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“Promoting the professional and scientific interests of members to safeguard the public interest in the application of chemical sciences in water-related industries.”

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WSF Committee Updates

This year, the Water Science Forum Committee bade farewell to our Secretary, Roger Wellings. Roger had a long and distinguished career with the British Standards Institute, primarily involved with the development of standards related to Water Quality. He joined the Water Science Forum in 2009 as an ordinary member, becoming Secretary in 2011 and serving two full 4 year terms in that role. Roger provided fantastic administrative support to the Committee and our success in organising events and administering bursaries over that period is due in no small measure to his hard work, dedication and commitment. We wish Roger a long and happy retirement. The role of WSF Committee Secretary has been taken up by Ian Barnabas. He has some big shoes to fill!



Committee members wishing Roger farewell at RSC, Burlington House, London

Clive Thompson and Martin Padley have retired from the Committee having completed their second four year term. We thank them both for their valuable contribution and wish them well. In Clive's case he has served at regular intervals on the Committee and we have had the benefit of his considerable experience for around 30 years. He has agreed to stay on as a Corresponding Member so that we can continue to benefit from his insight.

Fiona Campbell, our Early Careers Representative has resigned from the Committee as she is taking her career in a different direction. We thank Fiona for her contribution and wish every success for the future.

The Committee welcomed three new participants, elected by the wider WSF membership earlier this year:

Veerle Vandeginste is an Assistant Professor of Geochemistry at Nottingham University

Alexandra Borisova is a Process Engineer with Veolia

Zain Khan is an Assistant Professor of Industrial Chemistry at AMU, Aligarh, India

We look forward to working with Veerle, Alexandra and Zain in 2020 and beyond

Water Factoid— 6.5 million tonnes of rubbish end up in the world's Oceans each year. 50% is long lasting plastic.



Green Infrastructure and the Chemical Sciences Event

— bookings now open!

29 April 2020, Burlington House, London

<https://www.eventbrite.co.uk/e/green-infrastructure-and-the-chemical-sciences-tickets-82282879307>



Green Infrastructure (GI) can be used for removing or reducing the concentration of aquatic pollutants or for managing water flows. It includes sustainable drainage systems (SuDS) and constructed wetlands together with parks and woodlands, street trees, garden roofs and walls.

This conference will bring together those who wish to review current research and technologies in GI and understand how GI leads to pollution abatement. The talks and Q&A sessions will explore the chemical science underpinning the removal of traditional and emerging pollutants using biological wetland/SuDS type systems and other nature-based solutions.

Sustainable Water in the 21st Century

We were fortunate during this one-day conference organised by the RSC Energy, Sustainability and Environment Division, as befits a global issue, to hear from speakers who were able to provide insights into this topic from both the UK water sector and also from national, international and global perspectives.

At a global scale, the UN Sustainable Development Goal 6 (SDG6) relating to clean water & sanitation includes a target of clean, accessible water for all by 2030. Set against this the UN tells us that, as of 2015, 30% of the world's population does not have access to safe drinking water and 60% lack access to safe sanitation facilities. We have some way to go to reach our target, particularly considering that water scarcity affects 40% of the global population. Projecting forward, by 2025 some 1.8 billion people are likely to experience absolute water scarcity and $\frac{2}{3}$ of the world will live under water-stressed conditions.

More parochially, England's Environment Agency reported that the country is set to run short of water within 25 years. The population of the UK as a whole is expected to rise from 67 million to 75 million by 2050. By 2040, more than half of our summers are expected to be hotter than the 2003 heatwave leading to more water shortages and potentially 50-80% less water in some rivers.

