Circulation

No. 163

February 2025

The newsletter of the British Hydrological Society



BHS membership

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SCAN ME

The British Hydrological Society gratefully acknowledges the financial support of UKCEH in the production of Circulation.

Cover photo: River Tees at Low Force (Vicky Shackle)

Circulation is published quarterly; free to members of the British Hydrological Society, or £25 to non-members on annual subscription. Articles published reflect the views of the authors and do not represent official BHS policy.

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Circulation is indexed in Geosystems' Hydrotitles & GeoArchive & NISC HydroROM

Copy deadline for Circulation 164 is 27th April 2025.
Please email your material to bhs-circulation@outlook.com—contributions may be edited for length or clarity (**maximum** 1,000 words, or 750 with figures). Hydrological photos very welcome.

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In between issues of Circulation, you can keep up with the **British Hydrological Society** on social media:

LinkedIn—search for British Hydrological Society

Bluesky @britishhydrosoc.bsky.social

President's perspective

Duncan Faulkner

Who is the best-known hydrologist in the UK?

There's a case to be made that it's someone who has never published a paper, never spoken at a conference, never run a training course. As far as I'm aware (say this in hushed tones), he's not even a member of BHS. Until recently I'd never heard of him. But I was enlightened by a 9-year old.

Let me explain. BHS was contacted by the mother of a boy who was keen to meet a hydrologist. We arranged a call on what was his ninth birthday. He seemed genuinely delighted, claiming this encounter was his favourite present of the day. So I asked him how he had come across hydrology. And he explained about a cartoon he watches, the Octonauts. One of the characters, Paani, is a hydrologist. An appropriate name: Paani means water in several Indian languages.

It turns out that, rather than spending all day running computer models, Paani applies his hydrological knowledge to rescue creatures in distress. A generation of children is growing up excited to see a hydrologist working in harsh, remote environments, protecting others from droughts and floods. Nothing in our new BHS statutes explicitly prohibits offering membership to imaginary non-human creatures (did I mention that Paani is a macaque monkey?) so maybe we should include Paani in the BHS menagerie.

Can we expect an influx to our profession in 10-15 years' time? We could do with it. The number of UK students studying hydrology Masters has dropped to a very low level. A colleague says she was one of four on her recent MSc. We had only 13 applications last year for the MSc studentship scheme run by BHS and the JBA Trust. It seems unlikely that hydrological careers will easily come to mind when undergraduates are thinking about next steps.

Most have probably never met a hydrologist. I'm not sure I had heard of hydrology at that stage, studying physics, until my dad mentioned that a friend of his was a hydrologist and wondered if I might consider it.

At BHS we'd like to do more to increase awareness of hydrology as a career option. We can all play our part. If you know undergraduates or apprentices who might want to follow Paani's footsteps, let them know they can now join BHS for free. And tell them about the studentship scheme, which offers a generous contribution towards fees for MSc or MRes courses in hydrology or catchment management (https://www.jbatrust.org/funding-and-support/bursaries-and-scholarships/studentship-award-scheme/).

We are hoping to collaborate with other organisations, such as RGS-IBG, to inspire school children, and teachers, about the joys of a career in hydrology.

There is a wealth of hydrology careers information on our website. Check out the profiles of job types and individuals at https://www.hydrology.org.uk/profiles.php. There you can find which UK hydrologist once held the record time for climbing all the Wainwright fells in the Lake District. Like much of our website, this treasure trove is rather hidden away. We've started work to make our website easier to update, more intuitive to navigate and more contemporary. We hope that will help create an inviting shop front for future as well as current hydrologists.

But our reach will never be as wide as that of CBeebies.

With thanks to my colleague Alex Scott, who not only administers the studentship scheme for the JBA Trust but has also joined the BHS sub-committee for education, careers and members and, most importantly for this article, is the mother of another avid Octonauts fan.

John Rodda, 1934-2024

Mark Robinson



John studied Geography at Aberystwyth University when concerns about the flooding of Welsh valleys by reservoirs led to an interest in the new discipline of hydrology. He undertook a PhD on the water balance of the River Ystwyth, which required regular measurements of rainfall, soil water and streamflow, so set about recruiting and equipping a network of about 30 local volunteers to take daily weather records across the catchment. This was quite an achievement for a young postgrad student. Analysing the results he noted a number of geographical factors that affected precipitation depth, rather than just altitude, which was the common practice for making areal estimates at that time. A contemporary later said John was well-known for his ability to combine original thinking and inter-personal skills with a talent to organise and delegate. All these attributes were to be important in his later career.

