

Circulation

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The Newsletter of the British Hydrological Society

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President's Perspective

The last fourteen months have forced us to change the way we run professional meetings across the UK and internationally. Now that the Covid-19 regulations over meeting face-to-face are beginning to ease, it is an opportunity for us to rethink our future meetings programme, and how to make our meetings work best for you, our members. In this President's Perspective, I am reflecting on what we have learnt and setting out options for how we might go forward. I would value your input on the direction you would like us to take.

BHS webinar programme

Firstly, I would like to thank the many people who have helped in delivering such a successful BHS Webinar programme (*Circulation* 146 and 148). We have delivered eight enthralling webinars, with attendance growing and regularly reaching over 200 participants and at times risking going over our Zoom licence limit of 500 people. Especial thanks go to BHS Honorary Secretary Mike Cranston, and his successor Lucy Barker, for developing the webinar programme, and to our UK committee members for supporting with webinar ideas and logistics, particularly Michael Pollock for his social media activity in 2021. Our voluntary speakers deserve equal thanks, as do so many of you, for engaging with this Society activity. I would also like us to appreciate our regional groups, who have also delivered great webinars to a wide audience. All these people given their time voluntarily in a period when home working has added to our professional workloads. I am also very grateful to ICE Secretary Moira Doherty and the ICE Events Team for their excellent help with meeting organisation and promotion.

From the outset, the BHS webinar programme had three core objectives:

- Keeping BHS members in touch with the ongoing activities and ideas of UK hydrologists while we are restricted in our travel and in-person meetings,
- Providing an inclusive activity, particularly for those with greater personal responsibilities or financial constraints, but for the benefit of all, and
- Promoting the BHS, your activities and the discipline of Hydrology more widely – hence the free access to the live webinars.

Emerging opportunities from the online webinar programme and the future

While the BHS webinar programme developed as a response to restrictions, it has highlighted the benefits of meeting virtually. These include:

- Avoiding the travel and overnight accommodation, saving time and money;
- Reducing impact on work and home commitments: even when meetings are short and nearby, meeting virtually has advantages because it still saves travel time and permits other activities to take place simultaneously – such as keeping track of emails or maintaining caring

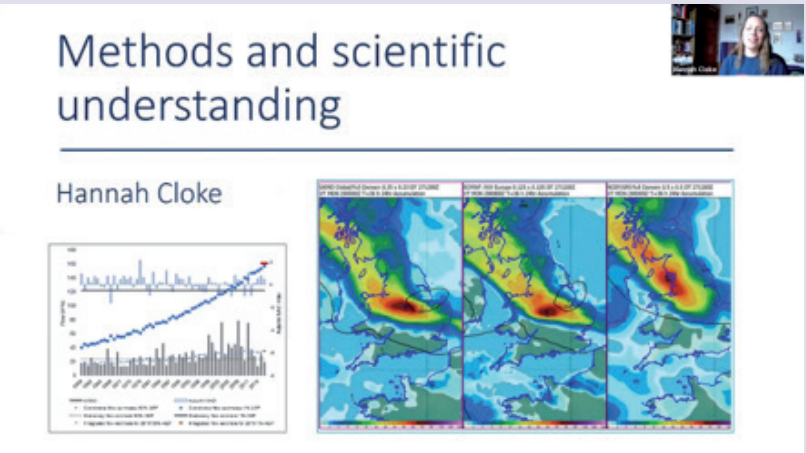
responsibilities at home;
- Offering greater flexibility for participants, for instance virtual meetings are often recorded so can be viewed later via for example the BHS YouTube channel;
- Reducing our carbon footprint. There is an increasing awareness in the academic and practitioner communities of the carbon footprint of our travel to meetings. For example, over 25,000 people attended the 2019 Fall Meeting of the American Geophysical Union in San Francisco – producing the equivalent of 80,000 tonnes of carbon dioxide from participant travel alone (*Nature*, 15 July 2020). With commitments to carbon neutrality, travel to meetings will be increasingly scrutinised.

Given these benefits of meeting virtually, I am keen that we retain a BHS webinar programme (in a form manageable for our committee volunteers) and consider what digital elements we incorporate within future in-person meetings, including our in-person Symposia in 2022. This does mean the Society continuing to retain the £1,120 per year 500-participant Zoom licence (and the option to raise numbers for individual webinars to above this when registration numbers begin to approach the limit).

Webinar presentations from overseas speakers? To date, our programme has focused on speakers from the UK hydrological community. Given that there are no travel costs associated with speakers in the webinar programme, I would like to know if you would be interested to hear presentations from hydrologists based overseas. Perhaps you also have suggestions for speakers and topics?

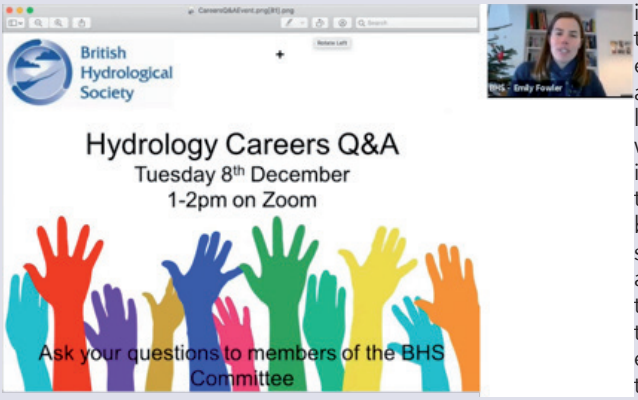
Joint webinar events with learned hydrological societies overseas? Would you also like to hear from hydrological societies from around the globe? Joint webinars could be a mechanism to begin such initiatives without incurring significant cost to the Society.

