

Points of interest:

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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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Congratulations – Simon Parsons Sustainable Water Award 2014 Winner

Professor Simon Parsons, past Vice Chair of the Water Science Forum has been awarded the Royal Society of Chemistry’s Sustainable Water Award for 2014.

He was presented with the award by Professor Brendan Keely at a special event following the Water Networks Meeting at Cranfield University.

The award was in recognition of the work Simon has done in “advancing the understanding of natural organic matter in water treatment and how it affects the performance of oxidation processes and the fate of micro-pollutants, as well as the development of treatment processes to improve water quality and sustainability”. Having joined Scottish Water in April 2012 as Chief Scientist, Simon is now Director of Strategic Customer Service Planning, leading teams in regulation, water and waste water services, strategic review, science and innovation. It’s his responsibility to ensure customer needs and expectations are built into strategies and plans for the future, ensuring Scottish Water continues to deliver the very best service for all.

Prior to joining Scottish Water in 2012 he had a long career in academia at Cranfield University where he was the Professor of Water Sciences and led the Cranfield Water Science institute.

Simon joined Scottish Water in April 2012 as Chief Scientist; he is now Director of Strategic Customer Service Planning.



Simon being presented with the award by Professor Brendan Keely.

Photo Cranfield University used with permission

Proposed Ban of Potassium Dichromate and the implication for Chemical Oxygen Demand Tests.

Potassium dichromate, used worldwide as the oxidizing agent of the COD tests will be banned in the EU as of September 2017. It was included in Annex XIV to Regulation (EC) No 1907/2006 REACH regulation (Commission Regulation No 348/2013 of 17 April 2013 amending Annex XIV to REACH). Chemical Oxygen Demand (COD) is an empirical test that is a measure of the potential oxygen consumption of waste waters. The test, widely used in the water industry (internationally) is ISO 15705:2002 COD-ST. It uses a Chromium (VI) salt, potassium dichromate, as one of its principal reagents.

The reason this test is used is partly historical but, in addition, the method itself has very good performance characteristics, is cheap, easy to automate and gives all stakeholders a great degree of confidence when assessing the compliance of waste water against relevant regulations. The COD test has been used for a very long time as one of the components of the method that European water utilities and regulators use to charge dischargers for their part of the effluent that enters a waste water treatment works, and for other effluent discharges that operate under licences.

While it may be possible to seek exemption for the COD test through REACH, it is proposed that an alternative suitable method is developed to allow the removal of the COD test in Europe as a reference method. The EU commission intend to promote a project to look into this issue and are working with member states to understand the next steps that need to be taken to allow the ban of potassium dichromate to be implemented.

This edition's water factoid:

Where are the worlds water volumes:

The earth's total amount of water has a volume of about 344 million cubic miles

- 315 million cubic miles is seawater
- 9 million cubic miles is groundwater in aquifers
- 7 million cubic miles is frozen in polar ice caps
- 53,000 cubic miles of water pass through the planet's lakes and streams
- 4,000 cubic miles of water is atmospheric moisture
- 3,400 cubic miles of water are locked within the bodies of living things

Water Science Forum bursaries

Please consider applying for the Alan Tetlow and WSF bursaries. They are open to all WSF members from any country and the money available can be used for a wide range of activities from conference and research lab visits for example to research projects in a range of topics including the water quality area. Up to £2000 is available per applicant. If you are unsure of eligibility please still apply and your application will be given full consideration.

Improving CSO performance

John Machell

The Pennine Water Group at the University of Sheffield are researching the application of Artificial Neural Networks for assessing combined sewer overflow (CSO) performance because, in the United Kingdom, increasingly intense rainfall patterns, growth of urban areas, urban creep (increasing areas of impermeable surfaces within existing development) and sewer blockages, are contributing to an increased number of pollution events and sewer flooding.

Wastewater service providers are under pressure to improve CSO performance in their ageing sewerage networks which have a legacy of CSOs. Ensuring CSOs continuously perform at an acceptable level is key to maintaining good water quality in the receiving watercourse, and unconsented discharges are considered unacceptable by both environmental regulators and the public, and can result in fines and damage to the reputation of wastewater service providers. Real time monitoring of water levels in CSO chambers is therefore becoming more common, and some water and sewerage companies have embraced this technology and built up significant data sets. The key to obtaining best value from this data, is to facilitate timely identification of CSO performance shortfalls.