With these dynamics in mind, each of the speakers focused on the importance of developing solutions to these intractable problems that require accurate acquisition and interpretation of chemical data so that rational decisions can be taken about critically important issues such as:

- | | | |
|--------------------------|--------------------------------|---|
| -Water conservation | -Catchment management/planning | -Managing water leakage |
| -Managing water risks | -Resilience | -Decentralisation of supply and treatment |
| -Water reuse | -The value of water | -The market in water |
| -Public health education | -Hygiene, and Sanitation | |

It was clear from the proceedings that good data and evidence-based decision-making will be critical in helping us to achieve a sustainable future for our planet's water. Each of the engaging and inspiring speakers' presentations illuminated and helped reinforce both the strategies and tactics that are being used. - **by Glynn Skeratt**

Slides for the day's presentations can be found [here](#).

Alan Tetlow Bursary Report: Beaver-induced biogeochemical alterations of mountain stream environments in Northern Utah, USA

Funds awarded from the Alan Tetlow Memorial Bursary supported the research of Deni Murray, a M.Sc. Student at Utah State University. Deni studies the net effect of beaver (*Castor canadensis*) ponds on water quality in Northern Utah streams affected by agricultural non-point source (NPS) pollution. Despite best management practices, NPS pollutants are the leading cause of water quality impairments and remain high in many watersheds. As beavers become an increasingly popular stream restoration tool it is important for scientists and managers to consider both the ecosystem services and disservices of beaver activity on headwater streams.

Beavers convert lotic systems to semi-lentic, indirectly altering the fate of nutrients in streams by impounding stream flow and trapping sediments, which have a high affinity for nutrients and most pollutants. Beaver ponds promote biogeochemical processes that both attenuate (sedimentation, denitrification, biomass production) and enhance (erosion, mineralization, decomposition) nutrient fluxes in streams. The results of her study will identify the potential drivers and constraints on biogeochemical changes to help predict beaver-induced water quality outcomes across dryland fluvial systems.



Preliminary results suggest water residence time and impounded sediment volume may determine whether ponds are a nutrient source or sink; two ponds with low sediment-water interactions had little to no effect on nutrients flowing in and out of beaver ponds compared to a pond with high sediment-water interactions, which had a significant impact on nutrients. Mass balance results from the pond that displayed significant biogeochemical alterations from beaver activity suggest that beaver ponds are a phosphorous source and a nitrogen sink. Beaver ponds may be a more efficient “reactor” when experiencing environmental conditions that promote high sediment-water interactions, such as intermediate water residence time, upstream resource supply and impounded sediment volume.

Within-pond conditions, such as organic matter content and impounded sediment depth, may classify areas within a beaver pond as “biogeochemical hotspots”. Areas within the pond such as the margin and backwater areas may disproportionately influence nutrient concentrations compared to areas within the pond with shallow sediment, such as the thalweg. Results from sediment cores indicate areas within the pond with higher organic-rich sediment contained 4-7 times more total heavy metals than organic-poor counterparts. Further, our results suggest that in autumn, backwater and margin areas experienced higher rates of nitrogen and phosphorous mineralization, suggesting that microbial activity within impounded organic rich sediments largely control processes influencing water quality, such as nitrification, ammonification and phosphorous mineralization. When considering beaver ponds as a stream restoration strategy in watersheds affected by NPS pollution, scientists and managers must consider both the issue nutrients and whether the sub-habitat composition of ponds will promote nutrient attenuation. Further studies need to link physical processes to biogeochemical processes in order to determine whether beaver ponds will significantly impact water quality downstream in watersheds located outside of the Intermountain West of the U.S.

Report on ISO TC 147 Meeting, Tokyo, October 2019

ISO Technical Committee 147 exists to develop International Standard Methods for the analysis of water, which could be drinking water, wastewater, river water, ground water, sea water, industrial effluent etc. It is comprised of six subcommittees as follows:

SC1 – Terminology

SC2 – Physical, chemical and biochemical methods

SC3 – Radioactivity measurements

SC4 – Microbiological methods

SC5 – Biological Methods

SC6 – Sampling (general methods)



Much of the work of drafting International Standards is carried out by members of national “mirror” committees, in the case of the UK, BSI EH3, one of the sub committees of which, EH3/2 is chaired by Ian Barnabas who is also secretary of the Water Science Forum. Each standard is developed by a working group comprising typically 8 – 20 members from several different countries.