I would welcome your thoughts on these two questions via **president-bhs@lancaster.ac.uk.**



I will share this feedback with the BHS Honorary Secretary and in the next issue of *Circulation*.

We are aware that by opening our webinars beyond the BHS membership, we may not have given sufficient time for individual BHS members to interact with speakers after presentations. We also know that potential 'conversations' at the end of typical webinars are very public and impartial compared with a face-to-face chat over a coffee. For these reasons, we are planning some online meetings just for BHS members and designing them to enable greater interaction between speakers and BHS participants, as well as informal conversations between BHS members. Our first one-day online event in 2021 – 'Innovation in UK hydrology' on 7 September – will be for members only to help facilitate your two-way participation; others would be welcome to join the Society to participate.



Our early career members are perhaps the most severely impacted by the constraints imposed by the limited nature of two-way discussions in typical online-only meetings: so the organisers of the Peter Wolf Symposium have kindly agreed to organise an interactive online event on 8 September 2021, in advance of the in-person event in spring 2022.

Value of face-to-face activities

While we see the value of increased digital communications, we are increasingly aware of their limitations. Indeed, the absence of face-to-face meetings has forced us to think more deeply about what we miss about in-person meetings and how this absence affects advances in hydrological science and practice, day-to-day professional activities, and us personally. I should like to highlight a range of issues:

- Watching an online presentation, where only a tiny live image of the presenter is visible, makes it very difficult to read facial expressions and body language which are so important for the connection between speaker and audience. For the audience, this is a key element of the credibility of the presentation (and presenter) and of their learning experience. For the speaker, who is typically unable to see the audience, this means they cannot gain immediate audience feedback, and so modify the presentation accordingly.
- Where we are in a shared venue with our attention solely focused on the speaker we are

'forced' to listen' and so give our full attention to what the speaker has to say. We are giving them more respect and making us better listeners. This is somewhat different to sitting at home half-concentrating on a live webinar as we check our emails!

- While many of us have engaged with live discussions involving online whiteboards, various studies demonstrate that in-person meetings are more effective at 'mind mapping' ideas or in-depth technical discussions (e.g., www.greatbusinessschools.org/networking).
- Perhaps the greatest problem with online events is the loss of the impromptu interactions that come with in-person meetings. These *ad hoc* chats are often how we build our professional friendships and broaden our networks. Making these connections is particularly important for early career hydrologists who have less developed networks, but also for our retired members who may have fewer professional interactions outside of a work environment.
- Having a two-way conversation with a 'whole person', including facial expressions, body language etc., rather than with a digital image of an individual, also facilitates greater awareness and respect of differing ideas and perspectives. Consequently, the ability to chat with other hydrologists over a coffee or a poster is very important for social inclusion.
- A prolonged absence from in-person professional meetings and increased remote working can affect our wellbeing. It is likely to degrade our social and communication skills; and has also worsened the work-life balance for some people.
- Field meetings, while being intrinsically safer for Covid-19 transmission (due to considerably better ventilation) have been restricted due to limits on group size and travel. Some worthy attempts at 'virtual field trips' have been made over the past months, but the immersive experience from being in the 'real world' engaging all of your senses, combined with the informal atmosphere of a field visit, is not readily replaced with an online event. The informal atmosphere of such trips breaks down the barriers between those from different backgrounds or levels of experience.



Exploring field installations and their local context also develops an appreciation of field measurements not easily replicated by other means.

Developing in-person meetings: future options for BHS members

Given this wide range of specific benefits from in-person meetings, it is important that we try to deliver some of these for the BHS membership.

We have two in-person meetings already in the calendar for 2022 – the Peter Wolf Symposium at the University of Strathclyde in spring, and BHS2022 at Lancaster University in the autumn (14th National Symposium 6-8 Sep 2022). Both events will have fieldwork and/or field-visit options.

I am keen to know your thoughts on options for other in-person meetings in 2022 and if you have particular thoughts for the type of in- person meeting you would like to see. Perhaps you would like a field-visit to a particular installation or research site in the UK, and could offer suggestions? Maybe you would value a more traditional meeting with presentations, to be held at a particular academic institution, research organisation, consultancy or regulator building, so that an informal 'look-see visit' could be incorporated into the day's activities? Perhaps you are missing our meetings at the prestigious surroundings of One Great George Street in London (Institution of Civil Engineers), and would welcome a prompt return to this venue? Or would you like us to host our UK-wide meetings in different parts of the UK? As with your ideas for possible internationalisation of future webinars, I welcome you sending comments and suggestions via **president-bhs@lancaster.ac.uk** on these topics. Again, I will share your thoughts with our Honorary Secretary and in the next issue of Circulation.

Closing remarks

I have not really left space for a roundup of hydrological news from the past three months – I will endeavour to highlight these important developments in the next issue. Given the very challenging conditions currently in India, my thoughts are particularly with fellow hydrological researchers and practitioners in India who are trying to maintain their professional activities whilst looking after the welfare of their families.