John's research attracted the attention of Eamon Nash, Head of the newly created Hydrological Research Unit at Wallingford (later the Institute of Hydrology), and in 1960 he began work on new instrumented river catchments, which culminated in establishing the internationally renowned Plynlimon catchments. Together with fellow geographer, John Sutcliffe, the 'Two Johns' toured the high rainfall Western Uplands where forestry expansion and the construction of new water storage reservoirs were expected.

They looked for suitable study sites, eventually choosing two catchments at Plynlimon in mid-Wales. One had tree cover, one was upland grazing. John noted that at this time the Cuban Missile crisis was reaching its climax, with nuclear war a possibility; days were spent touring remote areas for suitable catchments and evenings listening to the news.

Fortunately all turned out well, the world survived, and hydrology prospered, as did John's career. Alongside the upgrading of the HRU to the Institute of Hydrology under the Directorship of Jim McCulloch, John's own research continued, centred on the accurate measurement of rainfall as being vital to understanding catchment behaviour. This included developing forest canopy-level raingauges which proved crucial for the water budget studies at Plynlimon. This research interest brought international contacts, and a year's posting in 1969 to the World Meteorological Organisation in Geneva.

Returning to Britain the following year, John joined the Department of the Environment, helping prepare the 1973 Water Act, but retained his research links. He edited the International Hydrological Sciences journal and conference proceedings, and in 1972 arranged a permanent home for the IAHS Press at Wallingford, where it continues to this day. Unusually at that time, it brought together scientists from the so-called Iron Curtain and Developing World, with the Western science community. He was one of the few western hydrologists to develop international links with hydrologists those behind the Iron Curtain, and while still at a time of 'Cold War' tension he recounted travelling in a sealed carriage on the Berlin underground as it passed under the infamous dividing Wall through Eastern Sector stations on its way between Western stations.

After a decade with the DoE, John returned to the Institute of Hydrology in 1982 as its Assistant Director.

One of John's principal achievements was combining individual catchment studies into a wider international analysis. His idea for the 'Friend' project initially comprised half a dozen European countries, but has since been extended across the world. It is now recognised as one of Unesco's most successful international projects. Last November marked its 40th anniversary.

In 1988 John returned to Geneva as the WMO's Director of Hydrology, until his retirement in 1995 . He chaired the organising committee of the International Conference on Water Resources, producing the 'Dublin Principles' of Water Management, and was particularly proud that they were assimilated into the 1992 Rio 'Earth Summit'.

In a career of over 50-years John wrote, edited or contributed more than 500 academic works, from the earliest in 1963 to the most recent in 2022. He was elected Honorary Professor at Aberystwyth in the early 1990s and gave lectures in Global Water Resources until 2009. In 2015, he co-edited 'Progress in Modern Hydrology' covering half a century of hydrological research at Wallingford.

John could see both the detail and the bigger picture. He worked tirelessly to foster the UK's contributions to international hydrology. A passionate Internationalist he brought and worked together with scientists from many nations. During his career he made many friends and was widely respected. He encouraged younger scientists, and was particularly proud of the support he provided via the WMO for postgraduate training in Africa.

Even in his 80s he remained a 'go-to person' for younger scientists seeking advice and information about international contacts and organisations.

To see and hear John recounting some aspects of his career, visit: https://youtu.be/Yru9hHj-f8o?feature=shared

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Irish National Hydrology conference, November 2024

Kate de Smeth and Ashling Laffey

In November 2024, over 130 delegates attended the Irish National Hydrology Conference in Athlone, Co. Roscommon. This event is the primary meeting for Irish hydrologists each year and is organised by the national committees of the IHP and ICID.

Talks covered a range of themes and were presented by academics, representatives from government scientific agencies, and consultants. The day began by talking about monitoring of essential climate variables with an introduction to the second iteration of the Irish Hydrometric Reference Network that now includes 53 stations, followed by the expanding application of Cosmic-Ray Neutron Sensors to measure soil moisture across the island.

Two presentations focused on arterially drained catchments: one showcasing a mixed-method approach combining hydrological modelling and regression analysis to explore and attribute historical river flow change, and another exploring the role of groundwater in buffering river temperature extremes. A comparative analysis of three different hydrological models to assess model uncertainty was also shared.



The importance of grounding management strategies in an understanding of system complexity was also explored. Firstly, via an

interesting case study from the Burren that examined interactions between a river, blanket bog, and a turlough in a small catchment. Secondly, via a talk featuring UK river restoration examples that demonstrated the use of hydraulic and sediment modelling to understand local and reach-scale hydraulics.

Mitigating flood risk was the last session and prompted several questions and discussions as the day ended. A forecasting system for groundwater levels was presented with demonstrated effectiveness up to 180 days in the future, and an expansion to 143 sites across Ireland is planned. The final presentation explored how the extreme flows brought about by Storm Babet necessitated reassessment of a planned flood relief scheme leading to revised design flows and modest changes to the proposed scheme.

