



IAHR/IWA Joint Specialist Group on URBAN DRAINAGE

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For updated information, please regularly visit our website at:

http://www.iwa-network.org/specialist_groups.php and

<http://www.jcud.org>

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Prepared by the IWA Urban Drainage Specialist Group

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2. CHAIRMAN'S THOUGHTS

Magdeburg, March 2017

Dear friends and colleagues,

We are already in March, and I would like to take this opportunity to greet you for the year 2017 and wish you all the best in your personal and professional life. This newsletter summarises some of the past as well as ongoing activities worldwide within our topic area of urban drainage, and I sincerely hope that it will assist you in one way or another.

The year 2016 has seen an expansion of the Joint Committee itself – with our new member Annette Semadeni-Davies from New Zealand, the committee now has thirteen members (see list on page 2) and our non-voting (but very active) secretary Jiri Marsalek.

Important events of 2016 include the Novatech conference in Lyon with 500 participants, the Sewer Processes and Networks conference (SPN) in Rotterdam, and the Low-Impact Development conference in Beijing. Reports on these events are elsewhere in this newsletter. In connection with the many activities coordinated by the Joint Committee, the important roles of our working groups should be mentioned. I am pleased to welcome a new “Urban Drainage Metrology” working group proposed and led by Francois Clemens from Delft Technical University. The group will publish a book on metrology of urban drainage.

And, of course, we are looking forward to future events: A core urban drainage event of 2017 will be the International Conference on Urban Drainage (ICUD) – this time organised by our colleagues from Czech Republic. It will be held in the Congress Centre (former Palác Kultury) in the centre of Prague. By the time the Newsletter reaches you, you have probably uploaded your conference contributions. It will be a nice event for many of us, I hope, to gather again and meet and discuss past research findings and present and future work on many aspects of urban drainage. Also, this occasion invites us to look to the more distant future (though it is not so distant anymore, as our Australian colleagues are already busy with preparations), the 2020 ICUD will be in Melbourne, Australia.

May you get – from reading the literature and earlier work, and from discussions with colleagues at conferences, or by email or other means of communication – stimulation and thoughts for your work, for your role in the big picture of urban drainage – which is not a stand-alone entity, but, as it is currently being perceived more and more, closely interwoven with other disciplines. May the Joint Committee and also this newsletter be of some help for you – in whichever part of the world and whichever area of urban drainage you are focussing on.

Finally, if you have any suggestions on how the Joint Committee or its working groups can serve you better, please do not hesitate to contact me or other members of the Joint Committee. Best wishes and regards,

Manfred Schütze Chair of the IWA/IAHR Joint Committee on Urban Drainage
ifak Magdeburg

What is the Joint Committee on Urban Drainage and how can I get involved with it? -

A primer (not only) for newcomers to the Urban Drainage Community

By Manfred Schütze, Chair of the JCUD

The very fact that you are reading this newsletter indicates that you are aware of (at least) some of the activities of the Joint Committee on Urban Drainage. This newsletter, compiled annually by Jiri Marsalek, with contributions from all around the world, provides a good insight into what is going on in our area around the globe. Still you might wish to know more about “what is behind the scenes?”. Here comes the answer – or, at least, an attempt to it:

The Joint Committee on Urban Drainage of IWA and IAHR (short: JCUD, or JC) is a committee of, at present, 13 members (plus a non-voting secretary) worldwide, who are elected for a period of three years (one extension is possible). Their aim is to bring together and to coordinate activities related to urban drainage. Every three years, including 2017, a new chair is elected.

The JC organises, once every three years, the International Conference on Urban Drainage (e.g. 2014: Malaysia, 2017: Czech Republic). Furthermore, the JC oversees various working groups (list and contacts are also included in this newsletter). Some of these working groups run specialist conferences (e.g. Sewer Processes and Networks; Urban Drainage Modelling etc.). Everyone is most welcome to get engaged in the activities of the working groups.

Furthermore, the JC attempts to stimulate contacts, exchange and discussion, e.g. by this newsletter (published annually) and by the "urban-drainage" email discussion list.

How can I get involved?

-
- Subscription to the "urban-drainage" **email discussion group** (see www.jiscmail.ac.uk/urban-drainage). Subscription is free and does not involve any commitment (Simply go to <https://www.jiscmail.ac.uk/cgi-bin/webadmin?SUBED1=URBAN-DRAINAGE&A=1> or send an email with the contents *subscribe urban-drainage YourFirstName YourLastName* to listserv@jiscmail.ac.uk)
Conference announcements and other information are distributed by this list. You can also put your announcements or questions to this list. At present, the list has 352 recipients worldwide and therefore provides an easy access to urban drainage experts around the globe. On the webpage given above you can also find previous posts to the list.
IWA has launched a new **communication web portal** (in social-network style): Feel free to join in at <https://iwa-connect.org>
 - Participate in and contribute to the **Working Groups**: Feel free to contact the working group of your interest (see their reports in this newsletter), to get more information about their activities and, possibly, to contribute to their work.
 - **Conferences**: Participate and contribute to the conferences. The conferences under the auspices of the JC and/or of its working groups are usually announced, among others, through this newsletter, through the webpage of the JC (www.jcud.org) and through the urban-drainage list.

Role of IWA and IAHR as parental organisations

The JC can be considered as a Specialist Group under the umbrella of, both, IWA (International Water Association) and IAHR (International Association of Hydro-Environment Engineering and Research), hence the word "joint" in "Joint Committee". There are also many other Specialist

Groups of these associations (e.g. Large Wastewater Treatment Plants and many more). Obviously, you are most welcome to join IWA (www.iwahq.org) or IAHR (www.iahr.org) – or even both - and enjoy their benefits (e.g reduced subscription rates to their journals etc.).

Should you have any questions about or any suggestions for the Joint Committee, please do not hesitate to get in contact with me or with any of the JC members. It is our desire to facilitate urban-drainage related work in order to contribute to solutions of one of the pressing needs of this world.

The “urban drainage” email discussion list (managed by Dr Manfred Schütze, Magdeburg, Germany)

The urban drainage email discussion list has been set up in 1998 by David Butler and Manfred Schütze. It is an easy and convenient means of getting in touch with urban-drainage researchers and practitioners worldwide. Salient points for getting on and using this list appear in the box below (courtesy of our Chairman, Manfred Schütze).

How to use the “urban-drainage” email discussion group? – All you need to know in a nutshell

- To subscribe:
send an email with the contents
subscribe urban-drainage YourFirstName YourLastName
to listserv@jiscmail.ac.uk
- To leave (un-subscribe):
send an email with the contents
leave urban-drainage
to listserv@jiscmail.ac.uk)
- To send a message to the list:
Send your message
to urban-drainage@jiscmail.ac.uk
Your message will then be distributed to all list members worldwide. At present, the list has, at present, 352 members worldwide. Please note that commercial use/commercial advertising is not allowed on the list.
- To obtain more information:
Consult www.jiscmail.ac.uk/urban-drainage

3. FROM THE SECRETARY’S DESK

Committee Newsletter – our annual newsletter is published to serve the international urban drainage community and meet the requirements of our parental organisations. The main purpose of the newsletter is to facilitate communications and interactions among specialists in our field, rather than to present detailed information. The most recent newsletter can be found on our website <http://www.jcud.org>

Both IWA and IAHR now distribute newsletters only electronically, and place our newsletter on their websites. We also distribute the Newsletter to more than 1,200 colleagues on our JC mailing list, which is based on the IWA and IAHR memberships, and participation in ICUD and

NOVATECH conferences. Please share your electronic newsletter copy (or the link to our website) with colleagues, or refer them to the IAHR, IWA and Joint Committee websites. Your comments on this newsletter issue and contributions to future newsletters are most welcome.

Joint Committee Activities – The 2016 annual Committee meeting was held during the NOVATECH Conference in Lyon, France, on June 27, 2016. The highlights of the minutes of the meeting follow.

A newly elected member of the Joint Committee (in 2016): Dr. Annette Semadeni-Davies (New Zealand) was elected at the meeting. Annette has a distinguished career in urban drainage documented by numerous publications on various topics. The Committee has now 13 voting members and as a part of continual renewal, new members are solicited for in Section 4 of this newsletter.

The Joint Committee website (www.jcud.org) is operated by Jeroen Langeveld at Delft University of Technology. The latest news from JC, including the minutes of the meetings, is posted on this website (in addition to the website hosted by IWA).

Involvement in IWA Affairs: reported on by Jean-Luc Bertrand-Krajewski. IWA has adopted the Strategic Plan for 2014-2018, with priorities of great importance to JC. IWA operates 49 Specialist Groups and is working on increasing the integration of such activities in the form of clusters. For more information about the IWA Strategic Plan, visit <http://www.iwa-network.org/downloads/1424767381-Iwa-Strategic-Plan-2014-2018.pdf>

A new task group on metrology of urban drainage has been approved by the Committee – this effort will be led by Francois Clemens and Jean-Luc Bertrand-Krajewski.

Reports on conferences – Jean-Luc reported on the 9th Novatech – in total, there were 500 participants in all categories combined. The conference was moved to INSA to save money on renting conference facilities. There is a new municipal partner, the municipality of Villeurbanne, which also offered to host the conference ice breaker at their city hall. The conference audience was 60% French speaking, and that part of attendees was well distributed among sectors. The vast majority of international attendees were researchers (80%).

14th ICUD in Prague, 2017 – Vojtech Bares reported good progress of various activities, including establishing a conference website, distributing announcements at some international conferences, setting up a core International Scientific Committee, proposing special sessions, and getting first sponsors. Some help may be needed concerning the Poul Harremoes Award selection process, suggestions of keynote speakers, JC Career awards, conference workshops, and financial dealings with parental organizations.

15th ICUD in 2020 – two highly competitive proposals have been received, one from Australia, Monash University, and the other one from New Zealand, University of Canterbury (UoC). Both proposals were deemed excellent. Following discussions of both proposals, JC members took a vote and voted anonymously in favour of the Australian proposal.