Nick Chappell
BHS President
May 2021

Dates for your diary:

- **The Peter Wolf Virtual Event (half-day, as part of the virtual BHS National Symposium): 8 September 2021**
- **The Peter Wolf Symposium at the University of Strathclyde: 22–23 March 2022**

Equality, Diversity and Inclusion in hydrology

We'd like to encourage a conversation around diversity and inclusion in hydrology and invite you as members to write something on the issue in Circulation, either to help others understand the issue or simply to start a conversation. This could be anything from a well-researched article of a page or two, to a short paragraph with your ideas or questions. It could contain reflections on things you've heard from others or be about your personal experience. The ultimate aim is to make hydrology in the UK a more comfortable space for a wider range of people so that the discipline can thrive.

We'd be happy to receive pieces around any diversity characteristics and hydrology- could be on disability, age, race, sexuality, trans-status, class, whatever else seems underrepresented in hydrology.

If you're considering writing something but you're not sure and want to talk to someone about it, please feel free to contact Celia Kirby as a start

BHS committee

Authors

- Nadeem Shah has kindly let us know that the *Forestry Journal* now has an Editor for 'Forests and Water' and is inviting submissions related to forest hydrology.
The website is: https://academic.oup.com/forestry/

Enquiries may be sent to nadeem.shah@forestresearch.gov.uk or the Editor-in-Chief, Dr Gary Kerr: gary.kerr@forestresearch.gov.uk

New members

Adewolo Adereti .....Sunderland
Sven Berendsen.....Newcastle University
Chryssa Brown.....Exeter University
Lisa Chatterjee.....JBA Consulting, Hove
Gordon Falconer..... BEC Eco Engineering, Blairgowrrie
Sarah Johnson..... Loughborough University
Aude Pineau.....Mott MacDonald, Hove
Hannah Pool..... Canal & River Trust, Aylesbury
Jess Stevenson-Steels.....Chesterfield



It is perhaps just a little sad* that as well as his output of hydrological papers and books Keith Beven has spent a lot of his free time taking photographs of water. The result is this book, just published by the Mallerstang Magic Press, in a limited edition of 100 signed copies. The book includes images of surface reflections and skypools, surface caustics and caustic sheets, frozen waters, water waves, waterfalls and the marks of past water taken over the last 25 years.

With 94 images on a 20 x 25cm format it includes a Foreword written by the photographer and image maker Paul Kenny. It is bound in a sturdy matt soft cover with additional printed dust jacket and costs £30 + p&p. The book can be ordered from the Mallerstang Magic site at http://www.mallerstangmagic.co.uk/?page_id=2167 https://www.mallerstangmagic.co.uk/?page_id=2167 All profits from the sales will be donated to the charity WaterAid.

** This is Keith's own view but as hydrology is a discipline that depends heavily on visual information, I don't think many of us would agree... -Ed*



National River Flow Archive

Review of the Year: 2020/2021

The UK Surface and Groundwater Archives Committee (SAGA) convened online for its 38th annual meeting held earlier in March.

The **SAGA Committee** comprises representatives of organisations from across the UK involved in the measurement, management or use of hydrometric data. This year's meeting was attended by members of the UK Centre for Ecology & Hydrology, British Geological Survey, Scottish Environment Protection Agency, Environment Agency, Natural Resources Wales, Met Office, Canal & Rivers Trust, Welsh Government, British Hydrological Society, Chartered Institution of Water and Environmental Management and representatives from the UK water industry. Amongst the items discussed at this year's meeting was a review of the activities of the NRFA over the last 12 months.

2020/2021 as we all know too well, was very different from previous years and necessarily the NRFA operations moved into respective team member's homes. The usual liaison visits with our colleagues in the Measuring Authorities also could not go ahead as planned. Thankfully we were able to continue almost 'business as usual' with regard to the NRFA's ongoing updating and maintenance of the nation's central database for hydrometric data. Ensuring that the archive is up-to-date involves an intensive programme of year-round work to quality control new data before it is added to the archive as well as reviewing existing data. The NRFA's core daily mean flow dataset alone was subject to around 700,000 updates and changes in the last 12 months.

The annual update to the archive this year contained data for the water year 2018/2019, which included several new record flows across the UK. Alongside the routine update to daily flow data, an annual update to peak flow data as well as a period of record review of a subset of peak flow stations led to the release of **Version 9 of the NRFA Peak Flow Dataset**, and some 6,000 station years of data reviewed.

NRFA staff continued to liaise and engage with key stakeholders and the user community, with presentations at the Royal Meteorological Society, BHS's webinars and the Nordic Hydrometry Workshop.

The NRFA website remains very popular and has seen sustained activity in 2020/2021. There were around 30,000

downloads of river flow, spatial and metadata and around 700,000 page views by 60,000 users across all pages on the NRFA website. Updates to the website included the addition of interactive rating plots and new features added to the **UK Water Resources Portal**. Use of the NRFA API has also increased this year with data downloaded over 500,000 times.

The National Hydrological Monitoring Programme (NHMP), operated jointly by the UK Centre for Ecology & Hydrology and British Geological Survey, has continued to publish the monthly **Hydrological Summaries for the UK**. The NHMP analyses of NRFA data also contributed to three peer-reviewed papers on the drought in 2018/2019 (Turner *et al.*, submitted), flooding of 2019/2020 (Sefton *et al.*, in press) and an updated analysis of UK-wide flood trends (Hannaford *et a*l., in press). We also published **hydrological status updates** commenting on the water resource situation.

Isabella Tindall, Head of the NRFA noted that 2020/2021 has been an unprecedented yet successful year for the NRFA, with a number of important outputs and updates to services and the publication of several papers and blog posts. At the SAGA Committee meeting, the plans for the next 12 months were noteded, such as further improvement to our tools and systems including the development of new catchment land cover change metrics and the automation of the production of catchment average daily rainfall.