A highlight of the day was the poster session, which provided many opportunities for discussion and networking. Several posters explored contaminant hydrology, particularly nitrate pollution in both surface and groundwater resources in Ireland. JBA Ireland brought the fun factor with their Lego Mountain, demonstrating the concepts and benefits of natural flood management while highlighting its role in mitigating flood risks and enhancing climate resilience in an interactive way. Sure, aren't we all just big kids at the end of the day?

Many thanks to the conference organisers, speakers, and attendees for a great day out! To learn more about any of the talks, supporting papers can be found at: https://www.gov.ie/en/policy-information/a11bd-2024-proceedings/ If you'd like to be included on the Hydrology Ireland mailing list to be first to hear about the 2025 conference, then please contact: info@hydrologyireland.ie

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Can rivers have rights?

Lisa Chatterjee

For most hydrologists, certainly those working in operational teams, we undertake our analyses in the midst of a legislative framework. When working with the water environment, laws exist to govern how we abstract and discharge water; the quality of water we can return to watercourses; what we can do in and adjacent to the river and where and what we can build on her floodplains. In general, these laws are there to ensure we manage our water environment for the benefit of society. So it is interesting that the concept of 'River Rights' is gaining momentum. The basic premise is that our current laws are insufficient and have failed to protect the river habitat and associated ecology. New 'rights' are needed to strengthen the position of rivers in decision making, particularly within development and planning; a shift from an anthropocentric perspective to an eco-centric one. This forms part of a much wider debate on the rights of nature, which has been a global movement for decades (see the Global Alliance for the Rights of Nature[1]).

[1]www.garn.org

[2]www.loveourouse.org

[3]www.rightsofrivers.org



Photo: River Ouse (Lisa Chatterjee)

In February 2023, Lewes District Council was the first council in England to pass a motion seeking to declare a Rights of River Charter for the Sussex Ouse. The Love Our Ouse[2] campaign has run several events within the catchment to raise awareness and gain insight from practitioners. As the campaign's website states, 'Rights of nature argues that nature should be recognised as existing on its own terms and have the same kind of legal rights that Human Rights give people.'

A Universal Declaration on the Rights of Rivers has been created by a collaboration between US organisations, the Vance Centre, Law Centre and International Rivers[3] and offers an idea of what river rights may look like:

- THE RIGHT TO FLOW
- THE RIGHT TO PERFORM ESSENTIAL FUNCTIONS WITHIN ITS ECOSYSTEM
- THE RIGHT TO BE FREE FROM POLLUTION
- THE RIGHT TO FEED AND BE FED BY SUSTAINABLE AQUIFERS
- THE RIGHT TO NATIVE BIODIVERSITY
- THE RIGHT TO REGENERATION AND RESTORATION

Speaking to other hydrologists and water professionals, it is clear that there is some agreement that the current management of the water environment requires improvement, it often being fragmented, inconsistent and lacking funding. Some practitioners also agree that the protection of riverine habitats should have greater importance in planning decisions, though this is often balanced by an appreciation of the housing crisis, particularly in the south-east.

However, two key questions arise that remain a challenge for the rights of rivers movement in the UK. The first is regarding how any Charter will fit in with current legislation. For example, water companies must adhere to rules set by Ofwat and as such any Charter must be part of those rules. Secondly, who will have responsibility for enforcing the Charter when enforcement of existing law is already lacking?

Despite these not insignificant challenges, there remains the more philosophical question about how the UK relates to and treats nature. In 2017, in New Zealand, the Whanganui River was granted legal personhood after a 160 year campaign by the Maori community. More recently, last year, a court in Quito, Ecuador, ruled that the Machángara River, which runs through the city, is a subject of rights, under the Constitution of Ecuador. Such laws stopped the mining of coal in Ecuador's Los Cedros Protected Forest. So it is possible.

The close connection with nature, particularly where there are active indigenous communities, plays a significant role in shifting the perspective of a nation. Do we have this connection in the UK? The People and Nature Survey[4] carried out by Natural England in 2021 indicates that we do. Of the 24,994 adults surveyed, '82% of adults reported that being in nature made them very happy, indicating high levels of nature connection among respondents.' Can this connectedness change our view of rivers such that we give them 'rights' which need to be adhered to in our decision making? We all want a better water environment but are we standing up enough to ensure the mutual benefit for nature? Do we need to shift our thinking?

