water in Port Elizabeth (see image), where the Assembly was located. There were strong efforts to help early career scientists from lesser developed countries participate in the Assembly, with support funding from IAHS for promising hydrologists identified by WaterNet, a regional network in southern and eastern Africa of university departments and institutes specialising in water research and training.

The conference programme comprised parallel sessions of talks on topics ranging from "Water security and the food-water-energy nexus" to "Prediction in ungauged basins", "Land use impacts on water quality" and "Extreme events: links between science and practice". These were accompanied by poster sessions, providing more opportunities to discuss research findings, network and make new collaborations. As outgoing President of the International Committee for Water Quality (ICWQ) I primarily attended sessions on this topic. ICWQ co-convened two sessions: one on "Water quality and sediment transport issues in surface water", which particularly highlighted the impact of dams in northern Africa on sediment transport, and the other on "Long-term evolution in catchment water quality". I presented in the latter session about the effects of upland peat disturbance on concentrations and fluxes of aquatic carbon, nitrogen and phosphorus.

In the evenings many participants came together for more open discussion sessions



The water use target for the Nelson Mandela Bay municipality which includes Port Elizabeth is 60 litres per person per day (compared with c.150 litres per person per day in the UK)

to shape the future of IAHS and promote more collaborations between countries and between different sub-disciplines within hydrology, such as using remotely sensed data for model calibration and testing. Notable at this Assembly was an expanded series of events organised in association with the Young Hydrologic Society particularly targeting early career hydrologists. "Side events" also included an open meeting of the Network of National Hydrological Associations (NHAs) which aims to enable NHAs, such as BHS, to share experiences and good practice in the development and application of the hydrological sciences. More information about the Network of NHAs is at: http://iahs.info/Links/National-and-Regional-Hydrological-Associations/Network-of-National-Hydrological-Associations/

There are 23 NHAs in the network of which about half were represented at the Assembly. Topics discussed by the network included the chartered status of hydrologists (an old favourite). The situation varies between countries. In the Netherlands it has been decided not to go down the chartered hydrologist route at the moment, but a foresight perspective is being conducted of hydrology in the Netherlands, updating a similar exercise from 10 years ago. Ongoing work is being conducted between IAHS, the World Meteorological Organisation and UNESCO to come up with internationally agreed competency standards for Hydrologists and Hydrological technicians, with reporting planned for 2019. The NHAs also discussed "lobbying by hydrologists" with multiple aims of educating the public about hydrology, attracting young people into hydrology degrees/research/profession and securing funding for hydrological monitoring and research. Mechanisms suggested for such lobbying included: (1) IAHS/NHAs being prepared to respond rapidly to water crises by identifying experts to put forward at short notice to answer questions and provide informed hydrological comment; (2) posting career profiles of hydrologists on webpages (an activity which BHS is already undertaking).

During the IAHS Plenary and Bureau meetings at the Assembly, updates were provided on the current status of IAHS. IAHS is on a sound financial footing, largely due to the success of the association's journal – Hydrological Sciences Journal – which now has an increased impact factor of 2.222. Also of interest to Circulation readers is that IAHS Ltd. is now a limited company and a registered charity both regulated by England & Wales law, with the office continuing to be hosted by the Centre for Ecology & Hydrology at Wallingford. Claire Lupton (email: info@iahs.co.uk) is the IAHS Executive Secretary and is very happy to receive any IAHS membership queries (membership is free) or you can join at: http://iahs.info/Members-Area/register.do

IAHS meets again in Montreal, Canada, in July 2019 as part of the next International Union of Geodesy and Geophysics Assembly, and will hold its next IAHS-dedicated Scientific Assembly in Montpellier, France, in 2021.

Finally, I am grateful to the support from the BHS Exeter Fund which enabled me to participate in the 2017 IAHS Scientific Assembly and fulfil the role as UK IAHS representative.

Kate Heal,
School of GeoSciences,
University of Edinburgh

Whither Engineering Hydrology

BHS National meeting, Loughborough University 13th September 2017

This meeting brought together members of the Society — both academics that are responsible for teaching the next generation of hydrologists and those from industry who manage hydrological issues on a daily basis — to discuss and debate the future direction of the hydrology discipline.