Tentative future JC meetings: Prague (just before the 14th ICUD), 2018 – in conjunction with the UDM in Palermo, Italy, and in 2019, at Novatech in Lyon, France. Please note that all JC meetings are public – all are welcome.

4. JCUD MANAGEMENT COMMITTEE: Call for NEW member nominations

The Management Committee of the IWA/IAHR Joint Committee on Urban Drainage (JCUD) will have at least one vacancy later this year and is looking for possible replacement(s) as a part of continuous revitalization of the Committee. Details follow below.

Job description: all members operate in their own way and contribute accordingly. Typical contributions include proposing to organize workshops/conferences and training courses (usually in collaboration with our working groups), organizing or contributing to publications (monographs, or journal review papers), contributing news from their country or region to the Committee's annual newsletter, participating in email discussions, attending JC meetings held annually in conjunction with drainage conferences, and promoting JC activities and visibility in general.

Qualifications: we are looking for colleagues actively involved in any aspect and sector of urban drainage. However, perhaps the most important qualification is having some time to devote to the committee activities and personal initiative in proposing and implementing new activities. One reason why our Committee has been successful in its more than 35 years of operation is our ability to attract highly motivated members to serve on the Committee. The elected candidates must be (or become, within one month of being elected) members of one of the parental organizations (IAHR or IWA), and our statutes allow only one member per country; if your country is already represented on the committee, you may have to wait till there is a vacancy, or even better, simply join in the meantime one of our working groups and start contributing to our efforts that way. The information on Joint Committee and the current membership can be found on our website: www.jcud.org.

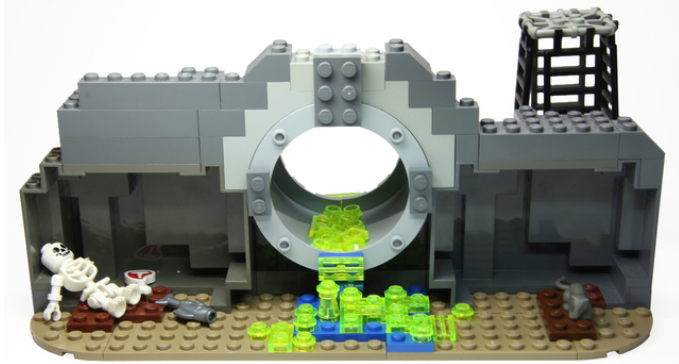
Application procedure: you can either nominate yourself for JCUD membership, or you can nominate another person (ideally after establishing their willingness to serve, otherwise this will have to be done by JCUD), and submit electronically the following two documents to the current JC Chairman, Dr Manfred Schütze (Manfred.schuetze@ifak.eu), copied to JC secretary Dr Jiri Marsalek (jiri.marsalek@canada.ca): (a) A brief CV, and (b) a statement of activities you would like to contribute to the JC programme. Neither document must exceed one page, using a 10-point font or larger.

Deadline: August 31, 2017. The applications received will be distributed to the JCUD members for assessment and voting; the results will be announced sometimes after the JC meeting in Prague (tentatively set for Sep. 10, 2017.)

5. INVITATION TO ATTEND THE 14TH IWA/IAHR INTERNATIONAL CONFERENCE ON URBAN DRAINAGE (ICUD), PRAGUE, CZECH REPUBLIC, SEP. 10-15, 2017, by Conference Chairs, David Stransky, Vojtech Bares, and Ivana Kabelkova (CTU Prague) www.icud2017.org

Dear colleagues and urban drainage enthusiasts,

by the time the first International Conference on Urban Drainage was held in Southampton, in 1978, our minds were mainly focused on creating something meaningful from Lego pieces, with only little interest in urban drainage.



Something meaningful from Lego pieces

In 1990, when the 5th International Conference on Urban Drainage was held in Osaka, we were starting our professional careers. Czechoslovakia was finally a free country and we discovered, that the world and urban drainage were much more complex and interesting than we had expected.

Copenhagen hosted the 10th International Conference on Urban Drainage in 2005 and the idea to organize an ICUD conference was born during a kick-off meeting of the Urban Drainage Specialists Group of the Czech Water Association and was pushed to action by Jiri Marsalek in 2009.

On December 19th, 2012, just two days before the prophesied end of the world, we received an e-mail from David Butler (at that time the chair of JCUD) that our second proposal was successful. We waited for two days and when nothing destructive happened to the world, we started preparations of the 14th ICUD.

From that time on, our working days have been continually growing longer and the nights shorter, but we are happy that our dream to welcome our colleagues and friends in Prague is finally becoming a reality. Prague has always been a springboard to fame for ‘future international stars’ of arts and science, including Tycho de Brahe, Johannes Kepler, Wolfgang Mozart, Christian Doppler, Bedrich Smetana, Antonin Dvorak, Franz Kafka or Albert Einstein. Now we give you the opportunity to expand this list.

For the ICUD conference, we offer you an excellent scientific and technical program, including special sessions, and a variety of technical tours ranging from visiting sewers more than 100 years old (real and dirty) to one of the largest WWTP construction sites in Europe. The meeting venue is

exceptional, not just because of its set-up and scenic location, but also because of the turbulent history of this Prague district.

Beside the professional experience, we will offer you a memorable cultural experience. Wandering the UNESCO protected medieval historic core, enjoying rich cultural programme and fine dining will help you get refreshed after a challenging scientific program. Friendly and relaxed atmosphere is guaranteed by the Prague's most charming fluid – beer. We have been personally and regularly checking its temperature, viscosity and taste to ensure that it will be at its peak condition during the conference.

The incubation period of the idea to hold the ICUD conference in Prague has taken many years, but now we are ready to welcome the urban drainage community to an exceptional meeting. During September 10-15, 2017, all sewers will 'drain' to Prague and we are warmly inviting you to be a part of this happening - of this event, this story, and this wonder.

David, Vojtěch and Ivana

6. WORKING GROUP REPORTS

6.1. International Working Group on Data and Models (IWGDM) (Chairman: Dr David McCarthy, Environmental and Public Health Microbiology Laboratory, Monash Water for Liveability, Department of Civil Engineering, Building 60, Monash University, Clayton, Vic 3800, Australia, Phone: +61 3 9905 5068, Fax: +61 3 9905 4944, E-mail: david.McCarthy@monash.edu; Secretary: Prof. Manfred Kleidorfer, Unit for Environmental Engineering, University of Innsbruck, Technikerstrasse 13, 6020 Innsbruck, Austria, Phone: +43 512 507 62134, Fax +43 512 507 62199, E-mail: manfred.kleidorfer@uibk.ac.at; Website: <http://iwgdm.wikispaces.com>)

For 2017, the IWGDM is planning to organize a “Stormwater Quality Modelling Tournament”. The idea was developed during the post-conference workshop at NOVATECH in 2016. INSA Lyon offers to provide data-sets of stormwater quality timeseries to stimulate the development of new models, calibration methods and uncertainty assessment methods. Different research groups, preferably PhD students and young post-docs, shall be invited to compare their modelling results and contribute to a joint paper. Currently the schedule and tournament rules are being developed, the concept shall be presented at a workshop at ICUD conference 2017; first results are expected to be available at the UDM conference in 2018.

A further group activity for 2017 is the organization of the special session “Models in real time control applications” at the ICUD conference in September (<http://www.icud2017.org>) together with the working group on Real-Time Control of Urban Drainage Systems (RTCUDS). Models of urban drainage systems are increasingly used in real time control applications (e.g. flood risk management, forecasting, nowcasting, reduction of pollutant discharges, etc.). We are interested in technical papers on all kind of challenges, which occur when running a model in real time control applications e.g. data management incl. online data validation, online model calibration and updating, consideration of uncertainties, model based (predictive) control, etc. We are also interested to learn from the experiences of the already implemented high-level RTC systems, e.g. global control of urban drainage system, integrated control, pollution based control, etc.

Everyone who wants to get in touch with the group and keep updated on its activities is invited to contact the secretary to join the group's mailing list.

6.2. The Real-Time Control of Urban Drainage Systems (RTCUDS) Working Group (Chairman: Prof Dirk Muschalla, Graz University of Technology, Institute of Urban Water Management and Landscape Water Engineering, Stremayrgasse 10/I, 8010 Graz, Austria; Phone: +43-(0)316-873-8370, Fax: +43-(0)316-873-8376, E-mail: d.muschalla@tugraz.at , Web: <http://www.sww.tugraz.at>, Secretary: Dr Jeroen Langeveld, Delft University of Technology, Stevinweg 1, 2628 CN Delft, the Netherlands. Phone: +31 6 22409565. E-mail: j.g.langeveld@tudelft.nl)

The RTCUDS group has proposed holding a RTC workshop in conjunction with the NOVATECH 2016 conference. However, the workshop was cancelled due to too limited participants. This has raised the discussion with the JCUD whether or not to continue the RTCUDS working group. The general feeling of the JCUD is that the attention for RTC is fluctuating over time, but that the need to optimize existing urban drainage systems by RTC is still very strong. At the Joint Committee meeting in Lyon, it had been agreed to identify and recruit new members, for example, by using the "urban-drainage" email list and similar resources. The RTCUDS will also solicit for new members during a Junior Scientist Workshop on integrated modelling and RTC in 2017 near Graz, Austria together with the MIUWS working group (modelling integrated urban water systems) which is a part of the Modelling, Instrumentation and Automation Specialist Group of IWA. Contact: Dirk Muschalla: d.muschalla@tugraz.at

6.3. Sewer Systems and Processes Working Group (SS&PWG) - (Chairman: Dr. Jeroen Langeveld. Delft University of Technology, Stevinweg 1, 2628 CN Delft, the Netherlands. Phone: + 31 6 1897 6283, Email: j.g.langeveld@tudelft.nl ; Vice-Chair/ Chair of next SPN conference: Prof. Jes Vollertsen, Department of Civil Engineering, Aalborg University, Thomas Manns Vej 23, DK-9220 Aalborg, Denmark, Phone: +45 99408504, E-mail: jv@civil.aau.dk ; Secretary: Dr Asbjørn Haaning Nielsen, Department of Civil Engineering, Aalborg University, Thomas Manns Vej 23, DK-9220 Aalborg, Denmark, Phone: +45 9940 9817, E-mail: ahn@civil.aau.dk Website: <http://www.sspwg.org>.