[4]The People and Nature Survey for England: Data and publications from Adults survey year 1 (April 2020 - March 2021) (Official Statistics) main findings - GOV.UK

Ineson meeting 2024: summary and reflections

Geoff Parkin

On 19th November 2024 the IAH GB Chapter / Hydrogeological Group Ineson 2024 meeting was held in London on the subject of "Groundwater famine and feast. Quantifying future groundwater extremes". Over 130 people attended, hearing seven presentations including the Ineson Lecture by John Bloomfield (BGS) and a keynote talk by David Macdonald (BGS), as well as 18 posters and a panel debate. The event this year was sponsored by the FCRIP-funded Project Groundwater Northumbria (https://projectgroundwaternorthumbria.org.uk).

While the meeting was focused on groundwater floods and droughts, the range of topics highlighted ways in which understanding of both groundwater and surface water is critical as indivisible and integrated parts of the same hydrological cycle.

In his Ineson Lecture 2024, John Bloomfield reflected on the evolution of groundwater drought research, focussing on the phenomenology of groundwater level behaviour using standardised indices and time-series analysis methods, demonstrating the effects of different periods of antecedent rainfall, links between groundwater response and streamflow, and how climate change atmospheric warming can amplify groundwater droughts. Following a suggestion to extend historical groundwater flood records using citizen science, it was noted in discussion that this could take an approach to that already used successfully by hydrologists for rapid response catchments.

Will Rust showed intriguing evidence of an approximate 7-year cycle in long-term historic UK records of streamflow, rainfall, and groundwater levels which are linked to positive (wet and warm) and negative (blocking pattern) periods of the North Atlantic Oscillation (NAO) index, showing that each of these parts of the hydrological cycle are similarly affected. **Wilco Klutman** presented time-series analysis forecast modelling for the 2018 extreme drought in the Netherlands, highlighting how computational models need to be appropriate for processes that become active under extreme conditions. This was also emphasised by **Gemma Coxon**, who demonstrated the need for a new generation of hydrological models that take account of human interventions such as abstractions, inter-basin transfers, reservoirs, and wastewater returns and how these affect surface – groundwater interactions, calling for open collaboration and sharing of data, modelling and platforms within the context of the current UK flood and drought research infrastructure plans and investments.

Mark Fermor highlighted the generally unrecognised scale of the economic impact of groundwater flooding, particularly as fluvial flood response in permeable catchments is affected by the joint probability of occurrence of high baseflow and relatively low return period runoff events. Proposals were put forward on how better integration of organisational responsibilities set out in the 2010 Flood and Water Management Act are needed for overall flood management including from groundwater. **Ilias Karapanos** presented a water company perspective, outlining issues in developing Water Resources Management Plans (WRMPs) and Drought Management Plans (DMPs), advocating the benefits of conjunctive use of groundwater and surface water, but noting that this would require a move towards more flexible abstraction licensing.

Some talks were more specifically focussed on groundwater issues. Representing the event sponsors, **Geoff Parkin** and **Rhiannon Marchi-Smith** presented and discussed approaches to understanding and managing groundwater flood risk and resilience in the legacy mine workings in NE England which are representative of other similar post-industrial regions, using a systems approach to illustrate the complexity of flow pathways. **David Macdonald** overviewed recent international literature in the context of an extended definition of groundwater flooding and groundwater flood settings. Despite this body of work, it was noted that groundwater is represented by only a tiny proportion (~1%) of recent global publications into floods and droughts.

Some key take-home messages emerged during the day:

- a general lack of awareness of groundwater flooding significance in relation to other forms of flooding;
- need to better integrate groundwater with surface water and human activity in our conceptual thinking, data analyses, modelling, and in national and local regulatory and governance approaches;
- potential to improve flood forecasting from all sources including groundwater through a combination of NAO cycle predictions, historical time-series analysis, improved integrated hydro(geo)logical modelling, and recognition of the essential role of groundwater in river flood levels;
- the inter-related nature of floods and droughts and potentially unforeseen consequences in water management, and the need to take wider systems approaches in our thinking.

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In conclusion, closer links between the hydrogeological and hydrological communities would be mutually beneficial in understanding, quantifying, and managing hydrological extremes, including groundwater.

Further information on the Ineson 2024 meeting, including access to speakers' presentation material, is available on the IAH British Chapter website (https://iahbritish.wpengine.com/ineson-2024-meeting-summary-groundwater-famine-and-feast-quantifying-future-groundwater-extremes/).



Ochreous groundwater emerging from mineworkings in Team Valley, Gateshead (photo: Geoff Parkin)

Education, careers & members sub-committee report

The committee is making plans to address the wide scope of the sub-committee as described by the Society's President in Circulation issue 162.