The meeting started with five invited speakers. BHS President, **Geoff Petts**, gave an excellent introduction, which included a reference to a recent presentation to UK vice-chancellors by Sir Mark Walport in which he has placed "Hydrology and Meteorology" at the top of a list of six "Needs of society". **John Waddingham** of the Environment Agency gave an industry perspective, discussing themes relating to recruitment, investment and the role of the media. One of the key points related to how the Agency can maintain standards/quality with a recent reduction in employed hydrologists and diversification. **Duncan Faulkner** followed up with an excellent talk, completely without the use of Powerpoint, discussing hydrologists' diverse backgrounds and qualifications and the relevance of research to applications. **Chris Kilsby** then talked about hydrology as an engineering discipline, particularly within the university education system. The final talk was given by **Thorsten Wagene**r, who gave a thought-provoking talk on how hydrology has changed in recent years and the uncertainties we face as hydrologists.

The afternoon session consisted of two controversially titled debates, firstly, "Too much biology has diluted our science...let's put the physics back!". Lively discussions were had between traditional engineering hydrologists and more applied scientists. However, this breadth of hydrology and relevance to real-world problems was seen as a real strength of the discipline going forwards, and issues surrounding funding are possibly changing the focus of research. There was a conclusion that the hydrology community needs to be more supportive of each other and that we have to become better at selling what we do, both as a STEM subject in schools and also to the media. Going forwards, the society needs to play a bigger role in inspiring the next generation of hydrologists.

The second debate was entitled "Generic managers can't solve hydrological problems…. We need more technically trained Engineering Hydrologists". Discussion centred around the perceived skills gap, with employers struggling to find suitably specialised hydrologists. This loss of capability is concerning, and needs to be addressed at an education level but also highlighted to senior managers.

Overall, there were some encouraging outcomes and other questions which need further thought. First, it was felt that that hydrology is highly relevant to 21st Century problems. Many of the global challenges facing us relate to water and hydrology e.g. flooding of cities, supplying developing countries with safe water. It was concluded that the hydrology discipline has



evolved from the traditions of Engineering Hydrology, focussing on the physics of water movement and hydrological processes to a more diverse and applied discipline. However, rather than this being a negative outcome, in that the discipline has been diluted, this should be seen an important strength and we should celebrate this diversity. It was also concluded that there has been a decline in critical core skills and this needs to be addressed to maintain the health of hydrology. An example of this was that flood models, like FEH, are often run by non-specialists, with "a little knowledge being a dangerous thing".

The meeting was enjoyed by all, with stimulating discussion highlighting potential ways forward for how the BHS can help UK hydrologists evolve for the 21st Century. Action points originating from the meeting for the BHS to develop further were:

(1) communicating our specialism and inspiring the next generation;
(2) conducting a membership survey to assess the state of the discipline more widely;
(3) developing a position paper on what a hydrologist is and should do.

This meeting was seen as an excellent starting point in raising important issues and starting to think about the role the BHS can play in addressing them.

Watch this space…

Natural Flood Management in Practice

26 September 2017

Hydrologists in the North gathered at Arup's Rose Wharf offices in Leeds for a Peninnes Group evening of presentations courtesy of Paige Garside (Arup).

Alexander Nicolson kicked off with work undertaken in partnership by Arup, Staffordshire County Council and Newcastle University on the Village Brook in Staffordshire. Alex showed how often small-scale catchment measures such as intercepting overland flow with leaky barriers, bunding, and restoring sinuosity and floodplain storage can significantly reduce even 1:100 year events further downstream. These interventions were also demonstrated to have the lowest whole-life cost.

Josh Wells (Nottingham Trent University) followed with his award winning research in Southwell, Nottinghamshire, where contemporaneous inflows from three tributaries had contributed to flooding of around 300 properties. Josh showed how catchment interventions could slow run off, spreading flood volume and altering the timing of inputs to reduce peak flows downstream. Over the longer term, woodland was also seen as a useful measure to increase infiltration rates, which were very low in the crusted clay soils of the fields.

Finally, **Emma Wren** (Mott MacDonald) and **Simon Jepps** (Thomas Mackay Ltd) described work in the River Aire upstream of Leeds, highlighting how NFM was only one of the potential benefits of catchment measures; from a hydrological perspective other benefits included reducing sediment/ nutrient inputs and improving water quality, but there were also wider social benefits to be gained from encouraging the participation of local stakeholders.

Comments from the floor were equally thought-provoking, and as you'd hope, didn't let presenters have it all their own way: encouraging as some of the results presented were, there is clearly the need to prove the effectiveness of some of the interventions, ensure that distributed assets are maintained and maintain the involvement of stakeholders long after the initial stimulus of flooding has passed.



Overall then, a successful evening, and one which represented something of a relaunch for BHS Pennines after a bit of a hiatus.* A good curry was merited and duly partaken of."