A study was conducted by Pennine Water Group researchers to demonstrate that an automated data analytical tool comprised of an Artificial Intelligence (AI) system, integrated with near real time communications, is a viable method for the analysis of CSO level and rainfall data, and that it can be applied to the management and reduction of CSO spills.

The collaborating water company, Yorkshire Water, has CSO depth monitors installed on the majority of its (approximately) 1800 CSOs. The company had also developed a number of systems and practices which provided an overview of their CSO performance based on recorded depths. However, while these systems adequately capture trends in dry weather flow, they did not incorporate rainfall data, and therefore offered little benefit during or immediately after rainfall events. Thus a need was identified to include rainfall as part of the analysis, and data driven artificial intelligence systems were recognised as a way to incorporate the data without resorting to detailed mathematical models with their inherent high computational requirements.

Fifty CSOs, selected in conjunction with company personnel, were used in a pilot study. The selection criteria were designed to obtain a cross section of CSOs covering a range CSO performance and location characteristics within the company's catchment area, and to include some CSOs with recorded historic unconsented discharges.

Because every CSO has a unique response to rainfall, which itself is a function of the characteristics of the catchment and sewer network upstream of the CSO and CSO design, Artificial Neural Networks combined with a Fuzzy Inference system is an ideal data analysis combined method. Figure 1 shows an overview schematic of the developed analysis procedure.

The work demonstrated how data from online CSO level monitors can provide a wealth of information about what is occurring in the sewerage network and, combined with rainfall radar data, can enable a timely identification of reductions in performance.

The work also showed how a step change in awareness of system performance can be achieved through the online application of machine learning and automatic data analysis routines.

Further work is planned to increase the analysis frequency from a once daily system to a system which will make use of data as soon as it is telemetered from the CSO. With the rapid evolution of communication technologies, in future it may be possible to gather and transfer data for analysis every few minutes, should it be required, to ensure optimum CSO performance.

More details can be obtained from:

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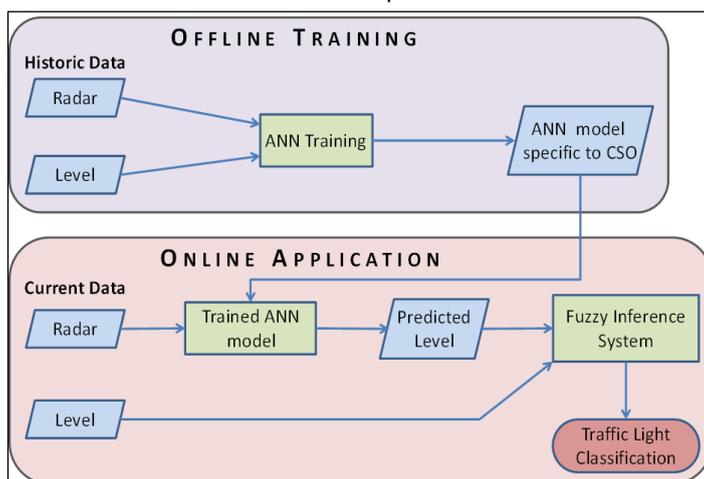


Figure 1. Schematic of the CSOA offline and online analysis procedure

Please let us have your ideas!

Can you suggest any topics of interest to members which might form the subject of a workshop or conference, or possibly a webinar or videoconference? Now is your chance, what would you like to have us discuss? WSF has recently set up a Conference Subcommittee to assist in the planning of future WSF-supported events. The role of the new subcommittee will be to encourage greater dialogue with members and the wider stakeholder community on key issues of interest, and to provide a focus for reviewing proposals. Subcommittee members will also be pro-active in seeking new opportunities to support and co-sponsor events with other RSC interest groups and outside professional bodies. As always, our remit is pretty broad where chemistry and water-related topics are concerned, so please let us know your thoughts. You can do this anytime using myRSC (where we will be hosting a discussion forum) or, if you prefer, you can relay your suggestions by email or post via our Secretary Roger Wellings at Networks@rsc.org.