We defined three initial priority areas building and expanding on previous activities

Careers Q&A sessions. We plan a first webinar session, aimed at undergraduate and post-graduate students, to promote hydrology as a subject, post-graduate course and career path. This will include promotion of membership of our Society, our role bringing together and developing hydrologists, our activities, events and publications. This student-aimed session will be around early March to coincide with decision making on next steps (e.g. undertake an MSc, apply for jobs etc.) and allow promotion of the Studentship Award which we plan to bring earlier in the year. We plan a second session later in the year for early career hydrologists. We are exploring aligning the timing of this session with the Peter Wolf symposium. To help us with these sessions, especially the first, we are working on developing a network of university contacts who we'll engage with for this and for future activities. **Alex Scott** from JBA is leading this.

Dissertation awards are run annually by the Society. Our sub-committee will coordinate this, ensuring it is enmeshed with our other activities and promoting membership which we offer for free to students.

Emerging new ideas – We are developing ideas about how our sub-committee can do more to a) support career development i.e. CPD for hydrology, b) develop mentoring schemes, c) consider career pathways. **Emma Cross** is leading on this planned activity, building upon her work in the Environment Agency.

We recognise the importance of working with the Society's other sub-committees to coordinate and fulfil the wide remit, particularly working closely together with **Amy Green** as early careers representative. We'd love to hear any ideas and are happy to answer questions, which you can send to bhs_education@outlook.com.

The Comms Committee would like you to know that they are working on a new website, and will soon circulate an online survey form to all the members on the BHS mailbase. The survey will ask what members would like to see on the website, and any features they would like added. Please respond with your thoughts!

Cheakamus River, British Columbia, Canada (Photo: Tim Hess)



From hydrological engineer to emperor. The first hydrologist?

Anthony Hammond

Pierre Perrault (1611–1680) has been credited with making hydrology an experimental science (Brutsaert, 2023); before him there was a common consensus that rainfall over a catchment was not enough to account for the continuous flow of rivers and springs, with many hypotheses about the source of the additional water. By making observations and quantifying the water balance Perrault showed that there *was* more than enough rainfall to account for the flow in the Seine. Arguably, Pere Jean Francois tackled this problem before Perrault in 1653 (Beven 2024).

Thales (c. 600 BC), one of seven sages of ancient Greece, is often thought to be the first known hydrologist (Stan & Simmons, 2024). Of course, hydrological engineering and irrigation was practiced at least since the earliest civilisations of the fertile crescent, part of which was Mesopotamia ("the land between two rivers" – Tigris and Euphrates). The Sumerians (5500 BC-1800 BC) and Babylonians are well known for their feats of hydrological engineering, Nebuchadnezzar's hanging gardens of Babylon (c. 600 BC) being one of the seven wonders of the ancient world.

Further to the West, the Nile was the foundation of the Egyptian civilisation and one of the first known measuring devices is known as the nilometer. Nilometers were used to measure the level of the Nile as early as 3000 BC (Biswas, 1970). The Nile was dammed in the time of King Menes (3000 BC) and the earlier, mysterious King Scorpion is depicted as being involved in the first recorded irrigation works around 3200 BC (Biswas, 1970).

Many cultures across the world have "great flood" myths or stories, perhaps the most famous names relating to these in

the west are Noah and Gilgamesh. However, both are known for boat building rather than inclusive flood management.

Further east there is perhaps a claim for the first named hydrological engineer (circa 2000 - 3000 BC) in another "great flood" story. Maybe a foundational myth but possibly historical, Da Yu (aka Yu the great), undertook a hydrological project with such success that he became Emperor and was the founder of the first Chinese dynasty.

Da Yu's father had been given the job of controlling the devastating floods of the Yellow River—floods which prevented economic development in the region. After a decade of building embankments, the flooding continued, washing the works away. The ruler rewarded Da Yu's father by chopping him into many pieces. Thankfully the lives of hydrologists and engineers are no longer so directly affected by the quality of their work.

The task fell to Da Yu. Rather than building embankments he travelled the river, studying it, talking to riparian tribes, convincing them to work together and for a central authority, to manage the flooding. Da Yu worked tirelessly for 13 years, building channels, diverting and redirecting the flood water, and into irrigation systems spreading water across farmland. He managed the flood risk, working with nature, rather than attempting a defence against it – a change of policy that was adopted in the UK not too long ago.

The legend suggests that during the work he never returned home to his family. He said he could not stop whilst the flooding was rendering people homeless. The ruler was so impressed with his work, he passed the throne to Da Yu rather than his own son. This was the start of the first Chinese dynasty, the Xia.

The first Chinese dynasty began with attempts to control flooding (Marr, 2012). The stories are of an ordering

of the world out of chaos (Lewis, 2006), and the figure behind these Chinese foundational stories is not a mighty warrior, dragon slayer, or someone who was suckled by a wolf and indulged in fratricide, but a hydrological engineer. A civil servant who centralised authority, practiced stakeholder engagement, and managed flood risk.