Stephen Turner

Editor's note

It seems to me that the print world sometimes has to compete these days with on-line sources but I would suggest that YouTube doesn't yet reign supreme so this is an unashamed plug for our website. I'm quite sure that absolutely no-one has ever waded through all the material it contains on our policies, past officers, events, awards, etc. etc. but I'd like to remind you that the Publications section does have material that you probably won't find anywhere else. Presentations from past BHS events may not be among the most prestigious literature but the myriad material presented over the years are all valuable records of hydrological expertise and experience.

However, I'd be the first to accept that retrieval is not easy: accessing papers from long past events does depend upon whether original documents were deposited on the site so the first hurdle is sometimes to find the event's full title from the Past Events page or use the 'Search' button on the Home page and then follow the instructions from the Publications page.*

We have also extended the coverge of 'watery' events on the Meetings page as there is now a link to the new on-line shared listing of events being run by other members of the Water Industry Forum. The aim is to help cross-fertilise practical and technical expertise across the UK water sector by making easier to see just what's out there that might be relevant to our shared interests.

The members of this group are: British Dam Society/BHS/British Water/CIWEM/ Future Water Association/Institute of Water/UK water Partnership/ Water Industry Forum

*Perhaps time to re-visit the 'Search' operation?!

Letter to the Editor

I recently received a leaflet from the National Trust headed "You'll be amazed at what your membership's achieving". These achievements included the reintroduction of beavers on the NT estate at Holnicote in Somerset — "and they've certainly been busy! Within a year the industrious creatures created what is thought to be the first beaver dam on Exmoor for over 400 years." The NT go on to tell me that as well as their undoubted ecological benefits "the dams they construct will hold water during dry periods, reduce flash flooding downstream and make rivers more resilient to climate change and the extremes of weather it will bring".

There are two major assumptions here that need to be questioned. To what extent do beaver dams "hold water during dry periods"? How impermeable can a barrier of logs and brushwood be? The second claim is the more contentious – and the more serious – and to what extent is it backed up by scientific research? My hydrological training and experience tells me that beaver dams could have a small but positive effect on reducing flood peaks downstream, although this effect will almost certainly diminish with the severity of the flood event — and that assumes that the beaver dam remains intact throughout the flood. I suspect that the National Trust in their enthusiasm have overlooked or are unaware that the three worst fluvial floods to have occurred in Britain during the 20th century – worst in terms of loss of life — Lynmouth (1952, 34 dead), Louth (1920, 23 dead) and Carr Bridge (1914, at least 5 dead) - all appear to have been greatly exacerbated by the collapse of debris dams. In each case the evidence, although circumstantial, is compelling. It is notable that all three of these catastrophic flood events occurred on relatively small upland catchments.

It is all too easy to dismiss the "wall of water" reported by witnesses at Louth and Lynmouth as the understandable exaggerations of traumatised survivors, but examination of the massive physical damage caused by the flood wave in both small towns give stark credence to those descriptions. How are these "walls of water" created? In a severe flood, river and stream banks are eroded and bankside trees, brushwood and other debris

can fall into the river and will be swept downstream to pile up against the arch of a bridge, blocking it. The plugged arch and the adjacent embanked approach roads form a temporary dam which fills rapidly and is then overtopped and bursts, to create havoc downstream. At Lynmouth, judging by the number of upstream road bridges over the Rivers East and West Lyn which were washed away during the flood, there seems to have been a 'domino effect' as a succession of debris dams burst at the height of the flood. Ironically, and ominously, Lynmouth is a mere 18km from Holnicote; both are on the edge of Exmoor.

Bear in mind that modern England is a far more densely populated country than Medieval England when the population was a mere fiftieth of what it is today. Since small single-arch brick or masonry bridges now occur every couple of miles or so along most of Britain's upland rivers, the activities of beavers can only increase the risk to human life downstream during major floods, compared to what the risk would have been 400 years ago. It is possible that the extinction of beavers in Britain by the 16th century may have been associated with the threats they were considered to pose, not only to the thriving woodland economy but also to watermills essential to food production. Has any research been done abroad on the hydrological impact of beaver dams – and their risk of failure during flood events? If it has, was the research done in, for instance, Canada where the activities of beaver colonies in a vast empty landscape would have little impact on any human habitation?

On the same page of their leaflet, the NT also tell me not only that by the reintroduction of beavers "you are helping to return rivers and catchments to a more natural and healthy state" but "you are also planting hedgerows and trees along riverbanks to alleviate flooding and create homes for wildlife." Even without beavers, the wisdom of a policy of planting trees and other vegetation in close proximity to a river bank is certainly questionable from the flood risk standpoint (see above) but, that aside, there seems to me to be a certain lack of joined-up thinking by the National Trust here (beavers + trees !?!?) but that's another matter.

Yours etc.,
Barry Barton, BHS Member.

British Flash Flood Chronology now available

New database of flash flood events available to support flood risk assessment

JBA Trust has published a database of flash flood events in Britain derived from historical reports dating back more than 200 years. The database is openly available here:

https://www.jbatrust.org/how-we-help/publications-resources/rivers-and-coasts/uk-chronology-of-flash-floods-1/

Purpose of the chronology

The primary purpose of the chronology is to support improved assessments of flash flood risk for a given location and more generally of catchment vulnerability to flash flooding. Flash floods arising from intense rainfall are rare events at a particular location and there may be few if any recent records. A search of a chronology of more than 200 years provides a better basis for assessing the probability of occurrence (Archer *et al.*, 2017) than the limited observations currently available, especially for surface water floods.