The SS& PWG group has organized the following activities in 2016:

SPN conference

The 8th SPN conference in the series, SPN8, was held in Rotterdam, Aug. 31 – Sep. 2, 2016. It was organized by the Delft University of Technology. The 9th SPN conference will be held in Aalborg, Denmark, August 27-30, 2019.

Solids in Sewers

A new edition of the Scientific and Technical Report on Sewer Solids is planned to be published in 2017, edited by Jean-Luc Bertrand-Krajewski, Simon Tait, Jeroen Langeveld, Jes Vollertsen and Alma Schellart. Contact: s.tait@sheffield.ac.uk or a.schellart@sheffield.ac.uk

6.4. Working Group on Source Control for Stormwater Management (SOCOMA)

(Chairman: Gilles Rivard, Lasalle|NHC inc, 9620, Saint-Patrick, Montréal (PQ), Canada, H8R 1R8; Phone: +1-514-366-2970, Fax: 1-514-366-2971, E-mail: grivard@lasallenhc.com ; Vice-chair & Secretary: Sylvie Barraud, INSA Lyon - LGCIE - Bâtiment Coulomb, 34 Avenue des Arts, F-69621 Villeurbanne Cedex. Phone: +33 4 72 43 83 88; Fax: 04 72 43 85 21; E-mail: sylvie.barraud@insa-lyon.fr ; Secretary: Tim Fletcher, Melbourne School of Land & Environment, The University of Melbourne, 221 Bouverie St, Parkville, Vic, 3010, Australia. Tel: +61 3 8344 0621, E-mail: tim.fletcher@unimelb.edu.au .

Working Group Report

The SOCOMA working group studies source controls, which are defined as all measures applied to control stormwater before it enters sewers or the receiving systems (surface water or groundwater). The group's objective is to facilitate the development of these techniques, by conducting research and experiments, and disseminating the results by various means. As compared to the WSUD (Water Sensitive Urban Design) working group, which has related interests but in a more holistic and institutional outlook, SOCOMA focuses more on technical aspects related to source control technologies as applied to urban drainage. The group's activities and workshops would therefore be more oriented to provide a forum for exchanging technical details of design and implementation of research results and approaches to source control mechanisms. A summary of group's activities in 2016 follows.

- Participation at the NOVATECH Conference in Lyon (June 2016); the members of the SOCOMA have been involved in the Scientific and Organization Committees and have reviewed abstracts for specific sessions.

- A Specialized Workshop was held at the NOVATECH Conference (July 1), with about 15 participants. The title for the Workshop was:

Admitting we might be wrong: how to design and monitor to ensure the adaptability of stormwater control measures (SCMs).

The background assumption for the Workshop was that some of the uncertainty involved in the performance and design of SCMs is inevitable and that monitoring their performance has the ultimate goal of providing us with knowledge that will enable us to design even better SCMs.

The Workshop explored how knowledge from the design phase of SCMs can be used constructively in the monitoring phase and vice versa, and how the concept of flexibility could contribute to make better SCMs. It provided a unique opportunity to share experiences among experts on design and monitoring respectively, with a planned technical visit of actual SCMs implemented on the INSA EcoCampus. A range of stormwater control measures (e.g. porous parking, infiltration basin, swales, etc.) were visited and participants discussed issues of monitoring and design to provide a practical focus to the discussions held during the workshop.

- Some SOCOMA members attended the LID International Conference (August 29-31, Portland, Maine, USA) (<http://www.lidconference.org/>).

Upcoming conferences

- 14th ICUD (Prague, Sept. 10-15, 2017). Members of SOCOMA will participate in the Conference, and a Workshop might be organized by the Group.

Other future activities

Members of the SOCOMA group are encouraged to provide relevant documents, references and sites for the group's web site so that it can become more useful for the community. It is planned in 2017 to revamp the web site so that it will be more up to date. Another item that was discussed previously was to develop a Wikipedia-type glossary that could be put on-line and provide basic technical information on topics associated with source control and storm water management measures.

Paper on monitoring and design of Source Control Measures (SCMs). As a follow-up to the Novatech Workshop, Sara Maria Lerer and other members of SOCOMA proposed to write a collective paper based on the discussions during the Workshop. The paper will discuss the importance of measuring performance of SCMs and monitoring in-situ rather than in the lab and will provide an overview of specific elements and case studies. People interested to participate and provide input can contact Sara Maria Lerer (smrl@env.dtu.dk) or Gilles Rivard (grivard@lasallenhc.com).

Another paper that will be developed in 2017 has as a tentative topic: Modelling source control techniques and assessing their impacts at the watershed scale. An outline is being prepared and will be discussed at the next meeting; people interested to participate can contact Gilles Rivard (grivard@lasallenhc.com).

The next SOCOMA meeting will be at the ICUD Conference in Prague (Sept. 10-15, 2017).

6.5. International Working Group on Urban Rainfall (IGUR)

(Chairman: Prof. Simon Beecham, Division of Information Technology Engineering and the Environment, University of South Australia, Room P1-22A, Bld P, Mawson Lakes Campus, Adelaide, Australia; Phone: +61 8 8302 3200; e-mail: simon.beecham@unisa.edu.au. Secretary: Dr. Thomas Einfalt, hydro & meteo GmbH & Co. KG, Breite Strasse 6-8, D-23552 Lübeck, Germany; Phone: +49-451-7027333; Fax: +49-451-7027339; e-mail: einfalt@hydrometeo.de. Group's web site: <http://www.kuleuven.be/hydr/gur>

As there was no annual meeting of the IGUR in 2016, this report is shorter than usual. The next annual meeting is scheduled to be held during the 14th ICUD in Prague, Sep. 10 to 15, 2017.

Søren Thorndahl coordinated the writing of a new paper on the radar use for HESS entitled "Weather radar rainfall data in urban hydrology", together with 7 co-authors, most of whom are IGUR members working in the radar field. The final published paper is available at <http://www.hydrol-earth-syst-sci.net/21/1359/2017/>

The ISO standard ISO/DIS 19926-1 "Meteorology — Weather radar — Part 1: System performance and operation" is currently being circulated within WMO for review. The standard is scheduled to be published by the end of 2017. This part of the standard is treating the instrument performance before product generation and therefore is targeted towards radar operating agencies.

The most recent information related to IGUR activities as well as the meeting reports can be found on the group's website which is regularly updated, see www.kuleuven.be/hydr/gur.

6.6 Urban Drainage in Cold Climate Working Group (UDCCWG) - (Chair: Prof Maria Viklander, Dept. of Civil, Mining and Environmental Engineering, Luleå University of Technology, S-971 87 Luleå, Sweden, Phone: +46 920 491 634, Fax: +46 920 491 493, Email: Maria.Viklander@sb.luth.se; Secretary: Assoc. Prof. Tone Merete Muthanna, Department of Hydraulic and Environmental Engineering, Norwegian University of Science and Technology, Phone: +4795186817, Email: tone.muthanna@ntnu.no.)

Cold climate PhD seminar, Trondheim, 10-11th May 2016
Luleå University of Technology (LTU) and the Norwegian University of Science and Technology (NTNU) hosted a seminar for PhD candidates working on cold climate issues related to urban water systems, water treatment, stormwater, urban streams, or water infrastructure. Altogether, there were 13 PhD students, and two PostDocs participating in the seminar. It provided useful networking and knowledge exchange for the PhD students. The two universities plan to repeat the seminar in the fall of 2017, at LTU in Luleå, Sweden. The seminar is free and open to all interested PhD students. The dates for the fall seminar are not set yet, but will become available before the 14th ICUD conference in Prague.

6.7 International Working Group for Water Sensitive Urban Design (IWG for WSUD)(Co-Chair: Dr Megan Farrelly, School of Social Sciences, Monash Water for Liveability Centre, CRC Water Sensitive Cities; 20 Chancellors Walk, Monash University, Wellington Rd Clayton VIC 3800; Ph: +61 3 9905 4618, megan.farrelly@monash.edu
Co-Chair: Dr Briony Rogers, School of Social Sciences, Monash Water for Liveability Centre, CRC Water Sensitive Cities; 20 Chancellors Walk, Monash University, Wellington Rd Clayton VIC 3800; Ph: +61 3 9905 2581, briony.rogers@monash.edu
Secretary and Vice-Chair: Dr James Shucksmith, Pennine Water Group, Department of Civil and Structural Engineering, University of Sheffield, Sir Frederick Mappin Building, Mappin Street Sheffield S1 3JD, UK; J.shucksmith@sheffield.ac.uk.)

6.8 Working Group on Urban Streams (USWG) - (Chair: Dr Ivana Kabelkova, Department of Sanitary and Ecological Engineering, Faculty of Civil Engineering, Czech Technical University in Prague, Thakurova 7, 166 29 Prague 6, Czech Republic, Phone: +420 2 24321292, e-mail: kabelkova@fsv.cvut.cz.)

2016 activities – the group started preparation of a workshop to be held at the next ICUD conference in Prague, 2017. The workshop will concentrate on the framework for urban streams assessment and will include a field trip with active involvement of the participants.

6.9 Working Group on Urban Storm Water Harvesting – (Chair: Prof Alberto Campisano, Dept. Civil Engineering and Architecture, University of Catania, Viale A. Doria 6, 95125 Catania, ITALY; Phone: +39 0957382730, Fax: +39 0957382748, Email: acampisa@dica.unict.it); Secretary: Dr Matthew Burns, Melbourne School of Land & Environment, The University of Melbourne, Building 379, Parkville, Vic, 3010, Australia. E-mail: matthew.burns@unimelb.edu.au.)