This article was largely inspired by Andrew Marr's a 'A History of the World' (2012). The Da Yu story is primarily from Marr (2012) and Biswas (1970). Full references are available on request from Anthony.hammond@jbaconsulting.com

Biswas, A. (1970). History of Hydrology, North-Holland publishing. Amsterdam. Available from: https://www.academia.edu/83088550/History_of_hydrology

Marr, A. (2012). A History of the World. Pann Books. London

New members

Kerr Adams
Kate Benny
Sally Brown
Lee Eric Brown
Harry Clayton
Michaela Connolly
Ilona Dezelski
Elizabeth Follett
Emma Michelle Ford
Ana-Diana Golgojan
Natalie Hacker
Susannah Hardwick
Jenny Hindle
Elena James
Olivia James
Kate Lambert-Smith
Cordelia Menmuir
Gareth Howard Old
Matthew Paul
Ramtin Sabeti
Ioanna Samakovlis
Jane Sellars
Stefano Simoncelli
Jasmine Simpson
Victoria Taylor
Thorsten Wagener
Sarah Warren
Matthew Williams
Tom Willis
Qiuyu Zhu

Letter to the Editor — from Ian Littlewood

Dear Editor
I would like to make the following non-exhaustive specific responses to the letter in Issue 162 about my article "Should old water be taken with a pinch of salt?" (first published in Circulation 161):

The suggestion of a "critical flaw" and misconceptions are rejected. The comments fail to recognise the implications for 'tracer-based hydrograph separation using Eq. 3' (TBHS3) of two related points: (a) constant rate injection dilution gauging (CRIDG) and TBHS3 are two sides of the same coin (they are based simply on different combinations of Eqs. 1 and 2); and (b) CRIDG provides a benchmark against which TBHS3 can be assessed.

The second paragraph says of CRIDG (c) "… only plateau concentrations allow for an accurate calculation of stream discharge" and (d) "The equations … are valid at all times – even during the rising limb of a tracer curve …". Both cannot be true; (c) is correct and (d) is not. The paragraph has some rather mysterious reasoning and does not offer a clear explanation in support of (d). In my opinion the following (third) paragraph is not right (especially the last sentence).

The first part of the last paragraph I take as a useful comment rather than a criticism. The reason why the issues raised in the Article have not been mentioned in published assumptions behind TBHS3 (so far) is that they have appeared in the literature only recently, i.e. in the Article. Concerning the last part, in my opinion TBHS3 specifically has never been good for hydrograph separation or for inferring streamflow generation processes.

Editor's note: comments on this article are now closed, thankyou. *Circulation* continues to welcome general discussion of dilution gauging.

Letter to the Editor—from Rod Wilkinson, retired hydrologist

Dear Editor.
Barry Barton's article (Circulation Issue 162 December 2024) certainly brought back memories of hydrometry and data quality control in the1970's. The numerous stages in the capture of hydrometric data when human intervention was necessary, had its advantage in that data errors were readily spotted and corrected. Today's more automated data gathering systems may have saved cost but have increased the potential for data errors. From what I have experienced in recent years, this may not matter. Reliance on understanding the natural processes and the data that verify their application may now be obsolete. I say this because on too many occasions I have sat on a Professional Review Panel interviewing a young candidate aspiring to become a chartered professional, who has claimed to be a hydraulic modeller. When questioned, their knowledge of basic hydraulics was minimal or non-existent. What they had meant to say was they knew how to select a software package that does hydraulic analyses on whatever catchment they were working on. Furthermore, this is often done without reference to the grounding truth of measured data from the catchment. If hydrology and hydrometry are being overtaken by simulation models that do not reflect observed data from the catchment under study, are they becoming obsolete areas of expertise?
To return to the point Barry was debating i.e. are Hydrology and Hydrometry one and the same, to my mind the differences are quite clear. Hydrology is the science and understanding of the natural water cycle, whereas Hydrometry is the measurement of that cycle. I would go further to say that true deterministic hydrology (not the type concocted in a software black box) cannot be practised without hydrometry. Not that hydrometry is hydrology's poor relation, indeed this could not be further from the truth. Hydrometric techniques have been standardised for several decades now through British, European and International Standards covering most aspects of the measurement of precipitation, open channel flow by velocity area methods, structures (weirs and flumes), sedimentation

in lakes and watercourses, and groundwater. I chair two International Standards Committees, one that deals with European Standards on Hydrometry, and another through ISO that deals with flow measuring structures. The importance of hydrometry is recognised worldwide through these and other committees. However, it does not end there. As any hydrometric observation is just a sample of the real event, the understanding of data sampling uncertainty goes hand in hand with hydrometry and hydrology, but that's a whole different subject to explore.