Dan Cadman
BHS Pennines Chairman

Reservoir and Flood Hydrology

18 October 2017

This Pennines Group meeting at Leeds University which discussed and explored some current issues was well supported, with 75 attendees providing questions, debate, and opportunities to meet with others and share ideas.

> For the first session, **Andrew Coen** and **Faye Lync**h (Environment Agency) presented an outline of their ongoing work on "Utilising water supply reservoirs for flood risk management - balancing needs". There was a lot of interest in this topic, which has entered the wider public consciousness following the 2015 floods. The focus was on the Upper Calder Valley, where the steep-sided topography provides little opportunity for conventional upstream storage solutions. Through modelling, they could demonstrate that drawing down reservoir levels in advance of a flood could provide considerable opportunities to reduce flood risk to key communities such as Hebden Bridge, but that there are also challenges and complexities to be overcome, including technical and regularity issues for both water companies and risk management authorities.

The talk prompted interesting discussions about how to prove that such actions are effective, the importance of reliable forecasts, and the risks that the storage could be filled by rainfall in advance of the main flood-generating storm.

For the second half of the evening, **Duncan Faulkner** (JBA Consulting) reviewed the current guidance for estimation of Probable Maximum Precipitation (PMP) and Flow (PMF) in the latest FRS4 guidance under the title "Reservoir flood estimation: Time for a re-think?". Duncan challenged the methods, demonstrating their limitations, and arguing that they need to be revised, citing examples where observed data



have exceeded the estimated PMP and PMF. In particular, his concerns were:

(1) the age of the methods, which were developed in the 1970s and the advances and increased datasets which are now available;
(2) the assumptions used to derive key parameters, estimation of snowmelt and % runoff and the linear relationship between Tp and rainfall intensity; and
(3) that the methods do not consider the effects of climate change.

Duncan brought this all together by presenting a challenge – when considering reservoir safety, and the possible consequences for public safety, we should not to bury our heads in the sand and hope that methods from over 40 years ago will keep us safe.

These talks form part of an ongoing programme of events, which are below. We thank those

***Future meetings for the Pennines Group:**

30/11/17 – Bringing flood modelling to your local community – Leeds Workshop. (partnership with CIWEM and CH2M)
01/02/18 – Bringing flood modelling to your local community NewcastleWorkshop. (partnership with CIWEM and CH2M)
Feb 18 – Groundwater Warrington

who have supported our recent events and hope that you will be able to join us in future. We also would welcome any ideas for future meetings to include in next year's programme.

Chris Allman
BHS Pennines Committe Member

"Evaporation could be an energy source comparable to current wind and solar"

In the first detailed study considering natural evaporation as a potential energy resource, a team of researchers at Columbia University find that natural evaporation from open-water surfaces could provide power densities comparable to current wind and solar technologies (average flux of 80W/m^3, c.f. 2.9W/m^3 for wind, 8.06 W/m^3 for solar panels)

Citing the advances in water-responsive materials and devices which generate work from evaporation by repeatedly absorbing and rejecting water via evaporation, the Columbia University team looked at the possibility of controlling power output from an evaporation-driven machine which uses water's large heat capacity to store and release energy. This controls power input and improves reliability. From this, they estimate that 325GW* of evaporation power is potentially available in the US from the large lakes and reservoirs (excluding the Great Lakes).

As research continues into materials and devices that could convert energy from evaporation while protecting freshwater resources, it is possible that evaporation could form part of the clean energy mix of the future.

*equivalent to c.70% of US electrical energy generation in 2015

[extracted from *Engineering & Technology* (27/09/17) reporting on a paper in *Nature Communications*]

Aquator™ User Group Autumn Meeting

The eleventh Aquator User Group Meeting was held on Tuesday 10 October 2017 at Dwr Cymru Welsh Water (DCWW)'s Ty Awen Newport offices. Jointly promoted by Oxford Scientific Software (OSS) and Hydro-Logic Services (HLS), the event was attended by over 40 delegates drawn from the UK water industry regulators, the Canal & Rivers Trust, water companies and consultancies.

The event commenced with a DCWW safety discourse followed by formal introductions to the event. Dr Colin Fenn of HLS and Dr Will Clark of OSS provided an overview of the programme for the day with a special welcome to Dwr Cymru Welsh Water delegates who are now registered Aquator users.

A keynote address titled "Meeting decision support challenges in DCWW – why we need innovation and how system modelling can play its part" was delivered by Dr Ian Brown (Head of Water Resources at DCWW) and Chris Hughes of Amec Foster Wheeler. The talk highlights important expectations along the DCWW's journey in migrating the company's water resources modelling platform from WrapSimTM to AquatorTM.