Members of the WG have recently published the following position paper on Water Research:

Campisano, A., Butler, D., Ward, S., Burns, M.J., Friedler, E., DeBusk, K., Fisher-Jeffes, L.N., Ghisi, E., Rahman, A., Furumai, H., Han, M. (2017). Urban rainwater harvesting systems: Research, implementation and future perspectives, *Water Research*, 115, pp. 195-209.

The paper provides a global overview of the state of art of research and implementation of rainwater harvesting systems in urban areas, trying to identify main research needs and future opportunities in this sector. For additional details, please contact Prof. Alberto Campisano (acampisa@dica.unict.it).

The WG is organizing a session on research advances and technological aspects of rainwater / stormwater harvesting systems during the next ICUD 2017 to be held in Prague. Potential speakers from companies working in this field are invited to present contributions. Please see <http://www.icud2017.org> for submission of abstracts/papers.

The call for papers for the Special Issue of *Water* on “Advances on Urban Stormwater Harvesting Strategies” is open. The SI aims to foster applied research on a diverse range of topics associated with urban rainwater/stormwater harvesting systems. Topics include technical design and performance, strategies for water saving and reuse, quality aspects of rainwater, runoff control in urban areas, urban agriculture, and restoration of urban stream patterns. Socio-economic aspects, as well as policies and strategies aiming to promote system implementation are included. Deadline for paper submission is Sep. 30th, 2017. For details, please contact Prof. Alberto Campisano (acampisa@dica.unict.it).

6.10 Working Group on Metrology of Urban Drainage – (Chair: Prof Francois H. L. R. Clemens, Delft University of Technology, Stevinweg 1, 2628 CN Delft, the Netherlands. Phone: +31 15 278 5450, Email: F.H.L.R.Clemens@tudelft.nl)

The working group is being formed; potential members should contact the Chair.

7. NEWS FROM IAHR

IAHR Secretariat contacts: IAHR, Paseo Bajo Virgen del Puerto 3, 28005 Madrid, Spain; Tel: +34 91 335 7908; Fax: +34 91 335 7935; E-mail: iahr@iahr.org, URL <http://www.iahr.org>. For more information on IAHR activities and free subscription of the IAHR e-newsletter ‘NewsFlash’, please contact the IAHR Secretariat: IAHR@IAHR.org

Note that the 2017 membership fees are now due (for more information, visit the IAHR website). IAHR offers various categories of membership described on their website. IAHR members can choose from a variety of journals available either as a part of membership benefits or in the form of paid full or reduced subscriptions, depending on the journal and the type of membership: Journal of Hydraulic Research, Journal of Applied Water Engineering and Research, International Journal of Water Resources Development, Civil Engineering and Environmental Systems, International Journal of Computational Fluid Dynamics, Urban Water Journal, Environmental Technology, Journal of River Basin Management, Journal of Hydro-Environment Research, Journal of Hydroinformatics, Journal of Sediment Research, and the Journal of Ecohydraulics.

IAHR is sponsoring organization of many conferences of potential interest to the urban drainage community; for full information, please visit their website www.iahr.org. Among those, the most important is the forthcoming 37th IAHR World Congress, Aug.13-18, 2017, Kuala Lumpur,

Malaysia. The congress will cover latest developments in science and practice in all IAHR disciplines, organized under eight themes:

- THEME 1: River and Sediment Management (River conservation and restoration, River sediment management and morphodynamics, Debris flow and Reservoir sedimentation, Flow interaction with hydraulic structures, and Dam decommissioning)
- THEME 2: Flood Management (Flood risk assessment, Urban flood management, Flood mitigation and control, Flood disaster and adaptation measures, and Flood recovery and resiliency)
- THEME 3: Environmental Hydraulics and Industrial Flows (Ecohydraulics, Sustainable use of terrestrial ecosystem and rehabilitation of water systems, Sustainable (renewable) energy, Industrial flow management, Hydraulics machinery)
- THEME 4: Coastal, Estuaries and Lakes Management (Coastal and estuary morphodynamics, Estuaries and shore protection, Dynamics and exchanges in estuary-coastal zone, Inland and coastal lake management, and Coastal structures (ports and harbours))
- THEME 5: Urban Water Management (Rainfall-Runoff Processes and Modelling, Stormwater Management, Sewer Sediment, Combined Sewer Overflow (CSO) Control, and Assessment of Stormwater and CSO Quality and Its Impacts)
- THEME 6: Water Resources Management (Water resources management under increasing uncertainty, Alternative water resources, Conflict resolution in water management, Advanced water resources systems analyses, and Groundwater Hydraulics)
- THEME 7: Hydroinformatics / Computational Methods and Experimental Methods (High performance computing and 5th generation of modelling systems, Impacts of pollutants on the environment, Development and Application of soft computing tools in hydroinformatics, Instrumentation and experimental methods, and Big Data and Data Acquisition Technologies).

For details, please visit <http://www.iahrworldcongress.org>

8. NEWS FROM IWA HEADQUARTERS AND IWA PUBLISHING

8.1 News from IWA Headquarters

For 2017 IWA Membership Renewals, please go to <https://iwaconnect.org/subscribe>.

If you experience any difficulties with your renewal, please feel free to send us an email at members@iwahq.org and we will get back to you as quickly as possible.

Outcomes from the World Water Congress and Exhibition 2016 in Brisbane

- Brisbane Report highlights the conclusions, key messages and outcomes to emerge from five days of critical discussions and debates into the future of sustainable water management.
[Read more...](#)
- Launched the [12th edition of the International Statistics for Water Services 2016](#).
For the first time an interactive statistics portal allows users to graphically compare individual

cities' differences within water abstraction, consumption, tariff structure and regulation of water services.



- Launched the [Principles for Water-Wise Cities](#) (in English, French and Chinese) to help city leaders ensure that everyone in their cities has access to safe water and sanitation, that their cities are resilient to floods, droughts and the challenges of growing water scarcity, and that water is integrated in city planning to provide increased livability, efficiencies, and a sense of place for urban communities.
- The IWA specialist groups and clusters published “The Global Trends and Challenges in Water Science, Research and Management compendium”. [Download here](#).

See the video on the 2016 World Water Congress and Exhibition (including Plenary Speeches): <https://vimeo.com/iwahq/iwa2016brisbane>

8th IWA Young Water Professionals Conference, 10- 13 December 2017, South Africa

Abstract Submission Deadline: **1 April 2017**

http://iwaywconference.org/submit_abstract/

IWA Water and Development Congress & Exhibition 2017, 13-16 November, Argentina

<http://www.waterdevelopmentcongress.org/>

8.2 New publications from IWAP - Selected books

Selected books

Hydraulic Design and Management of Wastewater Transport Systems

Michiel Tukker, Kees Kooij, Ivo Pothof

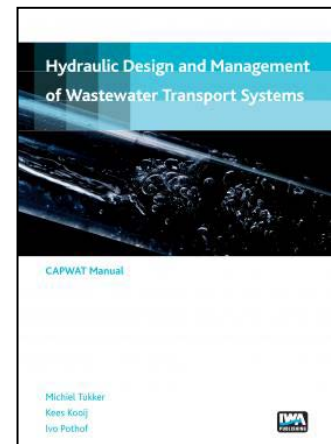
ISBN: 9781780407821

June 2016 • 224 pages • Paperback

IWA Members price: £ 67.00 / US\$ 121.00 / € 90.00

<http://www.iwapublishing.com/books/9781780408248/water-governance-cities>

This manual compiles all hydraulic knowledge necessary for designing and managing wastewater transport systems, which link collection and treatment. These systems include suction basins, the sewage pumping station and the pressure pipelines. Wastewater transport systems are becoming more complex due to larger sewage water treatment plants, transportation over greater distances and more small pipelines connecting to sewers. Pumping station operations are determined by how the entire system behaves, so systematic insight is crucial for proper design and management.



Regulation of Urban Water Services. An Overview

Enrique Cabrera Marcet & Enrique Cabrera Jr

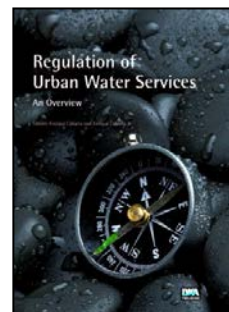
ISBN: 9781780408170

September 2016 • 218 pages • Hardback

IWA Members price: £71.00 / US\$ 128.00 / € 96.00

<http://www.iwapublishing.com/books/9781780408170/regulation-urban-water-services-overview>

Over the years urban water systems have developed rapidly and unsystematically and their implementation requires more control. They need to sustainably meet 21st Century



demands, providing good quality at low cost. This book provides an overview of the regulation of urban water management throughout world and in Spain. The management of urban water systems requires a new tool to regulate varied concerns of high quality standards, growing complexity, social importance, the monopolist nature of the sector and sustaining them environmentally, economically and socially.

Water Consumption, Tariffs and Regulation

Francesc Hernandez-Sancho

ISBN: 9781780404677

June 2017 • 200 pages • Paperback

IWA Members price: £ 64.00 / US\$ 115.00 / € 86.00

<http://www.iwapublishing.com/books/9781780404677/water-consumption-tariffs-and-regulation>

This book aims to provide a statistical overview about water abstraction, consumption, tariffs and data on sewage and wastewater treatment at an international level. It is structured in three main parts. Part I presents tables and figures on water consumption and sanitation status, particularly water abstraction, delivery, consumption and the evolution of sewer connection and wastewater treatment. Part II focuses on the analysis of water tariffs and their relationship to GDP and the size of the cities. Part III analyses water regulation and the importance of private operators in the management of the water cycle.