It is important to note that hydrometry is not limited to flow measuring structures and rated channel sections operated by the environmental protection agencies. Hydrometry is of significant importance in industrial applications such as potable water treatment works and wastewater plants where data from the flow measuring structures inform the process control systems. Furthermore, many industrial abstractors of large volumes of water use hydrometry on the abstraction and wastewater return systems to demonstrate compliance with abstraction licence and discharge consent requirements.

We must not ignore the importance of Hydrometry even though it may sometimes seem overshadowed by or merged with its more attractive cousin Hydrology. The two are not the same but they are inseparable. The realistic practise of Hydrology depends almost totally on the support given by related Hydrometry.



Unusual ice formations over Bollihope Burn, Weardale (photo: V.Shackle)

UK Hydrological Bulletin, November 2024-January 2025

Compiled from UKCEH summaries

A dry, cloudy and mild first half of November was followed by snow, storms and heavy rain in the second half. Total rainfall was below average in the north of the UK and, despite the first dry fortnight, average in the south – although this masks regional variation. Snowfall arrived on 19th November in northern Britain, Northern Ireland, Wales and central England. Cold conditions persisted, with ice and wintry showers, particularly in the north and west of the UK. Further snow fell in south and south-west England on the 21st and in Scotland and northern England on the 23rd with the arrival of storm Bert. Heavy storm rainfall and a rapid thaw contributed to surface water flooding and at least five fatalities. Further rainfall from storm Conall affected Scotland and southern England on the 24th/25th, southern England on the 26th , and western Britain on the 29th/30th. Total November rainfall for the UK was still only 68% of average.

November river flows also had a north-south gradient, with below normal to notably low flows in the north and normal to notably high in the south. Rainfall from the named storms resulted in flow responses in the majority of UK catchments, with multiple peaks registered in Wales, western Scotland and the south of England. Soils wetted up towards month-end, although remained drier than average in eastern Scotland. At most sites, groundwater levels ranged from the normal range to exceptionally high, with recharge observed in late November. Reservoir stocks at most impoundments fell relative to average, removing surpluses for some in the north (e.g. Loch Katrine, the Northern Command Zone) and for Scotland as a whole. Despite this, stocks remained near-average for each country individually.

The wet start to December somewhat ameliorated water resources concerns associated with the dry autumn in the north, but the wetted soils and high groundwater levels continued to elevate flood risk in the south and east during the transition into winter.

December was characterised by unsettled weather, with a succession of weather fronts delivering wind, rain, and snow. Storm Darragh, the fourth of the 2024/2025 season, contributed to turbulent conditions. Total December rainfall was above average for the UK, again with significant regional variability—less than 50% of average across much of south-west England, and 170% of average in northern Scotland.

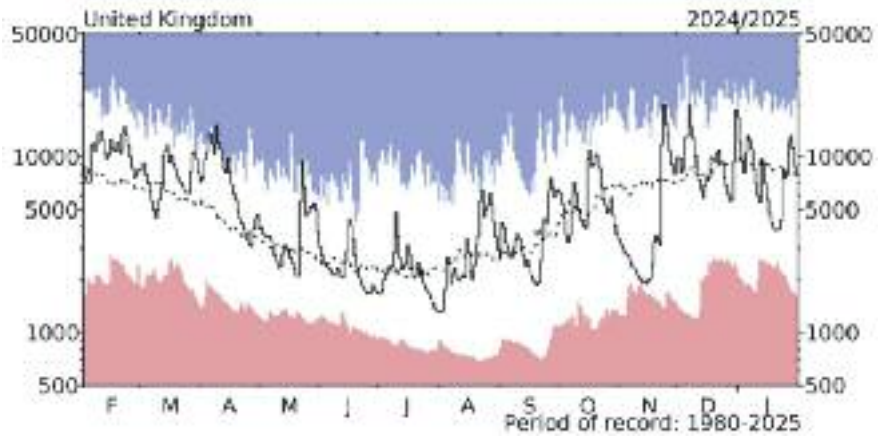


Figure 1: Daily mean outflow for the whole UK, past 12 months, with max and min

River flows were mostly in the normal or above range, although some catchments in south-west England and eastern Northern Ireland had below normal flows. Soil moisture continued to increase, and groundwater levels in major aquifers were also predominantly in the normal range or higher. However, in Northern Ireland, the Midland Valley area of Scotland, and South Wales, groundwater levels

remained above average for the time of year. The combination of saturated soils in many regions, high groundwater levels and a likelihood of normal or higher river flows in the north and west, meant flood risk remained elevated.

January was characterised by a dry period mid-month, bookended by unsettled conditions with frontal systems bringing wind, snow and heavy rain. Storm Éowyn was the strongest windstorm to affect the UK in a decade. However, rainfall totals were below average for the UK, but this concealed a strong spatial gradient.