This was followed by presentations on a range of Aquator related developments and case studies, including:

- Kunle Akande and Antonino Scarbaci of HLS on resilience analysis using AquatorXV
- Claudio Arena of the University of Palermo Italy on assessing the risks that may affect a regional supply system
- Rob Brown of Hydrology.UK on demand factor reduction method for DO estimation
- Rob Tothill of Atkins on extended methods of options assessment

The presentations were complemented by a user topic discussion panel covering 3 topics: managing large Aquator climate change modelling runs, drought management modelling using Aquator and WRMP19/PR19 scheme options modelling using Aquator.

David Mould from the Canal & Rivers Trust (CRT) presented an update on the activities of the informal technical meeting group which comprises of Aquator users drawn from CRT, United Utilities, Severn Trent Water and Anglian Water. David noted that Rob Brown has now joined the group.

Dr Peter Edgley of OSS spoke about recent and on-going developments of the Aquator software to make it future proof. These include: release of AquatorXV and AquatorXM, development of Aquator Add-Ons such as the Resilience Analyser and a time-dependent groundwater module to facilitate comprehensive assessment of conjunctive use of mixed reservoir, surface water and groundwater d ominated systems.

Aquator User Group meetings are held annually, with a bi-annual combined Training Day and User Group meeting. It provides ample opportunities for users to meet and discuss their experiences of working with Aquator. For further information on the User Group, and Aquator in general, contact Dr **Kunle Akande** at kakande@hydro-int.com or visit http://www.oxscisoft.com/.

Reviewing the role of trees in flood alleviation

As we approach the winter season, natural solutions in flood alleviation schemes are highly topical again.

A further contribution to the evidence for tree cover as an effective flood mitigation measure comes from a CEH recently published review*. Looking specifically at the influence of trees in a catchment on flood peak, there is broad support for the conclusion that increased tree cover in catchments results in decreasing flood peaks, while decreased tree cover results in increasing flood peaks.



Considering just observational studies (approximately half of the total number of 71), the authors note that the difference between the numbers reporting an influence and those reporting no influence of trees on flood peak becomes less clear. Analysis of the small number of observational studies that differentiate on the basis of flood magnitude suggests that whilst there is strong evidence of an influence during small floods, the majority of observational studies relating to large floods report that trees have no observable influence on flood peak. **

Full report reference

Stratford, C., Miller, J., House, A., Old, G., Acreman, M., Dueñas-Lopez, M. A., Nisbet, T., Newman, J., Burgess-Gamble, L., Chappell, N., Clarke, S., Leeson, L., Monbiot, G., Paterson, J., Robinson, M., Rogers, M. and Tickner, D. 2017. Do trees in UK-relevant river catchments influence fluvial flood peaks? Wallingford, UK, NERC/Centre for Ecology & Hydrology, 46pp.

*CEH Project no. NEC06063 carried out in collaboration with Forest Research, the National Farmers' Union (NFU), National Trust, Woodland Trust, WWF-UK, Environment Agency, Coed Cymru and Lancaster University Environment Centre

**The Plynlimon experiment, set up 50 years ago, came to much the same conclusion - *Ed*.

News from Members

MSc Hydrogeol course at Birmingham

We've heard that some members were dismayed at the decision to close this course. Here is an extract from the reply from the university

"...subject to University Council consideration, we will:
•continue to deliver the MSc Hydrogeology programme with improved delivery effectiveness; this is a revision to the original proposal in response to internal and external support for the MSc, and shows the University's commitment to address the apparent skill shortage for UK (and overseas) industry in the area of Hydrogeology

• retain the Year 2 undergraduate module (An Introduction to Hydrogeology) that opens a pathway to M—level modules in Hydrogeology
•organise the School's research activity into four complementary themes: Environmental Health Sciences; Geosystems; Physical Geography; and Human Geography (including the Centre for Urban and Regional Studies), and disinvest in Hydrogeology research, as proposed originally "

Bye-bye mercury

Elemental mercury – the silvery stuff we (well, those of us of a certain age) played with in the chemistry labs at school - has long been known to be rather nasty stuff. If we survived poking it about with our pencils in the fifties, we later got used to the feel of it (admittedly amalgamated with silver, tin and other metals) in our mouths as dentists had for many years favoured its use as an effective filling material. It is still allowed for this purpose although many dentists won't use it (it's probably more of a hazard to those mixing the amalgam than it is to the patient) and the EU is about to vote to have it banned by 2030. If we have Brexited by then, we will probably muddle along for another century!