Origins of the chronology

This chronology was initiated as part of the "SINATRA" (Susceptibility of catchments to INTense RAinfall and flooding) project, which was funded by the UK NERC Flooding from Intense Rainfall programme (the 'early chronology').

Regional chronologies were initially prepared for northern England and southwest England, divided into eight regions, as shown here on the map and described in Archer *et al*. (2019). The interest shown by users provided the stimulus to extend the chronology to the rest of England, Scotland and Wales as a private project by David Archer, in part supported by SINATRA. This extended chronology is divided between a further eight regions shown in the map. The total number of events for all regions is nearly 8000.

Flash floods

Flash floods as defined in the chronology have a rapid or sudden onset for which Archer and Fowler (2018) proposed a 'threat response time' as th time from the initial perception of a flood (by a victim) to the occurrence of a level posing a threat to life and property. The hazard of rapid onset differs from the threat of extreme flood level or discharge, but the greatest danger arises from the combination of both rapid response and extreme flow.

Potential uses of the chronology

It is hoped that the historical context provided by the chronology will help to support the management of flash flood risks with greater confidence. Some of the potential uses of the chronology are:

- In assessments of surface water flood risk the data may be useful for Local Authorities or their consultants

with respect to locations for which there is little previous archived information. Section 19 of the Flood and Water Management Act 2010 places some statutory requirements on local authorities to publish investigations of flood events, including those from surface water and smaller watercourses. Whilst numerous Section 19 reports have been published online, they rarely provide historical information.

- Flood risk on rivers from rapid rate of rise: The serious risk to life and property from rapidly rising river levels is of interest to risk management authorities. Despite this, there are few references to the assessments of risks of very fast-rising water levels in national flood strategy documents. By highlighting nearly 300 events of this type on rivers the chronology provides a basis for further investigation of vulnerable catchments and consideration of methods of forecasting and warning. The sudden nature of many surface water floods is also problematic, as is recognised in Defra's 2018 Surface Water Management Action Plan.

- Research on trends and variability Whilst there are some limitations with respect to recent data, the chronology has the potential for assessing trends and variability and to determine links between flash flood occurrence and broad scale weather or climatic patterns. Events where large hail or deep accumulations of hail have occurred,



especially with accompanying reports of flooding, are included in the chronology as a supplement to the TORRO hailstorms index.

- Members of the public may simply want to know what extreme events have happened in their towns and village.

The chronology is the result of substantial archive research by David Archer. JBA Trust would like to thank David for his generosity in carrying out this work and making it openly available.

For further information, please contact:
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Be Prepared.....

I undertake numerous site visits as a Hydrologist at Corylus Planning and Environmental. Mostly, these are to support planning applications, where the site visit provides valuable observations on drainage and flood risk. Some visits are part of routine water resource management, for example at the Coln Park Estate, a major development in the Cotswold Water Park. Visits are also undertaken to provide the comprehensive understanding of site hydrology needed as part of legal work.

In recent years, I have built up an extensive set of what are referred to as my "toys" – a range of measurement devices for use during these visits. Since one never quite knows what conditions may be encountered on a site visit, I generally take the whole lot with me.

What's in the "toy" box?

Undoubtedly, the most regularly used item is a surveyor's level – a quick on-site check of ground, river and water levels can be hugely informative for understanding the hydrology of a site. A regular "Dumpy" level is fine, but I have access to a laser level; that enables me to do solo surveys including channel cross-sections. Alongside the surveyor's level, comes a wide range of measurement devices – a 5 m staff, measurement tapes, distance measuring wheel and a foldable 2 m rule which is great for probing into ditches and pipes.

I have not forgotten my hydrometric roots and now carry a small well dipper[1] – its 10 m range is suitable for shallow piezometers and for dipping river levels from bridge parapets. I have recently added a v-notch weir plate to the toy box. It's a home-grown job whose parts cost under £20, but whose thin plate, formed from steel rulers is not that far from British Standards! A combined pH/temperature probe[2] is less frequently used but helps to characterise water across a site.



Paul with the contents of his 'Toy box' ...

As my career has progressed, I have learnt just how important soils are to hydrological processes – how I wish that I had been able to concentrate more during my undergraduate pedology lectures at Bristol. I always carry a decent spade so that I can dig shallow pits. An auger[3] helps me get down to just over 1 m below

ground level which is really helpful when you are looking for (but hoping not to find) shallow groundwater. I try to do soil textural analysis whilst on site by following a flow-chart procedure. However, I have not been properly mentored so my results are a bit erratic. As a result, I carry containers so that I take a suitable sample enabling a 2-day jar test with a suitable sample[4]. I carry a soil pH tester.





No consideration of site visits would be complete without some reference to health and safety. I carry a good collection of PPE and a change of clothes and footwear. Since I am often working alone, I use our Company 'Lone Worker System'. I am also renowned for my 'food hampers' for if I am to work effectively, I need to be well fed and watered – whatever the conditions.



Infiltration testing

It has been really helpful to do BRE365 infiltration testing on my visits. Whilst digging to 2 m is just outside my comfort zone, I can do 'shallow' testing down to a nominal 300 mm. Even so, it can be quite hard graft to dig five or so trial pits that are a nominal 300 mm cube and do the necessary augering. That said, it

is hugely informative to explore the soil profiles across a site and to witness, first hand, the differential rates of infiltration.