Innovative Wastewater Treatment & Resource Recovery Technologies: Impacts on Energy, Economy and Environment

Juan M. Lema & Sonia Suarez Martinez

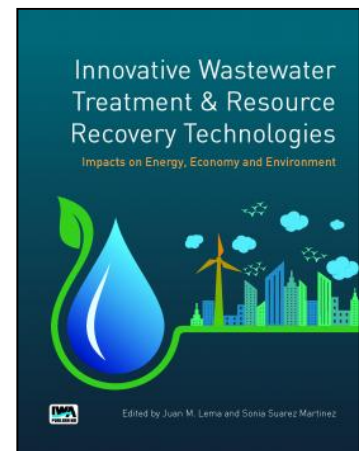
ISBN: 9781780407869

June 2017 • 600 pages • Paperback

IWA Members price: £ 112.00 / US\$ 202.00 / € 151.00

<http://www.iwapublishing.com/books/9781780407869/innovative-wastewater-treatment-resource-recovery-technologies-impacts-energy>

The main original approach of *Innovative Wastewater Treatment & Resource Recovery Technologies* is that the chapters dealing with technology include a conclusion section in which data can be fed into the Environmental Decision Support Systems and a mini-assessment is provided. The book covers the technological opportunities, benefits and challenges as well as the environmental, economic, and legal impacts.



Selected journal papers

Enumeration of sulphate-reducing bacteria for assessing potential for hydrogen sulphide production in urban drainage systems

Esther Karunakaran, Dejan Vernon, Catherine A. Biggs, Adrian Saul, David Crawford, Henriette Jensen

Water Science and Technology, Jun 2016, 73 (12) 3087-3094; DOI: 10.2166/wst.2016.026

<http://wst.iwaponline.com/content/73/12/3087>

Dropshaft cascades in urban drainage systems

Francesco Granata

Water Science and Technology, May 2016, 73 (9) 2052-2059; DOI: 10.2166/wst.2016.051

<http://wst.iwaponline.com/content/73/9/2052>

Lost in calibration: why people still do not calibrate their models, and why they still should – a case study from urban drainage modelling

Franz Tscheikner-Gratl, Peter Zeisl, Carolina Kinzel, Johannes Leimgruber, Thomas Ertl, Wolfgang Rauch, Manfred Kleidorfer

Water Science and Technology, Nov 2016, 74 (10) 2337-2348; DOI: 10.2166/wst.2016.395

Assessing the impact of arid area urbanization on flash floods using GIS, remote sensing, and HEC-HMS rainfall–runoff modeling

Mohamed El Alfy

Water Practice and Technology, Dec 2016, 47 (6) 1142-1160; DOI: 10.2166/nh.2016.133

<http://hr.iwaponline.com/content/47/6/1142>

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9. NEWS FROM AROUND THE WORLD

BELGIUM (REPORTED BY PATRICK WILLEMS: Patrick.willems@kuleuven.be)

- New climate scenarios have been set up for Belgium, which include scenarios for extreme precipitation, design storms for urban drainage applications, and a climate perturbation tool that can be used by end users for perturbing long-term time series of rainfall and other meteorological variables to the climate scenarios. Weblink: <http://www.kuleuven.be/hydr/CCI-HYDR.htm>
- A new EU-H2020 project “BRIGAIID - BRIdges the GAP for Innovations in Disaster resilience” (2016-2020) started. The project focuses on the innovations that increase EU societies’ resilience against floods, droughts and extreme weather conditions. KU Leuven (Prof. P.Willems) is the leader for the work package for extreme weather related innovations, e.g. innovations that reduce the risk of urban flooding. The project will make an inventory of the innovations, will conduct or support testing of the innovations for their technical performance (in the laboratory or through actual field implementation or through model simulations) and social readiness. Also a market analysis will be conducted and – after successful testing – support will be given to the set-up of a business plan and a promotion strategy. Priority is given to nature-based solutions. Weblink: <http://brigaid.eu/>. Innovators who are interested in participating can declare their interest by sending an e-mail to: climate-innovation@brigaid.eu
- Another new EU-H2020 project “PUCS - Pan-European Urban Climate Service” has been launched (2017-2020; Greening the Economy – Innovation Action) to set up a pan-EU service for climate change information regarding the changes in extreme rainfall and other meteorological variables. Urban flooding is one of the applications, for which the service will be tested. Several European cities will participate.

- An ERA-NET Co-fund a project on “Smart Urban Futures” recently started: FloodCitiSense. The project will focus on real-time nowcasting of urban rainfall and urban flooding including the use of crowd sourcing data (citizen science concept).
- The ongoing project funded by the Belgian Science Policy, PLURISK on “forecasting and management of extreme rainfall induced risks in the urban environment” is currently developing methodologies and software (STEPS-BE) for nowcasting of fine-scale extreme rainfall, two-dimensional fine-scale modelling, mapping and nowcasting of inundations in urban areas (InfoWorks-ICM based), socio-economic urban flood risk quantification, urban flood risk communication and warning, and new sustainable urban flood management strategies (green - blue water; landscape architecture; ecotechnologies). The project focuses on selected Belgian cities and aims to support local authorities, which typically have low capacity in setting up risk quantification, forecasting, control and management systems.
- For the City of Antwerp, the local micro-climate and the effect of the urban heat island effect on extreme precipitation were studied. The city is very flood-prone and suffers from urban floods almost every year.
- Two PhDs finished at KU Leuven on integrated conceptual sewer-river modelling, for water quantity (PhD Vincent Wolfs) and water quality (PhD Ingrid Keupers) modelling. A semi-automatic model structure identification and calibration approach and tool were developed to set-up surrogate, conceptual sewer models based on simulation results of more detailed full hydrodynamic sewer models. The tool called Conceptual Model Developer (CMD) has been constructed. More info: vincent.wolfs@sumaquabe.be

BRAZIL (REPORTED BY NILO NASCIMENTO)

Forthcoming Conferences in 2017

The International Conference on Ecohydrology for the Security of Aquatic Ecosystems and Societies will be held in Campos dos Goytacazes, in the State of Rio de Janeiro, from March 20 to 24, 2017. The Conference is organized under the auspices of UNESCO IHP by the International Centre for Coastal Ecohydrology of UNESCO, with support of the EU Erasmus-Mundus Master Course in Ecohydrology. One of the Conference sessions is dedicated to ecohydrology of cities, aiming at characterizing the impacts of urban activities and development on the natural ecosystem and the solutions to make cities sustainable. Other sessions deal with climate change and water related risks, water ecosystem services, and water law and governance, among others. The Conference Venue is at the Convention Center of the Universidade do Norte Fluminense. For further information, please visit the conference website (<http://www.ehconferencebrazil.com/>)

The 14th IWA Leading Edge Conference on Water and Wastewater Technology (LET 2017), will be held in Florianópolis City, in the south of Brazil, from May 29 to June 2, 2017. The Conference is organized around 8 main topics, one of them being “Green-blue-infrastructure to enhance urban water management”, co-chaired by Wolfgang Rauch (Innsbruck University), Jean-Luc Bertrand-Krajewski (INSA-Lyon) and Nilo Nascimento (UFMG). Other topics are “Innovative decentralized technologies for developing countries”, and “Control of micropollutants and pathogens in emerging countries”, among others. Further information can be found on the conference website: <http://www.let2017.org/>.

The Brazilian Association of Water and Sanitation Engineering is organizing in São Paulo, from October, 2nd to 6th, three joint events: the 29th Brazilian Congress of Sanitary and Environmental

Engineering of ABES, the 28th AESabesp Technical Meeting and the 28th National Sanitation and Environment Exhibition – FENASAN. The ABES Brazilian Congress of Sanitary and Environmental Engineering is considered the largest event on environmental sanitation in the Americas, usually gathering more than 4,000 participants, including academics, students, professionals and representatives of water utilities and other companies from the water sector. The main Conference theme for this edition is "Environmental Sanitation: Development and Quality of Life in the Resumption of Growth". More information about the Conference can be found at <http://www.abesfenasan2017.com.br/en/event.php>

The Brazilian Association of Water Resources (ABRH) is organizing in 2017 the XI ENAU (Brazilian National Meeting on Urban Water: <http://www.abrh.org.br/xienau/>), which will be held at the Federal University of Minas Gerais (UFMG), in Belo Horizonte, from 5th to 7th July; and the XXII Brazilian Symposium on Water Resources (<https://www.abrh.org.br/xxiisbrh/>), which will be held in Florianópolis, from 26th November to 1st December. The ENAU gathers students, academics and professionals working on urban drainage and urban waters from all over Brazil and from abroad. The ABRH Symposium is a large conference, gathering more than 1,000 participants, this time around the main topic being “Water science and technology: opportunities and innovations for the sustainable development”. One of the sessions of the Symposium will focus on water in metropolitan regions following the water crises that are facing in many of the Brazilian big cities in the northeast, southeast and central Brazil, including its capital, Brasilia.

In 2018, Brasilia, the capital of Brazil, will host the 8th World Water Forum, which is considered the largest water related event in the world. It is organized by the World Water Council, an international multi-stakeholder platform organization bringing together nearly 400 institutions from nearly 70 countries. Contributions to the WWF thematic program are now open through on line consultation, with 6 discussion rooms focusing on climate (water security and climate change); People (water, sanitation and health); Development (water for sustainable development); urban (integrated urban water and waste management); ecosystems (water quality, ecosystem livelihoods and biodiversity) and financing for water security. For more information, please see the WWF webpage: <http://www.worldwaterforum8.org/your-voice>.