Despite the slow pace of change, there is a general worry that, by just mucking about with mercury in our manufacturing processes, we are increasing the likelihood of the elemental stuff entering the food chain and so any human practice which involves the handling of it is now viewed with suspicion. Which brings us to the point – mercury is being banned from thermometers (and other meters, switches and gauges). Following a shot across the bows by the WHO in 2005, legislation has been introduced in various regional and national legislatures over the last ten years. In October 2013, a UN conference in Japan adopted the 'Minamata Convention' whereby most mercury products (although not those only mildly deadly dental fillings) would be phased out by 2020 and ALL mercury mining would end ten years later. The EU/UK signed up to this convention and adopted a date of 10 October 2017 for final removal of mercury thermometers to measure temperature in weather stations. Why this date? Why do it before suitable replacements had been identified and sourced? Who knows? Perhaps they thought there was plenty of time for modern technology to crack the problem.

It turns out that alcohol



My Stevenson screen with one surviving alcohol thermometer – and the crap electrical one!

thermometers (which have been used for years when recording minimum temperatures) are also fine for dry and wet bulb measurements – but not maximum. Rather than wait until the technical challenges could be resolved and replacement systems installed in parallel (for check correlations), the Met Office decided that they had no room for manoeuvre and went ahead with planning the removal of all mercury thermometers by the due date. Unfortunately, apart from not having a reliable maximum recording system in place, they also didn't have enough alcohol thermometers to replace the wet-bulbs.

This state of affairs was viewed with dismay by many long term observers in the Met Office's network of manually-operated climate stations (including your correspondent) who had always endeavoured to maintain a continuous record of everything, such commitment involving much disruption of other plans, recruitment and training of stand-in observers etc.. One observer even barricaded his property against the arrival of those whose duty it was to collect the thermometers. Others were partially placated by the provision of temporary resistance-based thermometers offering 'dry-bulb' and max/min read-outs (although mine was rubbish). But, at the time of writing, I still have no wet-bulb thermometer and have a growing gap in my record which could easily have been avoided.

How did it come to this? Why didn't those responsible for maintaining good-quality continuous data sets stand up to their colleagues who were determined to enforce artificial deadlines? Why, after 300 years of mercury thermometers, did someone decide that it was safer to collect and remove hundreds of them (with the attendant risks of breakage) rather than leave them safely doing their job inside stout enclosures for a few more weeks?

As you might detect, this observer is pissed off!

Mike Lowing
Dorset

'Hydrology Research – an international journal'

In December 2015, 235 BHS members kindly participated in a survey regarding the journal, and we have subsequently been using this informati on to implement a number of changes, detailed below. Thank-you to all those members who participated in the survey. If you'd like to see a full report of the findings, please email me directly (email below). For new members, and those less familiar with the journal, it is the official journal of the British Hydrological Society, the Nordic Association for Hydrology and also of the Italian and German Hydrological Societies, although we take papers from all over the world and membership of any of these societies is not a prerequisite for manuscript submission. It is published by the International Water Association, a global non-profit and the largest professional water association in the world.

Since the survey we have

- adjusted the aims and scope of the journal in relation to feedback from members,
- revised the 'Instructions to Authors' to emphasise the requirements for novelty but also consideration of the practical application of any findings,
- appointed 5 subject-specialist Associate Editors [Professor Jan Seibert (University of Zurich, Switzerland), Professor Bjørn Klave (University of Oulu, Finland), Professor Elena Volpi (Roma Tre University, Italy), Professor Jie Chen (Wuhan University, China) and Dr Wojtek Kawecki (United Kingdom)], and
- we are currently implementing a more structured review system which will hopefully lead to more helpful reviews.

Staying connected with the Journal

One of the challenges raised in the BHS membership survey was that many members did not have access to the journal – either through a personal or institutional subscription. Subsequently a special BHS member price for personal subscription was arranged [£159 (print), £126 (online)]. For those interested in taking up this offer please email iwap@turpin-distribution.com quoting 'BHS' and your full name with your order. We appreciate that this is still a significant sum, and increasing access via institutional subscriptions would be the most effective. You could help us with this by determining whether your institution has a subscription, and if not, asking for it to be included. Please feel free to contact me if you have any other suggestions about improving access to the jou Journals, you will need to register, but following that you can edit your preferences to determine the types of alters you want via the 'Add New Alert' link. Of course any open access papers will be freely available via that the Table of Contents link.