For my tests, water management is critical for a successful test and in particular a suitable source of water that is not too far from the trial pits. I have 3 jerry cans, each with 25 l capacity and an 'all-terrain' sack truck to transport the jerry cans when full. A quad bike would be a really handy addition but I am still waiting for approval for that! The requirement under BRE365 for pits to drain twice before formal testing during the third fill, means that virtually all site investigations require a two-day visit. Generally, pits can be suitably 'primed' on the first day such that the formal test can be started at the beginning of the second day. Inevitably, there is a fair bit of time spent waiting for pits to drain. However, that provides an opportunity to do all of the other observations and measurements that are generally required as part of a visit.

On the value of observations

I wrote an article for *Circulation* back in 1986[5] in which I exhorted hydrologists to "get out there in the field and observe, for only good can come of it". That sentiment remains valid today. It is true that with explosion of data sets that are available to us, we can achieve so much from the confines of our comfortable offices. However, I can safely say that every site visit that I have undertaken has yielded valuable information that would simply not have been available without a visit. Sometimes that is just a better understanding of a site and its relationship to watercourses.

The observations though, can be fundamental to the project – knowledge of new flow routes or ones that were blocked, an opportunity to engage with local people, perhaps by chance, but who were able to recount past events. Much of our analytical work and modelling relates to extremes of flow – yet we rarely have the opportunity to witness such extremes. I have also learnt that a little reliable data, especially when you know its provenance, can be hugely informative.

There are, of course, two other essential items to take with you and to use to the fullest extent. One may seem obvious – and is your eyes. The other is a good imagination; one that enables you to visualise a site under the extremes of high flow and low flow and which underpins the work that we do.

Once again, 35 years after my first utterance of the expression, I urge hydrologists to get out on site whenever you can, "for only good can come of it".

Paul Webster
March 2021

[1] https://www.yamayo.co.jp/english/products/109wlm.htm
[2] https://uk.rs-online.com/web/p/ph-meters/1950938/
[3] https://www.electric-fence.co.uk/voss-farming-ground-hand-auger-o-7cm-for-installation-of-posts-etc.html
[4] https://hgic.clemson.edu/factsheet/soil-texture-analysis-the-jar-test/
[5] Flood Patrol in Namibia", Circulation 10, 1986.

Please note.....

The delayed Hydro-JULES Summer School is now scheduled for 12-16th July 2021 and will be held online via Gather.town and Zoom. All details are on https://hydro-jules.org/hydro-jules-summer-school-2021

BHS Hydro Profiles Questionnaires

*Many thanks **Emma Neachel** for completing a Questionnaire!*

How did you become interested in hydrology?

I've always found rivers fascinating. Geography was my favourite subject at school and the hydrologymodule of my Geography A-level gave me my first opportunity to measure flows in a real river; the Plants Brook in Sutton Park. However my interest in hydrology reallyblossomed during my undergraduate EnvironmentScience degree at The University of Birmingham and I went on to study for an MSc in Catchment Dynamics and Management at the University of Leeds.

What is your current job?

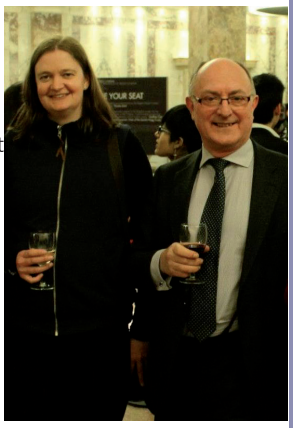
I first started working in hydrology with the Environment Agency in 2003 – later taking a career break with the fire service as well as completing a PhD. Having spent the last 18 months on assignment as a hydrologist within the Environment Agency's National Permitting Service, I have just changed roles to be a hydrology technical specialist in our Cumbria and Lancashire Area. I'm still getting to grips with the role but I'll be involved in leading hydrology input to water resources, hydrometry and drought related projects.

What is your dream job?

My assignment as a hydrologist within the National Permitting Service gave me the opportunity to influence the development of consistent technical approaches across the Environment Agency. I was able to work closely with hydrologists based in our Area teams and with colleagues in our Environment and Business directorate. This made me realise that my dream job within the Environment Agency would be working as a hydrologist within the National Hydrology team.

What, or who, has helped you get to this point in your career?

Geoff Petts. I first met Geoff as an undergraduate student at the Universityof Birmingham. Geoff was my undergraduate dissertation supervisor and I enjoyed working closelywith him and learnt a lot about hydrology and how to plan and to undertake effective research. Geoff gave me the confidence and belief that I had theability to complete a MSc and PhD. I kept in touch with Geoff during my MSc at Leeds and throughout my first career as a hydrologist with the Environment Agency. Geoff became my PhD mentor in 2011 and I spent four amazing years working with him. If it wasn't for Geoff I wouldn't be where I am today.



Do you have any advice for your younger self?

You are a good hydrologist so stick to hydrology. Don't leave the Environment Agency to join the fire service as you'll regret it!

What is your favourite river?

This may sound like a slightly unusual choice but the River Tame in Birmingham is my favourite river, largely because I feel like its (urban) location means that not many people in Birmingham appreciate it or are even aware it exists. Approximately 42% of the River Tame flows through built-up areas, which makes it the most urbanised river catchment in the United Kingdom. The River Tame played a key role in my PhD research as it highlighted the somewhat under-researched area of rivers that have higher than natural flows. A lot of research historically has focused on rivers that have lower than natural flows so it was fascinating to explore this discharge-rich flow regime.