Publications

RBRH is the Brazilian Water Resources Journal, ISSN on-line 2318-0331, edited by the Brazilian Association of Water Resources (ABRH). Since , RBRH scientific articles and technical notes will be published in English only. RBRH is included in the SciELO Brazil Collection (www.scielo.br/rbrh) and indexed in SCOPUS and DOAJ (Directory of Open Access Journals). The journal adopts the ScholarOne platform in its online review process. Aiming at enhancing its internationalization, RBRH is counting on the contribution of international associate editors and reviewers from different countries around the world. The journal scope covers topics related to the following areas of knowledge: surface hydrology; statistical hydrology; water quality; urban water; oceanography; hydrogeology and groundwater; hydrometeorology; limnology; fluid mechanics; river and maritime hydraulics; hydraulic structures; irrigation and drainage; erosion and sedimentation; management of water resources; hydrological and environmental modeling; measurements and instrumentation in water resources. More information about the RBRH journal and published papers can be found at: www.scielo.br/rbrh

Major research projects on water

Climate change impacts on water resources: With the support of the National Water Agency (ANA, acronym in Portuguese) and the research agencies, Capes and CNPq are funding networks of Brazilian universities and research institutes for developing research projects on climate change and

its impacts on water resources. The project gathers 17 networks and about 50 research groups working on topics related to flood and drought risks, soil and water conservation, managing water in large cities and metropolitan areas, agricultural production, hydropower generation, and large reservoirs, among others. With an investment of about 3.5 million Euros over 4 years, the project aims at developing a deep understanding on climate change impacts on the water sector in Brazil, which will be the base for formulating policies and guidelines to improve the resilience of the water sector to the above impacts. Additional information about the programs and studies led by ANA can be found in its webpage: <http://www2.ana.gov.br/Paginas/EN/programs.aspx>

National Institutes on Science and Technology. Since the early 2000s, CNPq, the Brazilian National Research Council, in collaboration with state agencies such as Fapesp and Fapemig, has been funding prominent Brazilian research groups through a long-term framework called National Institutes of Science and Technology (INCT, acronym in Portuguese). The INCTs are organized around main disciplines such as agriculture, energy, ecology and environment, engineering and information technology, nanotechnology, health, and human sciences, among others. Three INCTs were recently created on topics related to water and the environment, the Sustainable Sewage Treatment Plants (INCT Sustainable STP) and the INCT on Mineral Resources, Water and Biodiversity, both led by the Federal University of Minas Gerais (UFMG), and the INCT on Public policy, innovation and urban development, coordinated by the Federal University of Rio de Janeiro. The INCT website disseminates detailed information about this network of research institutes: <http://inct.cnpq.br/institutos/>

CANADA (REPORTED BY JIRI MARSALEK)

The Canadian Water Network held a two day workshop on Long-term Chronic Impacts of Urban Wastewater and Stormwater (Toronto, Feb. 8-9, 2017). While the literature contains abundant papers on short-term impacts, relatively little has been published on long-term impacts. Yet such impacts are of an increasing importance arising from the need to understanding the current state of thinking on the relevance of long-term chronic impacts from wastewater and stormwater discharges to environmental and public health, and identifying key considerations and insights that are of most relevance for informing current and future planning, policy and practices decisions. In preparation for the workshop, a state-of-the knowledge document has been prepared: Trudeau, M.P. (2017). State of the knowledge: Long-term. Cumulative impacts of urban wastewater and Stormwater on freshwater systems (61 p., 126 refs.). The parties interested in receiving an electronic copy of this document should contact Mark Spanjers (CWN) at mspanjer@cwn-rce.ca .

The maturity of stormwater management issues is reflected by the ongoing activities in this field, with more emphasis on promotion of, and guidance for, applications of LID and similar measures, rather than researching facilities performance. Examples of such activities follow.

The Ministry of the Environment is preparing a LIDS manual, which is in advanced stage and expected to become available in March 2017. It is the first version of the Ontario Manual, which includes a chapter on Climate Change.

Toronto Region –keeps updating Stormwater Management Criteria providing guidance for stormwater management implementation. The latest version of the document (prepared in collaboration with the Credit Valley Conservation Authority and others), includes detailed guidance for SWM design procedure, flood control design, erosion protection, stormwater quality

management, maintaining water balance, and SWM practices. The document is available for free downloads at <http://trca.on.ca/the-living-city/water-flood-management/storm-water-management.dor> The TRCA site also offers a number of documents on performance of various stormwater BMP/LID measures; similar documents are also available on the website of the Sustainable Technologies Evaluation Program (STEP – <http://www.sustainabletechnologies.ca>) and on the website of the Credit Valley Conservation (<http://www.creditvalleyca.ca>), with guides/documents for landscape design for LID, LID planning and design, construction of LIDs, thermal impacts of urbanization, overcoming institutional barriers to LID, SWM financing, rainwater management, and bioretention.

A broad presentation of urban water management activities in the Province of British Columbia can be found on the Waterbucket website (<http://waterbucket.ca>), which contains materials on such topics as the Water Balance Model, Green Infrastructure, Rainwater Management, Water Centric Planning, Water Sustainability Action, and Partnership for Water.

CHINA (REPORTED BY HAIFENG JIA, TSINGHUA UNIVERSITY)

Background. Over the past decade China’s urban population has grown from 42.5 percent in 2005 (in total) to 52.4 percent in 2015, and the build-up areas have increased by 17,252 km². This roughly equates to an addition of 165 million people dwelling in urban areas in a decade. This rapid urbanization process, sometimes lacking adequate planning and design, has led to a worsening “city syndrome” situation, such as urban flooding, water pollution, heat-island effects, ecologic deterioration, etc.

In order to promote a sustainable urbanization strategy, the Chinese government announced a new urban drainage infrastructure building paradigm, branding it the “Sponge City” (SC) initiative, in 2013. Deviating from the traditional “rapid-drainage” approach, the new paradigm calls for the use of natural systems such as soils and vegetation as part of the urban runoff control strategy. The “six-word” principle, which includes “infiltrate, detain, store, cleanse, use and drain”, forms basis of the guidelines for urban stormwater management.

The Ambitious “Sponge City” Plan. In October 2014 the China Ministry of Housing and Urban-Rural Construction (MHURC) issued a draft technical manual on Sponge City construction. In October 2015 the State Council of China announced a major expansion of the SC Initiative, which is being implemented nationwide. Recognizing the limitation of Low Impact Development (LID) / Green Infrastructure (GI) facilities in controlling large or less frequent storm events, the government mandates the integration of green and grey infrastructure. The expanded SC Plan includes as its goals not only the effective urban flood control, but also rainwater harvesting, water quality improvement and ecological restoration. The use of LID/GI practices will be required for all new development and retrofit sites, science and commercial parks, green spaces, non-mechanical vehicle roads, pedestrian walkways, etc.

During 2015 and 2016, the China Ministry of Finance (MOF), with support from MHURC and the Ministry of Water Resources (MWR), selected 30 cities, among more than five hundred applicants, as pilot sites under the Sponge City Plan. Each city is to receive 400 to 600 million RMB (1 RMB ~ 0.15 \$US) annually from the central government for three years, with the total investment estimated to be about 42.3 billion RMB. Local matching is required and public-private partnerships (PPP) are encouraged. Cities will receive a 10% bonus from the central government if the PPP contribution

exceeds a certain percentage of the overall budget. According to preliminary estimates, the total investment on the Sponge City Plan is roughly 100 to 150 million RMB per square kilometre on average, or 10 Trillion RMB for 657 cities nationwide.

China's SC Initiative represents an enormous and unprecedented undertaking by the government for achieving urban sustainability. MHURC officials recognize that the success of the SC will require a combined and coordinated effort by many government agencies in areas such as landscape / architectural planning, construction, municipal, water, transportation, finance, environmental protection and input from other stakeholders. To finance all the sponge city projects is a real challenge. The government has listed some innovative strategies for fund-raising, which include, in addition to government grants and subsidies, local matching and public-private partnerships. The government is also encouraging participation by financial institutions, and will allow qualified entities to issue construction bonds to finance the sponge city projects.

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COLOMBIA (REPORTERS OF INDIVIDUAL CONTRIBUTIONS ARE IDENTIFIED BELOW)

In a previous newsletter we reported an impressive increase in research activities on urban drainage topics in Colombia. These have evolved into a consortium of five research groups from different universities (PUJB, La Salle, Los Andes, Norte, UNC) that aim at joint efforts towards a faster and more technically sound transition from the conventional drainage systems to more sustainable approaches in the country and its regions. In this national report, we describe a national workshop on urban water to be held in the context of the ACODAL (The Colombian Environmental and Sanitary Engineering Association) international congress in Cartagena (June 2017) and each of the research groups lists the most important work activities.

This year, with a strong collaboration with different French research groups, the consortium is organising a two-day workshop on Urban Water. The workshop is framed in the "Year of Colombia - France" initiative that is fostering cooperation between the two countries. The workshop intends to gather local researchers and practitioners to discuss recent advances on four main topics: urban water quality, urban water management, asset management and risk management. Along with oral presentations, two discussion panels will complement the agenda. Those panels are designed to discuss, from different perspectives (i.e. academia, national and local institutions and water utilities among), the current situation and the challenges faced by our cities.

Pontificia Universidad Javeriana (Reported by Andrés Torres)

Research on Urban Drainage topics at Pontificia Universidad Javeriana Bogotá (PUJB) has been developed as a part of specific activities by the research group Water and Environmental Science and Engineering (Ciencia e Ingeniería del Agua y el Ambiente), ranked A1 by Colciencias (the Colombian Department of Science, Technology and Innovation), and in the frame of two research academic programs: MSc in Water Systems (Maestría en Hidrosistemas) and PhD in Engineering at PUJ. During the last 10 years, specific topics on Sustainable Urban Drainage Systems, water quality metrology, stormwater harvesting and sewer asset management have been developed. Research

activities have been supported mainly by the local government of Bogotá and Colciencias, through research and consulting projects.