Increasing the relevance to practitioners

Another issue raised by BHS members in the survey was that many felt that the journal

had less relevance to practitioners. We are trying to address this in a couple of ways. Firstly, we now expect that all papers will explicitly address the practical implications of their findings. Secondly, we'd also like to encourage BHS members from areas of practice to submit papers that document key challenges or development in practice. We also have an underutilised 'Invited papers' option, so if you have something important to say, please contact me to discuss this option. Although all papers would be subject to review, 'Invited Papers' offer the possibility of being more thought-provoking and challenging, with less emphasis on empirical or other evidence. If you have any other ideas about increasing the relevance for practitioners, please don't hesitate to get in touch.

Fourth BHS International Conference Special Issue

We have achieved a rapid turn-around with the publication of papers arising from the Fourth BHS International Conference with all papers either in the final stages of production or already available online. In particular I'd like to draw your attention to one of the papers because of its relevance to members and because it is also open access:

Harrigan, S, J. Hannaford, K. Muchan and T. Marsh (2017) Designation and trend analysis of the updated UK Benchmark Network of river flow stations: The UKBN2 dataset. See: http://hr.iwaponline.com/content/early/2017/10/23/nh.2017.058

Unfortunately we did not receive many papers for the Special Issue — seven submissions of which five were published. Although all papers are available online already (or will be very shortly), the print edition of the Special Issue will be combined with the Special Issue arising from the 2016 29th Nordic Hydrological Conference, and will be published in the first half of next year.

Changes to the Editorial Board

We were delighted to welcome Dr Thomas Kjeldsen (University of Bath) to the Editorial Board during 2017.

Editors Summit at EGU2017

Over the past five years, the Editors of a number of journals in the discipline of hydrology have met informally to discuss matters of common interest, and particularly, to address challenges facing the discipline in relation to the rapidly changing publishing landscape. The first of these meetings took place in Gothenburg in July 2013 during the Assembly of the International Association of Hydrological Sciences (IAHS), and was followed by a Joint Editorial (Blöschl et al. 2014) published by five journals (Hydrological Sciences Journal, Hydrology and Earth System Sciences, Hydrology Research, Journal of Hydrology and Water Resources Research). The second meeting took place in Prague in June 2015 within the Assembly of the International Union of Geodesy and Geophysics (IUGG) and resulted in a Joint Editorial (Koutsoyiannis et al. 2016) published by seven Journals (Hydrological Sciences Journal, Hydrology and Earth System Sciences, Water Resources Research, Journal of Hydrology, Proceedings of the International Association of Hydrological Sciences, Journal of Hydrology: Regional Studies, and Vadose Zone Journal).

The most recent meeting was convened in Vienna in April 2017, during the General Assembly of the European Geosciences Union (EGU). This meeting was attended by twenty Editors and Associate Editors, representing 14 journals:

- Advances in Water Resources - Graham Sander
- Ecohydrology - Keith Smettem
- Hydrological Sciences Journal - Demetris Koutsoyiannis, Attilio Castellarin, Ross Woods
- Hydrology and Earth System Sciences - Erwin Zehe
- Hydrology Research - Nevil Quinn, Chong-Yu Xu
- Journal of Hydrology - András Bárdossy
- Journal of Hydrology: Regional studies - Patrick Willems
- Journal of Hydrology and Hydromechanics - Lubomir Lichner
- Journal of Hydrometeorology - Andy Wood
- Physics and Chemistry of the Earth - Hubert Savenije
- Proceedings of the International Assoc. of Hydrological Sciences - Christophe Cudennec
- Vadose Zone Journal - Harry Vereecken
- Water Resources Research - Martyn Clark
- Water Security – Upmanu Lall
- Associate Editors - Juraj Parajka, Alberto Viglione

Hydrology Research was asked to take principal responsibility for drafting the Editorial, which the BHS Editor has done, and which is currently working its way around the various contributors for comment. This will appear as a Joint Editorial under common authorship in all journals. One of the key points under discussion was challenges around the use and misuse of impact factors, stimulated by an interesting presentations by Martin Clark, Editor-in-Chief of Water Resources Research. Martin has published an open access editorial on impact factors in hydrology, which is well worth a read (see references below).

Blöschl, G., A. Bárdossy, D. Koutsoyiannis, Z. Kundzewicz, I. Littlewood, A. Montanari and H. Savenije (2014) Joint editorial – On the future of journal publications in hydrology. Hydrology Research 45. http://hr.iwaponline.com/content/45/4-5/515

Clark, M. and R. Hanson (2017) Editorial - The citation impact of hydrology journals. Water Resources Research 53. http://onlinelibrary.wiley.com/doi/10.1002/2017WR021125/full

Koutsoyiannis, D., G. Blöschl, A. Bárdossy, C. Cudennec, D. Hughes, A. Montanari, I. Neuweiler and H. Savenije (2016) Joint editorial – Fostering innovation and improving impact assessment for journal publications in hydrology. Hydrological Sciences Journal 61(7): 1170-1173. http://dx.doi.org/10.1080/02626667.2016.1162953

Finally, please consider how you might be willing to help support the journal. This could be by submitting a paper, offering to be a reviewer, helping improve institutional access to the journal or any other way. I'd be pleased to hear any suggestions, so do get in touch with me directly.