Do you have a favourite gauging station? Why is it your favourite?

This was quite a difficult one but the River Dove at Izaak Walton(28046) is probably my favourite gauging station. Izaak Walton gauging station was constructed by the Trent River Authority and opened in 1969 with the purpose of measuring continually "the flow of water in the river". Izaak Walton has a complete continuous daily mean flow record so it's achieved and continues to achieve its original purpose. The fact that the gauging stationis situated in a stunning location just makes it even more of a favourite.

What keeps you busy apart from hydrology?

I'm going to assume that this is in a pre- or a post- Covid 19 world! I love running and would usuallyaim to complete a minimum of 10 races a year although I'm not fast as I have a slightly fragile right knee. I volunteer most Saturday mornings at my local parkrun in Sutton Park. I also love reading and writing and I'm currently finishing off a paper on rivers with discharge-rich flow regimes I started writing with Geoff just before he died.

Which BHS meeting did you enjoy most?

I most enjoyed the 13th National Hydrology Symposium at Westminster University in September 2018. I presented a paper – The future of rivers with artificially enhanced baseflows: Central England – and received some great feedback which I've incorporated into the paper I'm working on at the moment. The Symposium gave me the opportunity to catch up with some of the people I worked with when I was a PhD student at Westminster University and hadn't seen for a while. Of course after the last 12 months we're now all missing these sort of events.

What do you like about being a member of BHS?

I enjoy being a member of a community of people who also love hydrology. I think it's important as a hydrologist to keep my technical skills and knowledge as up to date as possible, so it is great to find out about current research and projects through articles in *Circulation*.

Describe BHS in three words:

Broad, helpful, scientific

UK Hydrological Bulletin: February – April 2021

Precipitation over the February-April period for the UK was well within the normal range but its temporal distribution was very atypical: a wet February contrasting with an exceptionally dry April. Correspondingly, the widespread late-winter flood risk was succeeded by seasonally depressed river flows in April and a rapid increase in soil moisture deficits. The latter, combined with a seasonally exceptional frequency of penetrating frosts threatened vulnerable crops in many areas. The spring also served to highlight the control over flow patterns exercised by contrasting catchment geologies. As runoff declined steeply in impermeable catchments flows in many groundwater-fed streams and rivers remained very healthy; exceptionally persistent flood warnings extended into early May in a few rivers - mostly in the English Lowlands. Notwithstanding the very limited late-spring replenishment, stocks in most major reservoirs in late April were generally well within the normal range for the time of year.

Precipitation in February – which included a significant snow component – was around 20% above average at the national scale but below average in northern Scotland and parts of the English Lowlands. With many rivers in high spate entering the month, and appreciable upland snow cover, catchments across the country were vulnerable to further precipitation and, by the 4th, more than 150 Flood Alerts were in operation across England &Wales. A brief interlude of high pressure provided some relief but heavy snowfall in eastern Scotland – accumulations reaching 40cm in the Grampians by the 11th – led to substantial transport disruption. In southern Britain instances of groundwater flooding were reported (e.g. in Oxfordshire) – a harbinger of widespread and sustained flooding incidents in groundwater-fed rivers during the spring. The 20–25th saw further heavy frontal rainfall (48-hr totals exceeding 100 mm at Keswick) and, with rapid snowmelt an exacerbating factor, around 30 Flood Warnings were operational across Scotland. Index rivers registering runoff totals for February of more than twice the long-term average included the Annacloy (Northern Ireland), Tywi (Wales), and Lud (Lincolnshire); the latter exceeding its previous monthly maximum. Groundwater levels were generally even more exceptional – in the Lincolnshire Limestone, the New Red Lion borehole registered a new recorded maximum in a 57-year series. (*Note however that increased sampling frequencies in the 21st century can serve to exaggerate the significance of modern extreme groundwater levels*). The abundant runoff through the winter also ensured that late-February stocks in major reservoirs were at, or very close to, capacity.

North-west England was exceptionally wet in March but most of the UK was relatively dry with rain-shadow effects to the east of the Pennines contributing to rainfall totals of less than half of the long-term monthly average. High pressure dominated synoptic patterns early in the month but an active Atlantic low-pressure system brought strong winds and heavy rain to northern Britain (north

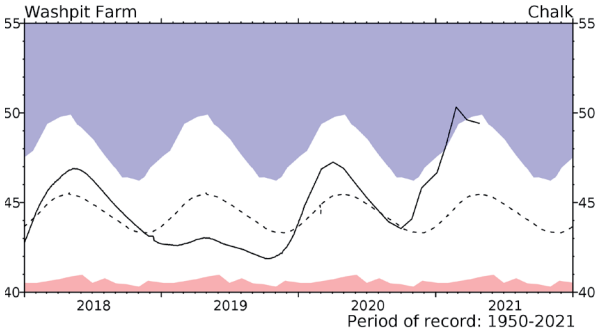


Fig. 1 Groundwater levels at Washpit Farm (Norfolk) – the blue and pink envelopes show the highest and lowest levels on record; the dotted trace is the long-term mean