Universidad De La Salle (Reported by Nestor Mancipe)

At Universidad De La Salle, the urban drainage topics recently started growing through the CLIMA research group, which focuses on environmental modelling of air, soil and water resources. The water related group's research interest focuses on water resources management, planning, and modelling using Geographic Information Systems (GIS) and remote sensing products. Currently, four main efforts are ongoing: [1] a regional assessment of sustainable urban drainage systems in tropical countries, a case study in Bogotá concerning green roofs and constructed wetlands, [2] developing GIS-based strategies for water resources planning in urban and rural areas providing guidelines for land use regulation; [3] integrated modelling (hydrologic, environmental, and social variables) of agricultural processes for improving planning and yield prediction of crops, in light of post-conflict, a case study UTOPIA (Universidad de la Salle rural campus); and, [4] assessment of the impact of climate change on urban and rural strategic Colombian ecosystems associating hydrodynamic and biological variables.

Universidad de los Andes (Reported by Juan Pablo Rodríguez)

The Environmental Engineering Research Centre (Centro de Investigaciones en Ingeniería Ambiental) at Universidad de los Andes is actively working on sustainable urban water management projects. The most relevant project under development is supported by the local water utility and environmental agency with the aim of developing sustainable urban drainage (SUDS) design guidelines for Bogotá. Besides this, a multi-scale methodology for urban drainage systems planning was proposed and an actual scale pilot implementation and monitoring of a SUDS train is underway in a public park. The pilot site comprises a swale and a dry extended detention pond. The group is also carrying different research projects on optimised urban drainage asset management tools, green roofs performance assessment (including pilots using páramo vegetation), and optimisation tools for designing semi-decentralised rainwater harvesting and recycled treated grey water systems.

Universidad del Norte (Reported by Humberto Avila)

The Institute of Hydraulic and Environmental Research - IDEHA of the Universidad del Norte in Barranquilla (Colombia) works in Stormwater Management as part of its main research subjects, conducting research projects, engineering consultancy and supporting MSc and PhD academic programs. Recent research and consultancy projects have been focused on stormwater retrofitting on consolidated urban watersheds through the application of Sustainable Drainage Urban Systems – SUDS (Green and Gray), large-scale stormwater drainage systems, field measurement and instrumentation, early warning systems, stormwater risk management, and economic analysis of SUDS. Recent projects include prototype scale SUDS pilot tests of retrofitting on existing sites, flash flood risk management through the use of SUDS and early warning systems, Large-scale SUDS management modelling, reactive and early warning models, and willingness-to-pay analysis by using SUDS.

Universidad Nacional de Colombia (Reported by Edgar Villarreal)

The Research Group on Water Resources Engineering (Grupo de investigación en Ingeniería de Recursos Hídricos, GIREH) has been actively working on several aspects of sustainable urban water management. The main areas of research cover aspects of the implementation of green-roofs as stormwater management systems, stormwater recycling, application of computer models, water

quality (particularly emerging contaminants), and characterization of extreme rain events. At present we have master as well as undergraduate students working on their theses on those aspects. The Universidad Nacional, Bogota campus, has already implemented two stormwater reuse systems. GIREH has received research funds to follow up on one of the on-campus systems.

Universidad del Valle (Reported by Alberto Galvis)

The institute CINARA (R&D Institute for Water, Sanitation and Resource Recovery) of Universidad del Valle in Cali, with the support of national and international institutions, organized the "Agua 2016" Conference: "Equity, Water and Sustainability" (November 8-11, 2016). It had 272 participants, representing 78 national and international institutions. Parallel sessions covered such topic areas as "Efficient water use", "Rural community-based water management" and "Micropollutants". Lecturers were from: Colombia, Mexico, Brazil, Argentina, Germany, Holland, United Kingdom and United States. In the project "Strategies for the recovery and integrated water resource management in the Cauca and Dagua river basins in Valle del Cauca", K. L Rojas, member of the Integrated Water Resource Management research group IWRM at CINARA, was an intern at the IFAK research institute in Magdeburg, Germany (March - May, 2016). This activity was developed with the support of the Colombo - German foundation in Science and Technology (FunCyTCA). In August 2016, Prof. Alberto Galvis and his team started the project "Management of resilience in urban drainage systems" (financed by Colciencias). In this project, five theses are being developed – one PhD, two MSc and two undergraduate theses.

CZECH REPUBLIC (REPORTED BY VOJTECH BARES, IVANA KABELKOVA AND DAVID STRANSKY)

Research and education

Czech Technical University in Prague (CTU) is running the TeleMAS project (Urban stormwater runoff predictions based on rainfall-induced attenuation of telecommunication microwave links) supported by the Czech Science Foundation in close cooperation with the EAWAG, Switzerland. The project team operates real-time data acquisition of microwave link data in several urban catchments in the Czech Republic.

New project on telecommunication microwave links was proposed and received funding for the period 2017-2019. It will be conducted by teams from the CTU Department of electromagnetic wave propagation and the Czech metrology institute. The title of the project is "Hydrological estimates from radiowave propagation in a terrestrial microwave network" with extension from rainfall monitoring to vapour flux estimation. Project is supported by the Czech Science Foundation.

CTU in Prague together with Veolia Czech Republic started a new project funded by the Technology Agency of the Czech Republic dealing with "Economic tools supporting sustainable stormwater management in urban areas".

The new CTU research and development centre UCEEB operates a microscale experimental site for monitoring of near-surface fluxes of water, energy and momentum in the soil-vegetation-atmosphere system, as well as above man-made structural surfaces. A postdoctoral research project "Water and heat dynamics in anthropogenic soil systems affected by soil structural changes" is concerned mainly with green roofs.

Another new project “Transport of water, suspended solids and heat in engineered soils of urban green infrastructure” involving experimental investigation of SUDS was proposed and accepted for funding by UCEEB for the period 2017-2019.

NGO Koniklec and CTU will continue an educational project “Counting on Rainwater” focused on the increase of understanding of the SUDS principles and technical requirements by engineers and public administrators in the upcoming years. The project is supported by the Swiss Confederation Funds for East European countries.

Brno University of Technology is developing, within the framework of a project on “Intelligent control of pressure sewerage systems”, funded by the Technology Agency of the Czech Republic for the period 2014-2017, new technical tools enabling optimization of design of new pressure sewerage systems as well as additional automation and optimization of existing pressure sewerage systems.

The Czech Water Association (a national member of IWA) strengthened its position by merging with the Czechoslovak Association of Treatment Experts. The IWA Governing Assembly meeting in Prague, in September 2017, is being negotiated.

Conferences

An international conference Urban adaptation, planning and practice: Supporting nature-based solutions was held from October 17 to 19, 2016 in Prague. The conference was organized in the framework of the project “UrbanAdapt - Development of urban adaptation strategies using ecosystem-based approaches to adaptation” supported by the grant from Iceland, Liechtenstein and Norway. Several European cities have shared their experience with the incorporation of the "green and blue infrastructure" as well as ecosystem services into the adaptation cycle and individual adaptation measures.

14th International Conference on Urban Drainage (ICUD), which will be held in Prague, Czech Republic, September 10-15, 2017, was introduced at the NOVATECH Conference in Lyon, France, 2016 including „First announcement “. The organizers of the 14th ICUD conference are the Czech Water Association (CzWA) and the Czech Technical University (CTU) in Prague. Twelve Special Sessions were suggested to be implemented in conference program, on top of the standard conference topics. The call for extended abstracts is open until 1st of March 2017. More information on www.icud2017.org

DENMARK (REPORTED BY KARSTEN ARNBJERG-NIELSEN)

DENMARK

Although the conference does not take place until 2020, the preparations for the IWA World Water Congress are well under way. It is an important driver in scoping the research and innovation activities in the coming years in order to ensure that there will be excellent excursions during the conference. So we look forward to welcoming you in less than four years. Meanwhile, you are invited to attend the NORDIWA conference in Aarhus/Denmark October 10-12, 2017 – which will focus on wastewater management and climate change adaptation in the Nordic and Baltic Sea region.

Governmental funding for research has decreased substantially in recent last years, and the funding for research with ‘a time to market’ between 5 to 15 years has been particularly reduced. This means that no new large projects were funded in 2016 by the national research councils. So the largest on-going project is the Water Smart Cities project (www.watersmartcities.ennv.org) funded in 2015. The project focuses on modelling of urban drainage systems with the aim of generating fit-for-purpose models. We have a range of suitable models for designing projects, but we lack better models and design procedures for both strategic planning and real time control. The project involves researchers, industries and utilities and will also collaborate with local governments.

So the attention is moving towards European funding. One very interesting project is the Cleanwater project financed by the BONUS Bluewater program. It addresses xenobiotics and micro-plastic in contaminated water from wastewater treatment plants, combined sewer overflows, and stormwater discharge. Its focus is on quantifying sources of xenobiotics and micro-plastic discharged to the Baltic Sea and low-energy technologies to reduce them. Universities, utilities, and industries from Denmark, Sweden and Germany participate in the project. Another very large project is the Coast2Coast project taking place in Central Jutland, which focuses on climate change adaptation on municipal and regional scale and has received more than 7M€ in funding.

The decrease in governmental funding is also counteracted by the initiatives of the largest water utilities. During 2016 we have seen utilities scoping and funding initiatives on innovation and research. Together they have funded an initiative focusing on obtaining a national archive of spatial rainfall based on radar measurements. Individually they have also been active, Aarhus Water by focusing on measurements of runoff from green surfaces to further improve their integrated real time control system, VCS Denmark by improved integrated modelling in combination with an extensive measurement program in the receiving waters, and HOFOR on how to implement the very ambitious plans for developing a more resilient Copenhagen by means of huge investments in both blue-green surface infrastructure and large tunnels for diverting the largest cloudbursts. From a research (as well as operational) point of view it is also interesting to note that consolidation of the urban water sector is starting to occur. HOFOR merged with a number of small utilities from individual surrounding municipalities and starting in January 2017 a new utility has been formed based on a merger of most utilities in North Zealand. This new utility, NOVAFOS, is the second largest utility in Denmark.