Nevil Wyndham Quinn
(BHS Editor)
nevil.quinn@uwe.ac.uk

Short course at HR Wallingford

River modelling and drainage assessment for flood risk management
23-24 January 2018

This course is targeted at local authorities, with the objective of helping participants understand the fundamental hydrological and hydraulic modelling issues necessary for the delivery of robust flood risk (FRA) and drainage impact assessments (DIA) / conceptual drainage designs. Current software facility and visualisation tools can often enhance understanding but can also lead to a reduced reliance on technical comprehension; and to rigorous model schematisation, parameterisation and numerical model output checks being overlooked. The course will benefit those responsible for reviewing river modelling outputs as part of flood risk assessment and drainage impact assessments for planning. The standard delegate fee is £599.00 (excluding VAT at 20%), this includes all documentation, lunch and refreshments.

Further details can be found on our training website. To book your place please complete the online registration form. Please note, if you are interested in booking more than one place or onto more than one course we have discounts available.
Further details from: training@hrwallingford.com.

UK Hydrological Bulletin: August – October 2017

The August-October period was characterised by relatively wet conditions and substantial regional, and more local, variations in rainfall amounts. Cyclonic weather patterns predominated as the drought stress, which was still evident in mid-summer, diminished rapidly in almost all areas. The favoured track of the Jet Stream was the primary driving factor in this transformation and by late September reservoir stocks, away from the far South-East, were generally above the seasonal average and the focus of hydrological concern had switched to flood risk particularly across northern and western parts of the country.

At the national scale August was a wet month but with notable spatial variability in rainfall totals, in part reflecting the frequency of convective storm events. On the 9th, 24-hour rainfall totals in excess of 30 mm were common – triggering moderate summer spates but significant flash flooding (e.g. in Grimsby, Bath and west London). Exceptional rainfall on the 22nd/23rd (South Uist in the Outer Hebrides registered 90.6 mm in 48hrs), generated widespread fluvial flooding in the Western Isles and, particularly, Northern Ireland



Fig. 1
Demolished gauging hut on the River Owenkillew at Crosh (Northern Ireland) following the extreme flood on August 22nd. (Photo: Gary Galbraith).

where flows in the Mourne basin were extreme (see Fig. 1). At the Drumnabuoy House gauging station on the River Mourne the peak discharge is likely to have exceeded 1000 m^3s^{-1}. As with most such extreme events this outstanding flow is subject to further scrutiny but it may well have established a new gauged flow record for Northern Ireland. By contrast, August flows in some groundwater-fed streams across southern England (e.g. the Coln in the Cotswolds) were well below average and, whilst overall reservoir stocks for England & Wales were healthy, the decline in stocks in many southern reservoirs continued. Considering Great Britain as a whole, the June–August rainfall total added to a cluster of wet summers in the 21st century thus far but, in contrast to the very notable increase in temperatures since the beginning of the 20th century, summer rainfall totals exhibit no discernible overall trend.

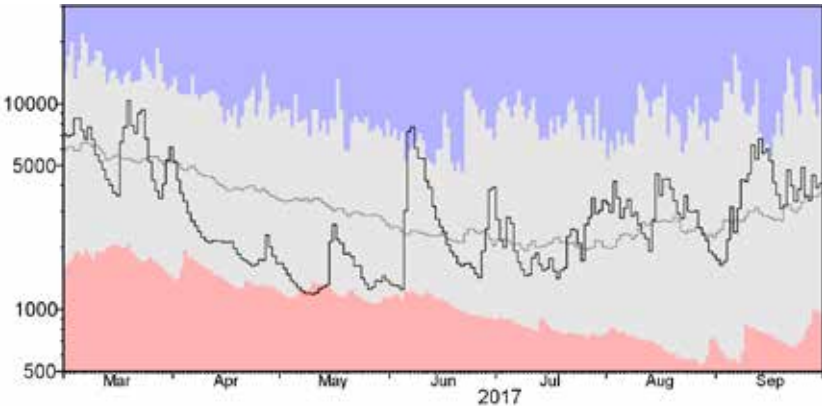


Fig. 2 Daily outflows from the UK (black trace); the blue and pink envelopes are the long term daily max and min outflows and the grey trace is the long term daily average

