Information and news from WIRC @ Bath.

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Water Innovation & Research Centre | UNIVERSITY OF BATH

Dear all,

Just before Christmas, it is time to look back. It has been a wonderful and successful year for WIRC. We organised our first conference, our research themes have been lined up for the future and most of all the discussions with all members have been very inspirational.
I'm convinced that 2017 will be even more exciting. A number of very interesting international projects has been proposed or granted which will enable WIRC to grow further. And we are ready to embark on a journey with our GW4 colleagues in the Water Security Alliance.

I wish you a Merry Christmas and a Happy and Inspirational New Year

Jan Hofman
Director WIRC @ Bath

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Upcoming Events at Bath

19 January 2017: WIRC Colloquium - Martin Shouler, Arup

25 January 2017: WIRC Open Discussion Day

16 March 2017: The effects of oxygen availability and biogeochemical cycling on water quality in lakes, reservoirs and oceans - Dr Lee Bryant

30 March-12 April 2017: Wetskills United Kingdom 2017

10-12 April 2017: 18th UK-Young Water Professionals Conference

11-12 April 2017: 13th UK Young Coastal Scientists and Engineers Conference (YCSEC)

Farming Algae to Treat Waste Water

By Dr Tom Arnot **and** Professor Rod Scott

A collaborative project between the University of Bath's Water Research & Innovation Centre (WIRC) and Wessex Water is using high rate algal ponds to remove nutrients from waste water and creating an added value by-product. The £0.45M project is funded by UKWIR and forms part of their phosphorus removal trial programme.

Every day over 11 billion litres of wastewater is produced in the UK through domestic and industrial use. This wastewater must be cleaned, or treated, before it can be safely released back into the environment or risk causing serious harm to both human health and nature. As a chemical engineer, my work through the Water Research Innovation Centre at Bath is about researching better, more efficient methods for wastewater treatment. One area of this work involves a particular focus on how we might use natural and sustainable solutions for our wastewater challenges.

One of these challenges is of course finding solutions to reduce the levels of

sewage treatment works (SWTs) are overall achieving high rates of nutrient remove, more needs to be done if we are to meet the challenging targets.

In the lead up to 2020 water companies across England will be trialling a range of new and different technologies aimed at finding a sustainable and effective solution for phosphorous removal, as an alternative to the traditional and increasingly expensive approach to ferric dosing. These technologies include the use of magnetite, and at least two different approaches to the use of algae. One of these is a project we've pioneered with Wessex Water – a installation involving high rate algae ponds (HRAPs) which we've installed at the SWT in Beckington in Somerset.

The principle behind HRAPs is a simple and satisfying one. In essence they are shallow ponds where the waste water being treated is continuously circulated by paddlewheels. Within each pond, algae harness sunlight to grow and draw nutrients from the waste water, they use carbon dioxide from a low rate gassing process. If algal growth is successfully maintained, very low levels of phosphorus (and nitrogen) are left on the water as the majority are locked up by the algal biomass. The water and algae mixture then transfer to a tank where gravity separated occurs. From this tank we get cleaner water which can be returned to the environment or reused, and nutrient rich algae biomass that can be used as biofuel or an agricultural fertiliser, or simply blended with digestate from other treatment works as a fertiliser supplement.

Through collaboration with Wessex Water and this pilot trial at Beckington we hope that we can demonstrate how a natural system like algae can be used to treat waste water on a small scale. We will be assessing treated water quality, the algal biomass which is produced, energy consumption, and capital expenditure. We will also explore options for further use or processing of the algal mass for value recovery. In parallel with this work we have a postgraduate student project funded by the EPSRC Centre for Doctoral Training in Water Informatics: Science and Engineering. He is working on metabolic modelling of algal metabolism, and directed evolution to improve algal performance in relation to phosphorus uptake, and to further refine the operating conditions in the HRAP systems. Together this information will provide the basis for a techno-economic evaluation of the potential for HRAP treatment to be deployed at larger-scale sites. Here the challenge will be in bringing down the cost of treatment to levels that are truly competitive with existing and established alternatives.

Professor Wim de Villiers, Stellenbosch University's Rector and Vice-Chancellor, met staff from across the University on Tuesday 15 November during his first official visit to the Claverton campus since taking office.

Professor Dame Glynis Breakwell with Professor Wim de Villiers

Stellenbosch, one of South Africa's leading universities, has been an important strategic partner since 2013 with active collaborations between our Centre for Sustainable Chemical Technologies and their Department of Chemistry & Polymer Science, as well as our Water Innovation & Research Centre and Stellenbosch's Water Institute.

Professor de Villiers and his wife Catherine were greeted by Professor Bernie Morley, Deputy Vice-Chancellor & Provost, before taking part in discussions about existing and potential research links with colleagues from the School of Management, Pharmacy & Pharmacology, Health, Chemical Engineering and Social & Policy Sciences.

Professor Stephen Ward said: "It was exciting to identify the potential for collaboration between their Centre of Infectious Diseases and our neuropharmacology and inflammation research, as well as their mental health information centre. Both could create strong applications to the RCUK Global Challenges Research Fund. Our epidemiological work, teaching and knowledge

After a tour of the Claverton campus with Mr Martyn Whalley, Director of Estates and Lucy Woodcock, SU President, our visitors met with President and Vice-Chancellor, Professor Dame Glynis Breakwell, to discuss recent developments in our partnership.

Dame Glynis noted: “Stellenbosch University is an excellent and much-valued partner. As part of the U4C Network, along with Zhejiang University and UNICAMP, we are working together to address major economic, political and social issues and influence policy makers nationally and internationally. This visit has enabled us to further strengthen our strategic relationship and to explore potential new research collaborations in a number of disciplines.”

WssTP Brokerage Event and Working Group meetings

On 23 and 24 November the Water supply and sanitation Technology Platform organised their yearly Brokerage event. The day started with presentations from the European Commission with information about the different Horizon2020 programmes and the importance of water. Water is back as a topic on the political agenda of the Commission. This means that most probable H2020 will have significant and explicit water related calls again in the next round (2018-2019). Unfortunately, no information about the content of these calls was given yet.
WssTP as a representative organisation the European water sector, has recently developed a vision on the water cycle until 2030 and a connected Strategic Innovation and Research Agenda (SIRA). This common vision will be used to influence the European policy makers and keep water at a high level on the political agenda. Water is a key factor in our society. Water is required for public health, economic prosperity, creating jobs and is important for the development of a circular economy. The new Vision aims at multiple use of water for multiple purposes and the use of ICT ('Digital water') to optimise systems and create new opportunities for sustainable water management.

During the brokerage event there were possibilities to meet on a one to one basis with different companies and stakeholders. I have met with Vitens (Dutch Water Utility), Anglian Water, Suez, CTM, Rietland and INL (International Iberian Nanotechnology Laboratory).

On the second day the Working Groups had their annual meetings. I chaired the Urban Water Pollution group, where we were discussing the organisations

Membranes
For more information on WssTP contact Jan Hofman

Upcoming Conferences

10 - 12 April 2017, Bath, 18th UK-IWA Young Water Professionals Conference, *A Water World without Boundaries*
29 May 2017- 2 June 2017, IFlorianopolis, Brazil, WA Leading Edge Technology,
3-5 July 2017, Ottawa, Canada, International Conference on Water, Informatics, Sustainability and Environment: iWISE 2017

You can find out all IWA event on their website.