River flows were above normal in England and Wales and below normal in Scotland and Northern Ireland. Groundwater levels across the UK were generally normal or above, although exceptionally high conditions were present across multiple aquifers. Reservoir stocks increased in most impoundments and remained above average at the national scale, with only minor deficits at Daer, Kielder Water and Celyn & Brenig. The current outlook suggests normal to above normal flows persisting at some catchments in southern England in February and normal to above normal flows and groundwater levels in the north and west over the next three months, maintaining an elevated risk of flooding.

River flows began the month above average, except for Northern Ireland where flows were in the normal range. More than 200 flood alerts and flood warnings were in force on New Year's Day across northern England and Scotland, with the fourth highest peak flow of any month registered at the Dyfi on the 1st (in a series from 1962). Many catchments in England registered their top three highest January peak flow maxima across the 5-6th. Recessions continued for most Scottish catchments until month end. River flows across southern England peaked again following storm Éowyn

Circulation

on the 26th-28th. The River Lymington recorded its fourth highest peak flow of any month in a series from 1960 on the 26th, while the Rivers Brue and Stour recorded their second highest January peak flows on the 26th and 28th respectively (both in series of >50 years). Mean January flows showed a strong spatial gradient; below normal to notably low flows were registered in Northern Ireland and western Scotland. The River Brue recorded its second highest January mean flow on record (in a series from 1965). This spatial contrast was further emphasized over the five-month period of September-January. The highest September-January flows on record were recorded for the Rivers Weaver and Brue (both in series of at least 60 years), while the Rivers Mourne and Clyde recorded their third and fourth lowest on record (in series from 1958 and 1982 respectively). Correspondingly, September-January outflow for the English Lowlands was the sixth highest since 1961, whilst Northern Ireland saw its fifth lowest outflows since 1980.

This bulletin is drawn from Hydrological Summaries for the UK produced by the **National Hydrological Monitoring Programme** (NHMP) and published by the UK Centre for Ecology & Hydrology (UKCEH). The NHMP is jointly undertaken by **UKCEH** and the **British Geological Survey**, and gratefully acknowledges the co-operation of many data suppliers (https://nrfa.ceh.ac.uk/background-and-data-sources).

Hydrological Summaries are supported by the Natural Environment Research Council award number NE/Y006208/1, as part of the NC-UK Programme delivering National Capability.

An archive of all Hydrological Summaries published since 1988 can be found at https://nrfa.ceh.ac.uk/monthly-hydrological-summary-uk.

Forthcoming events

Changing European Summers - RMets Event

Can we predict extremes in summer weather and climate—from months to years ahead? Virtual Meteorological Masterclass, **12th March 2025**, open to non-members. Registration is now open, go to http://www.rmets.org/event/login

European Geosciences Union general assembly

This annual assembly of geoscientists will take place **27th April—2nd May 2025** in Vienna, Austria. EGU aims to provide a forum where scientists, especially early career researchers, can present their work and discuss their ideas with experts in all fields of geoscience. Call for abstracts is closed; register to attend at https://administrator.copernicus.org/authentication.php

Flash Flooding—RMets Event

An event run jointly by BHS and the Royal Meteorological Society, held at the Royal Geological Society in London on **21st May 2025**. Booking details to be confirmed shortly.

Summer School—Runoff Prediction in Ungauged Basins. Learn methods of estimating runoff characteristics in the absence of local observations. **30th June—4th July 2025**, Wien, Austria. Flyer at https://iahs.info/uploads/Meetings/2025/Flyer_Summer_School_PUB_2025_Electronic.pdf

Land and Water in a Changing Climate – what's next for Science and Policy?

A two-day Hydro-JULES event at The Royal Society in London, **24th and 25th September 2025**, bringing together the hydrological and land-surface modelling community, industry and policy makers across the UK to discuss how research can influence policy decisions. Booking details to be announced shortly.

International hydrology meeting

A one-day meeting at the Institute of Civil Engineers, London, **1st December 2025.** Organised jointly by BHS and the UK Committee for International Hydrology, in the building where UNESCO was created 80 years ago; this conference will celebrate the 50th anniversary of UNESCO's International Hydrological Programme and the contributions made by UK hydrologists to meeting the UN Sustainable Development Goals. Booking details will be confirmed later.

Watch this space: we are making plans for the next BHS Peter Wolf Symposium, to be held at the University of Liverpool this summer. Plans are also in the pipeline for a BHS National Symposium, at the University of Leeds in autumn 2026.

Exeter fund

Early career participants who are giving a presentation at the biennial IAHS Scientific Assemblies can apply for a grant to help with travel costs. Full details can be found at: https://www.hydrology.org.uk/Travel_Grants.php



British Hydrological Society