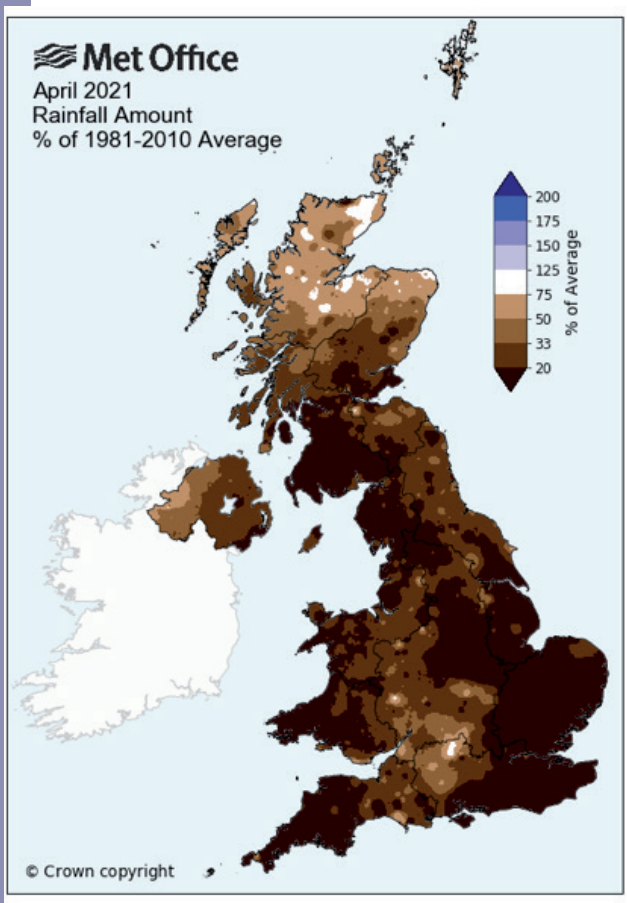


Fig. 2 UK rainfall pattern in April

Wales also) on the 11th – 96mm was recorded in 24 hrs at Shap (Cumbria). Flood warnings were extensive across the northern half of the UK and trees upended by exceptional windspeeds added to widespread transport disruption. Thereafter, anticyclonic conditions generally ensured useful river flow recessions until the final week when Seathwaite Tarn (Cumbria) recorded a 177.2 mm rainfall accumulation over the 28/29th. Flood Warnings were again common across the northern half of the UK where inundation of agricultural land was extensive. Nonetheless, March runoff totals were below average for most index rivers across England &Wales, and falling below 50% for the Annacloy in Northern Ireland. By contrast, groundwater levels generally remained very high – new monthly maxima were recorded in parts of the Magnesian Limestone and, in the slow-responding Chalk, levels at Washpit Farm (Norfolk) exceeded the previous maximum – see Fig.1.

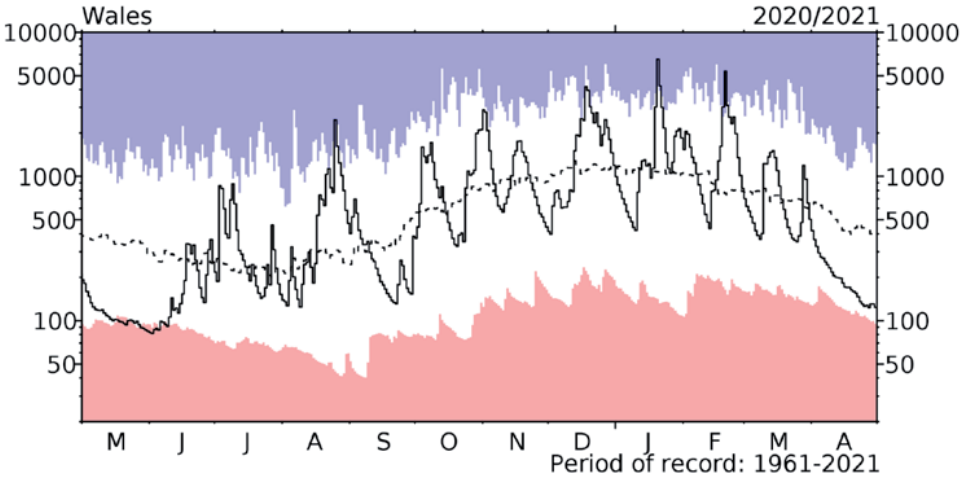


Fig. 3 Daily outflows from Wales (m3s-1); the blue and pink envelopes show the highest and lowest daily flows on record, the dotted trace is the long-term daily mean

With a dominant northerly airflow, April was a remarkable month – the coldest April since 1989 (with an exceptionally high frequency of frosts) and the 4th driest for the UK in a series from 1862. Very few areas recorded rainfall totals within the normal range (see Fig. 2) and many catchments registered negligible rainfall until close to month-end. 2021adds to a recent cluster of notably dry Aprils but no significant long-term rainfall trend is yet evident. The lack of rain was generally accompanied by a steep decline in runoff rates across the country, and particularly in Wales (Fig.3). By the fourth week, river flows were depressed over wide areas and approaching the minimum on record for the time of year in many index rivers including the Tyne, Exe, Taw and Ystwyth; this was also true of many urban watercourses (in London especially). With many headwater streams and shallow ponds dry, the habitat loss – albeit temporary – was substantial. In contrast, Flood Alerts remained extant for a few groundwater-fed streams and rivers draining from the Chalk of Lincolnshire, Norfolk and Hertfordshire where groundwater levels remained notably high. The combination of minimal April rainfall, penetrating frosts and parched soil conditions caused significant problems for farmers and growers but, despite very modest inflows, the legacy of heavy replenishment through last autumn and winter ensured that reservoir stocks entering May were generally only moderately below the late-spring average.

Terry Marsh
18/05/21

(Note: Only very limited river flow data were available for Scotland for this Bulletin)



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