Conference Subcommittee Agreed Terms of Reference

1. To canvass ideas/suggestions from the wider community (WSF members, interest groups, regional groups; through discussion with other professional bodies, government agencies etc).
2. To promote dialogue outside of formal meetings (via emails, MyRSC blogs etc).
3. To evaluate proposals received including requests for co-sponsorship or other support and to respond accordingly (at committee level where deemed appropriate).
4. To identify hot topics and key issues of concern and respond to RSC initiatives.
5. To consider the business case which would justify RSC support and WSF involvement.
6. To identify potential co-sponsors and stakeholder groups (assisting with financial support, speaker suggestions, contacts, promotion opportunities).
7. To indicate potential for success (look at possible risks including competing events) - preliminary assessment only.
8. To propose strategy (prioritise topics, scheduling, favoured event location) and consider alternative formats - workshop, conference, webinar, videoconference etc.
9. To present recommendations to WSF Conference Planning Committee for further consideration.

Younger Members

Hello younger members! I am your new representative on the WSF committee Dr Daniel VandenBurg. I started the role in January and have been settling in to my new role. One thing you might wonder is "Am I a younger member?" I was surprised myself to still be one at 32! The RSC defines a younger member as anyone who is under 35.



Now I am settled in I would like to extend a welcome to all younger members.

At a recent headcount we estimated that we had just over 100 younger members and like all sections of our membership it is growing year on year.

I am on the committee to represent your views and to also organise events which younger members might find useful. Therefore if you want to contact me about anything related to younger membership please send me a message on my.rsc my profile page is <http://my.rsc.org/profile/2136>.

I am now starting to organise our first event for younger members which will hopefully be a visit to a water treatment plant. This will be in conjunction with local section reps. If you have any ideas for events then please drop me a line via my.rsc. I hope to run an event twice a year or so.

Well that's it for now. Any questions or suggestions please get in touch!

Cardiff Engagement Event - October 2014

The 1st October saw the hosting of the third in a series of membership engagement events run by the WSF. Following on from successful events hosted in Edinburgh and Belfast, Cardiff's event was held in the Future Inns Hotel in picturesque Cardiff Bay. The event was well subscribed with about 18 attendees, including several from the local water company Dŵr Cymru, Welsh Water. Several committee members gave talks about what the WSF is and what we do, benefits of membership of both the WSF and the RSC as a whole and continuing professional development. The CPD element of the presentations in particular generated a lot of questioning and debate from the audience. Andrea McGee from the RSC came to talk to us about the different chartered programmes offered by the RSC and the benefits of such programmes. This section of the talks was also well received since the water industry sees such programmes as an important part of CPD for their scientists and technicians. Finally to round up the morning Daniel VandenBurg gave a talk about the bursaries offered by WSF, his own award of an Alan Tetlow Memorial Bursary and how it has benefited him. The day was closed by Chairman, Kevin Prior which was followed by a light lunch. Most delegates stayed for this and it turned into a useful networking event. Overall the organising party thought the event was a success and would like to thank the RSC for the funding which has made all the membership engagement possible events this year.

Forthcoming WSF events in 2014/2015:

Water Safety Plans. What do they mean to me?

11th December 2014
London, UK.

Emerging contaminants in waters and soils, practical considerations: Sampling analysis and consequences

4th March 2015
Sheffield, UK.

[http://www.rsc.org/
Membership/Networking/
InterestGroups/
WaterScience/
ForthcomingEvents.asp](http://www.rsc.org/Membership/Networking/InterestGroups/WaterScience/ForthcomingEvents.asp)

Science Jokes!

What did the atom say to the photon?

Don't get too close, I
might get excited!

Never trust an atom.

They make up every-
thing!

I'm running out of good jokes.

All the good ones
argon!

Did you here about the man who was cooled to absolute zero?

He's OK now!



WATER SCIENCE FORUM

The Newsletter of the Royal Society of Chemistry Water Science Forum

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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 or the author's organisation

Alan Tetlow Bursary

In memory of Alan Tetlow the Water Science Forum bursary will help post graduate students, young (under 35) or professional water scientists during the first 10 years of their career.