The work of preparing International Standards for publication is largely carried out by each Working Group via electronic platforms and email, coordinated by the TC 147 secretariat, which is run by the German National Standards body, DIN. However, approximately every 18 months, the members of TC 147 convene at a meeting hosted by one of the national standards organisations, to resolve differences of opinion, discuss inter-laboratory trial results, review and amend draft standards and make recommendations for future work.

This year’s meeting of TC 147 was hosted by the Japanese Industrial Standards Committee, JISC, in Tokyo. It was attended by WSF Committee members, Ian Barnabas and Simon Gillespie, and former Committee members Clive Thompson and Gavin Mills along with several other members of EH3 and its subcommittees. The meeting got off to a rocky, or should I say windy start due to Typhoon Hagibis, which closed the international airports when many of the Committee members were due to arrive. The first day was sparsely attended, but most working group meetings were able to go ahead. Fortunately, most of the delegates eventually managed to make it to Tokyo.



Ian, Simon, Gavin and Clive mainly attended SC2 working group meetings throughout the week, concentrating on chemical and physical methods, and were generally very successful in presenting and gaining acceptance of the UK perspective. As chair of a mirror subcommittee, Ian also attended the main SC2 and TC147 meetings at the end of the week. As native English speakers, UK delegates are kept busy recording the recommendations from the meetings as all business is conducted in English. On the social side, there was a drinks reception on the first evening of the meeting and a gala dinner on the Thursday. These and the working group meetings themselves are invaluable opportunities for international networking and exchange of ideas.

The next meeting of ISO TC 147 is scheduled for April 2021 in Finland.
- by **Simon Gillespie and Ian Barnabas**

WSF Events—Keep up to date with our future events on the RSC event website

<http://www.rsc.org/Membership/Networking/InterestGroups/WaterScience/ForthcomingEvents.asp>

WSF Newsletter— If you have any items of interest or stories for the newsletter please

email us at—rscwsf@gmail.com

Water for Life Award

The Water for Life Award is made biennially by the WSF Committee to an individual who has made an outstanding contribution in any of the following areas:

- Maintenance and improvement of public health
- Sustainability and access to water resources
- Environmental, Economic and Social sustainability of the water cycle

The individual does not have to be a member of the RSC, but they must be nominated by a member of the WSF. Nominations were invited from all members of the Water Science Forum earlier this year. The nominations were reviewed by two members of the WSF Committee and an independent chair.



The winner of this year's Water for Life Award is Professor Fiona Regan from Dublin City University. Professor Regan is the founder and Director of the [DCU Water Institute](#) and she serves on the Scientific and Technical Advisory Board of the European Water Joint Programming Initiative. Professor Regan's research focuses on environmental monitoring, but the review panel were impressed with both the volume and diversity of her published work, which ranges from the detection of E coli in surface water to developing a sensor for speciation of chromium.

Professor Regan was presented with her award of an engraved water jug and tumblers at the Water Science Forum Committee meeting at Burlington House on October 3rd, 2019.—by **Simon Gillespie and Gary Fones**



In the News

To clean drinking water, just add microbes— *Scientific American*

<https://www.scientificamerican.com/article/to-clean-drinking-water-just-add-microbes/>

Washing machine that fights scourge of plastic — *Daily Mail*

<https://www.dailymail.co.uk/sciencetech/article-7443607/Worlds-washing-machine-built-microplastic-filter-available-year.html>

Army Of Citizen Scientists Help Sample Hundreds Of Miles Of Waterways — *Water online*

<https://www.wateronline.com/doc/army-of-citizen-scientists-help-sample-hundreds-of-miles-of-waterways-0001>

UK chooses Glasgow to host major UN climate summit—*The Guardian*

<https://www.theguardian.com/uk-news/2019/aug/09/uk-chooses-glasgow-host-major-un-climate-change-summit>

Papers of Interest (RSC Journals)

Hydrophilic trace organic contaminants in urban stormwater: occurrence, toxicological relevance, and the need to enhance green stormwater infrastructure (Environmental Science: Water Research & Technology)