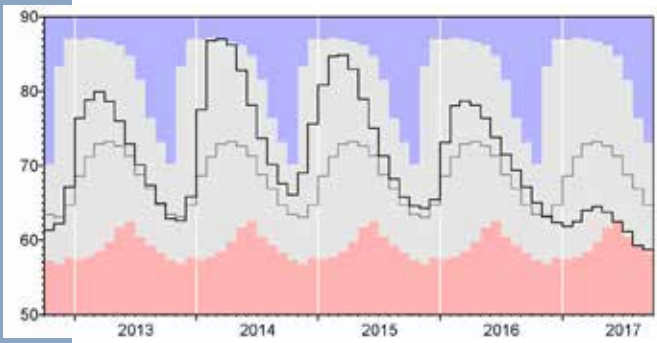


Fig. 3
Monthly mean groundwater levels (black trace) at Little Bucket Farm (Kent). The max. and min. monthly averages are shown by the blue and pink envelopes; the grey trace is the long term monthly average.

September rainfall totals were above average for almost all regions of the country and daily outflows from Great Britain exceeded the long term mean for much of the month (Fig. 2). Modest runoff was largely confined to catchments in northern Scotland and South East England. By contrast, very wet conditions in western Wales were directly reflected in exceptional monthly runoff totals; the River Teifi registered its highest September runoff .in a series from 1959. Meanwhile, river flows were generally below average across much of central, eastern and southern England. In the Cotswolds, the groundwater-fed river Coln recorded less than half of the monthly average and, with soil moisture deficits still very substantial – largely a reflection of the exceptionally dry spring – groundwater recoveries in the major aquifer outcrop areas had yet to gather any momentum. Fortunately, and contrary to the normal seasonal trend, overall reservoir stocks for England &Wales increased modestly through the month and stood appreciably above the early autumn average entering October. In Kent however, stocks at Bewl Reservoir continued to decline and by month-end were the lowest for late September since 1990.

As is often the case in the autumn, regional hydrological contrasts were further accentuated during October. The Jet Stream fed a succession of deep low pressure systems, accompanied by damaging winds and flood-generating rainfall, across the UK. On the 11th a 24-hour rainfall total of 211 mm was registered at Honister in the Lake District; flood warnings were triggered for a number of northern rivers including the Eden and Ure. In Scotland, many rivers were in high spate also but the most notable flows were generally in areas with low population densities. On the 16th ex-hurricane Ophelia caused very severe wind damage across Ireland and both tidal and fluvial flood alerts were common, particularly across northern Britain. The fourth week witnessed further notable storm events; 24-hr rainfall totals included 55 mm at Capel Curig (Snowdonia) and 46.6 mm at Achnagart (northern Scotland). Correspondingly, replenishment to most upland reservoirs in October was considerable but, in southern England, many winterbournes remained dry and, with soil moisture deficits still substantial, groundwater levels remained appreciably below average in parts of the Chalk outcrop, and depressed at the Little Bucket monitoring site in Kent where levels were at their second lowest for mid-autumn since 1976 (Fig. 3).

Terry Marsh
26/10/17

Events Calendar

Date	Title	Venue	Type
2017			
08 Nov	Integrated models for long-term planning in a changing world	Priory Rooms, Birmingham	Groundwater Forum
9 Nov	Saving the eel - measure to halt eel decline in the Thames	ICE London	BHS Regional
10 Nov	Integrated Urban Water Management	ICE London	BHS National + Irrigation Water Forum
20-24 Nov	Natural flood management	Lancaster area	NERC short course
30 Nov	Bringing flood modelling to your local community -	Leeds Univ	BHS Regional workshop
11-15 Dec	AGU Fall Meeting	New Orleans	Conference
2018			
24-25 Jan	Seasonal forecasting: meeting user needs	Loughborough	BHS National
01 Feb	Bringing flood modelling to your local community	Newcastle Univ	BHS Regional workshop
	Oxford flooding project	ICE London	BHS Regional
??	Groundwater	Warrington	BHS Regional
12-15 Feb	Snow Hydro 2018	Heidelberg	Conference
?? March	Reservoir hydrology revisited	Sheffield	BHS Regional
08 March	Low flows: water company perspective	ICE London	BHSRegional
19 April	International water resources	ICE London	BHS Regional
12-13 Sept	BHS NATIONAL HYDROLOGY SYMPOSIUM	Westminster Univ	BHS National

We thought we should try a simpler listing of forthcoming events so this is a 'work in progress' while we try out different type and file formats for use on all types of media.– Ed.



This great picture is a plug for a new CEH report – see page 18