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

Water Footprinting

The International Standards Organization (ISO) has recently published ISO-14046 Water footprint-Principles, requirements and guidelines. While water is abundant, it is well understood that somewhere close to 97% is saline with only 3% described as freshwater and of that, circa 1% is available for human use. With that in mind there is a focus on ensuring water systems (natural and managed) are sustainable against a backdrop of increasing demand and scarcity. Water pervades almost all natural and engineered activities at a very local level through to a global scale. It is becoming increasingly important for organisations to understand the flow of water through processes and products and to understand the environmental and public health impact of such activities. ISO-14046 provides guidance and tools necessary for calculating and reporting water footprints as part of an informed environmental assessment. At a local level the water footprinting standard can be applied to help optimise water use, identify potential water savings and, as a consequence, deliver economic benefit to businesses. On a macro-economic scale the water footprint model informs a discussion on the net flow of water into and out of countries, providing a view of imports and exports of embedded water in products. The water footprint standard supports improvements in operational efficiency and informs risk assessments when considering water resource management. Members of the water science forum have been involved in the development and drafting of the standard. To find out more about ISO-14046 visit www.bsigroup.com

How Scientists and Engineers can contribute to Capacity Building in Developing Countries

Gabrielle McGill, an Industrial Chemist by training, tells Rita Henderson, UNSW, about her 12 month trip to Cambodia working in the WASH sector with Engineers Without Borders, Australia.

Engineers Without Borders (EWB) Australia is a not-for-profit organisation, which is trying to link engineering skills with people in need. Their mission statement is to 'connect, educate and empower people through humanitarian engineering'. Essentially, they want to avail engineering technology to those who need it to help them create a life free from poverty. EWB has a large volunteer base in Australia and have two rounds a year where they send people on 12 month placements. These placements are aimed at capacity building of the local staff and there is typically a partnership developed with a local not-for-profit organisation. It is this organisation that identifies their own capacity and development needs and skills. In the case of Gabrielle's trip to Cambodia, the local organisation, Live & Learn Environmental Education Cambodia, was the not-for-profit that EWB Australia was working in partnership with. Rita interviewed Gabrielle to find out more about her experience...

So, what exactly did you do while you were there?

Live & Learn Environmental Education was working on sanitation solutions for communities who live on Lake Tonle Sap in Cambodia (approx. 1.6 million people). I was working with a team there on two solutions that were culturally, financially and technologically appropriate to the local community to meet their sanitation and hygiene needs. The two solutions that we were looking at were a urine diversion desiccation toilet (UDDT) that separates out urine and faeces and also anaerobic biodigestion. Now is probably a good time to mention that the communities currently practice open defecation into the lake. The lake is very much the community's livelihood in terms of fishing and also people occasionally have to drink that water. If they did, they would filter the water to treat it, but there are obviously health ramifications related to this.



Gabrielle and colleague transporting a biodigester to the community

To read the full interview please see:

https://www.engineering.unsw.edu.au/sites/eng/files/uploads/Interview_GabrielleMcGill.docx

To read more about EWB Australia please see:

<http://www.engineering.unsw.edu.au/engineers-without-borders-australia>

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

Water Safety Plans What do they mean to me?

Thursday 11th December 2014
Royal College of Surgeons

Water Safety Plans and the formation of Water Safety Groups and Teams are integral to the latest UK legislation and guidances, not only for hospitals, but throughout the entire worldwide water delivery programme. The speakers at this conference will deliver their global perspectives and how lessons learned from their own experience can benefit others in very different industries.



09:30 – 10:00	Registration and Refreshments
10:00 – 10:15	Welcome by Chairman Professor Christopher J. R. Bartlett
10:15 – 11:00	Water Safety Plans - a World Health Organisation Perspective Dr Suzanne Lee, Longtinella Ltd
11:00 – 11:30	Coffee break
11:30 – 12:00	Water Safety Plans - from the Cruise Ship Perspective Dr Barbara Mouchouni, University of Thessaly
12:00 – 12:45	Working in Partnership with Contractors Mr Paul Nolan, Colsby TM
12:45 – 13:00	CHA
13:00 – 14:00	Lunch
14:00 – 14:45	Water Safety Plans - a Hospital Perspective Dr Mike Weinreb, Chesterfield Royal Hospital
14:45 – 15:30	Water Safety Group Approach and Benefits of Independent Audit George McCracken, Belfast Health and Social Care Trust (BHSCT)
15:30 – 16:00	Delegates Feedback, Summary and Close Questions to the panel from the delegates

The WMSoc reserves the right to alter speakers and/or titles of papers if circumstances dictate.

5 CPD points awarded

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