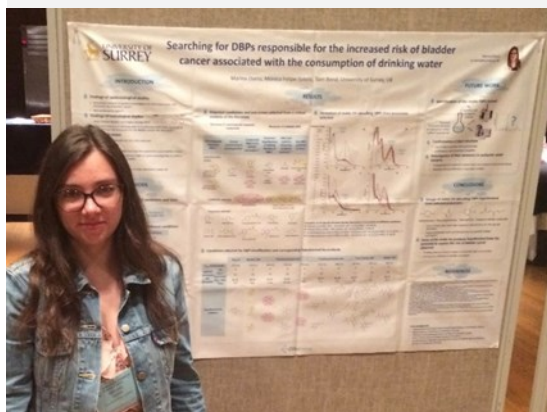
Clustering micropollutants based on initial biotransformations for improved prediction of micropollutant removal during conventional activated sludge treatment (Environmental Science: Water Research & Technology)

Event Discounts— did you know that WSF members are eligible for discounts to attend IChemE Water SIG events?!

<https://www.icheme.org/membership/communities/special-interest-groups/water/events/>



Alan Tetlow Bursary Report: Disinfection Byproducts Research Conference



Marine Diana was awarded the Alan Tetlow Memorial Bursary in May 2019. She is a PhD researcher at the University of Surrey, where she is searching for the disinfection by-products responsible for the association between the increased risk of bladder cancer and the long-term consumption of chlorinated water. Disinfection by-products are undesirable compounds generated during water treatment through reactions between disinfectants and organic and inorganic precursors.

The Bursary allowed Marine to attend the Gordon Research Conference on Water Disinfection, Byproducts and Health from 27th July to 2nd August 2019 in South Hadley, Massachusetts, United States. This high impact conference is very specific and gathered 184 attendees from 15 countries, including renowned researchers in water disinfection processes and disinfection by-products formation, analysis, regulation and health effects. She presented the findings of her research in a scientific poster and an oral presentation.

The conference offered plenty of opportunities for networking, and Marine hopes that the connections made will be valuable for her professional development. Among them, a researcher from the ICRA (Catalan Institute for Water Research) offered her to visit their labs. Through this collaboration, Marine will use some high-performance analytical instruments that are not available in her labs, and that will benefit her research greatly. She additionally learnt about methods and concepts presented in other researchers talks and posters that will be applicable to her research. Following her poster and oral presentation, she received some valuable feedback and comments that will enable her to strengthen her research. Finally, this conference gave her the opportunity to disseminate her research and advertise her recently published paper to her peers. Attending this conference was an invaluable experience for Marine and she is extremely grateful to the Water Sciences Forum for offering her this opportunity.

Visit MyRSC: <http://my.rsc.org/groups/home/74>

Water Science Forum bursaries

Water Science Forum bursaries have helped support research across a number of subjects. If you are interested in applying for our Water Science Forum Bursaries, up to £2000 is available per applicant for both the Alan Tetlow and Water Science Bursary. They are open to all WSF members from any country and the money available can be used for a wide range of activities including conferences, research, lab visits and research projects across a range of topics including water quality.

Contact: Hon Sec, RSC Water Science Forum, Thomas Graham House, Science Park, Milton Road, Cambridge, CB4 0WF, UK

See our website for more information: <http://www.rsc.org/Membership/Networking/InterestGroups/WaterScience/bursaries.asp>

Editors: Natasha Page & Gary Fones. Email: rscwsf@gmail.com

The views expressed in the newsletter are those of the authors and do not necessarily represent the views of the RSC, the Water Science Forum



RSC INTEREST GROUP
WATER SCIENCE FORUM

Get Connected—WSF are on Social Media

Water Science Forum are now on Twitter and Linked In. Please join us and become a group member by following the links provided below. We welcome your involvement with posts and conversations on all water related topics.



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RSC - Water Science Forum

<https://www.linkedin.com/groups/13519870>