At University of Copenhagen the Danida-funded project Water Resilient Green Cities in Africa (www.watergreenafrica.dk), including 6 double degree PhD students from EiABC in Addis Ababa, Ethiopia and from Ardhi University, Dar es Salaam, Tanzania) are running on fourth and last year. Also, a project funded by the Sino-Danish Centre and Realdania on Green Infrastructure and Urban Water Management – profile of five world cities is coming to completion.

NORDIWA 2017, the Nordic Wastewater Conference 2017, will be held in Aarhus/Denmark, Oct. 10-12, 2017. This is the leading Nordic event for water professionals – experts and practitioners, managers and operators: utility staff, city planners, researchers, engineers, advisors and others with an interest in wastewater management and climate change adaptation in the Nordic region. Special focus this year is on wastewater management in the Baltic Sea Region. A specialist workshop on stormwater management and climate change adaptation will be organised in cooperation with DTU. Deadline for abstracts: March 6th, 2017. Contact: Peter Steen Mikkelsen (psmi@env.dtu.dk).

FRANCE (REPORTED BY JEAN-LUC BERTRAND-KRAJEWSKI)

News from Lyon

Hireau: To reconstruct the history of wastewater and drinking water networks

What is HIREAU? HIREAU is research project funded par the IMU (<http://imu.universite-lyon.fr/>) aiming to develop methods to help utilities to reconstruct installation date of water and wastewater networks. Such information is often considered as a major explanatory variable of the condition of a pipe and thus is becoming indispensable in order to help utilities to implement proactive asset management of their networks.

What is HIREAU? HIREAU is a consortium of three laboratories in the fields of Urban Hydrology (DEEP INSA Lyon), Geography (EVS – UMR 5600), and Informatics (LIRIS – UMR 5205); two industrial partners (Veolia and Eau du Grand Lyon); and the Metropolis of Lyon. HIREAU started at the end of 2016, for three years.

How can you help? HIREAU focuses on the networks of the Metropolis of Lyon but we are seeking for:

- Data from other networks where age is well-known as well as main characteristics of the pipes (diameter, length, depth, material, etc.). If data related to surface activities are also available (such as construction date of building or road), this could also be of great interest. If you have such data and are willing to share with the HIREAU consortium, please contact Frédéric Cherqui (fcherqui@gmail.com).
- Publications or reports on methods to reconstitute the installation date of networks, in case we miss them. Methods include: (i) learning methods in order to predict installation date based on characteristics of the pipes and its environment, (ii) methods to consults archives in order to gather data on the existing networks, (iii) in-situ investigations methods to determine the installation date of a pipe.

If you want to find more information, please visit our website: <https://hireau.wordpress.com/>

News from SIPIBEL – Bellecombe

The Bellecombe observatory SIPIBEL was created in 2011 in the French region of Upper Savoy to study the characterization, treatability and impacts of hospital effluents on municipal sewage treatment plants. SIPIBEL is operated jointly by The Bellecombe Public Utility (operator of the sewage treatment plant) and the GRAIE. It involves many French research groups from Limoges University, ENTPE, INSA Lyon, Faculty of Pharmacy of Paris Sud University and ISA-CNRS of Lyon. The project is supported by the Rhône-Méditerranée Corse Water Agency, the Auvergne - Rhône-Alpes Regional Council, the French National Agency for Water and Aquatic Environments, the European Union, and other partners.

SIPIBEL is a research and observation site with the following structure:

- A field observatory aiming to monitor urban and hospital effluents (pharmaceuticals, monitoring biological agents, antibiotic resistance...) and their impacts on receiving water bodies;
- Research actions developed in conjunction with the field observatory, are grouped in four themes: 1) pollutant loads, 2) treatment, 3) risks, and 4) sociology.

- In 2016 two documents were published: “[the SIPIBEL report 2011-2015](#)” and “[the SIPIBEL synthesis 2011-2015](#)” (both are in French), which summarize the main results and findings at the Bellecombe site. In 2016, two research projects included in SIPIBEL were completed:
 - [TRIUMPH](#): Application of combined biological and chemical oxidation with ozone for the treatment of organic micropollutants, with global evaluation of the treatment performance (process conditions and removal efficiency, ecotoxicological effects, chemicals footprints); and
 - [PERSIST'ENV](#): Environmental persistence of pharmaceuticals and pathogenic bacteria in biofilms and water.

SIPIBEL also supports the RILACT project (2014-2018) on “Risks and Measures related to pharmaceuticals, detergents and biocides discharges in hospital and urban effluents”, which already achieved important improvements in detection and quantification of the degradation and transformation processes of pharmaceuticals and characterization of the release of pharmaceuticals. First public reports will be published in 2017.

For more information about these projects, please contact us (sipibel@graie.org) and visit our Webpage: <http://www.sipibel.org>.

OTHU News

Since 1999, 12 research laboratories from Lyon (France) have developed a long term field-observatory (named OTHU) with the support of the Greater Lyon city council and the Rhone-Mediterranean Corsica water agency. This observatory gathers a multidisciplinary team with competencies in climatology, hydrology, fluid mechanics, hydraulics, geography, soil sciences, chemistry, biology, microbiology, and social sciences.

It is dedicated to the study of a wide range of phenomena associated with urban drainage. OTHU undertakes intense continuous monitoring of climatic parameters, water flows and pollution in four experimental sites, in addition to many regular and specific monitoring campaigns. More than ten other sites are also monitored but in a less intensive way.

In 2016, the experimental site in Chassieu was retrofitted, a new experimental ECOcampus site started (dedicated to the monitoring of BMPs), and the new research program (2014-2018) based on the observatory was developed focusing on the following challenges:

- better understanding of the behaviour and management of BMPs (micro-pollutants removal efficiency, effect of the vegetation, asset management and citizen and stakeholders empowerment for its implementation in urban areas)
- management of sediments accumulated in detention basins or in beds of peri-urban streams
- control and remediation of noxious sewer gases
- possible impact of global change on river quality assessment and groundwater table
- undesirable bio species (e.g. Pathogens and mosquitos in BMPS)
- innovative metrological devices, biological indicators and biosensors for environmental impact assessment.

2017 will be an opportunity for OTHU to continue developing visible actions and outreach events to disseminate the knowledge derived from the OTHU research programs. That includes:

- Elaboration and publication of a brochure highlighting some key results

- Preparation of a scientific and technical book that will exhibit fundamental knowledge as well as applications (based on feedback and background after long-term observations) – to be published at the end of 2018.
- Continue the activities already undertaken: website life, press contacts, life of the Observatory twitter account, and proposals for OTHU communications in the framework of national and international technical events. Practical training (6 training courses in partnership with GRAIE and INSAVALOR in 2017 - in the field of self-monitoring of networks - metrology), small "home" pedagogic movies, image-based learning, ...

For more information on the OTHU project or collaborations, do not hesitate to contact us (info@othu.org - <https://twitter.com/LaetitiaBacot>) and visit <http://www.othu.org>.

News from OPUR in Paris

Wastewater treatment and sludge

In 2016, research activities dealing with the contamination of sludge and removal of priority and emerging substances by micro-grain (μ GAC) activated carbon were carried out.

For sludge, the contamination of different kinds of sludge (raw, centrifuged, digested, thermally dried sludge and sludge cake) from Paris conurbation by 71 various pollutants including pharmaceutical products (PHPs), hormones, perfluorinated acids (PFAs), linear alkylbenzene sulfonate (LAS), alkylphenols (APs), phthalates (PAEs), polycyclic aromatic hydrocarbons (PAHs) and polychlorobiphenyls (PCBs) was assessed. For most compounds (PHPs, PFOS, DEHP, PAHs), no significant differences in the micropollutant contents were found for similar types of sludge from different WWTP in Paris, highlighting the homogeneity of sludge contamination in downstream Paris catchment. The behaviour of the pollutants during sludge treatment (centrifugation, digestion, thermal drying, sludge conditioning + press filtration) was also investigated. For further details, please refer to:

Fate of emerging and priority micropollutants during the sewage sludge treatments: case study of Paris conurbation - Part 1: Contamination of the different types of sewage sludge, condensed and centrifuged waters. Mailler, J. Gasperi, D. Patureau, E. Vulliet, S. Deshayes, V. Eudes, S. Guerin, R. Moilleron, G. Chebbo., Rocher V. Waste Management 2017, 59, 379-393.

In pursuit of the first PhD thesis (Romain Mailler) dealing with removal of priority and emerging substances by powdered (PAC) and micro-grain (μ GAC) activated carbon, a new PhD thesis (Ronan Guillosoy) started in September 2016. This PhD is focused particularly on the performance of a large scale pilot plant operating with micro-grain. The coupling ozone-activated carbon will be investigated. In this project, a large broad suite of micropollutants including pharmaceuticals, alkylphenols, artificial sweeteners, parabens and pesticides will be studied.

Microplastics: from urban sources to surface water

Various projects are currently carried out on microplastics in the LEESU lab; all of them supervised by Johnny Gasperi and Bruno Tassin. The main objectives of these projects are: (i) to assess the microplastic contamination in various compartments of the urban water cycle (atmospheric fallout, stormwater, wastewater, combined sewer overflows), and (ii) to evaluate the impact of urban inputs on surface water. A PhD thesis (Rachid Dris) was defended in December, 2016. This PhD project

has already demonstrated the ubiquitous presence of microplastics in most compartments of the urban water cycle, and also in rivers. Fibers (made with synthetic but also man-made polymers) and fragments were both investigated in different compartments of the urban system. The study focused on the air compartment (indoor and outdoor air as well as atmospheric fallout), the sewer system (from the washing machine disposals to the WWTP influents and effluents), and the inputs during wet-weather periods, i.e. runoff and combined sewer overflows. Fibers and fragments were also examined in the Seine River. This work also aimed at providing relevant methodological keys to address sampling of microplastics in rivers. Two mesh size nets were tested (80 μm vs. 300 μm). The homogeneity of fibers distribution in rivers was also verified as the short term temporal and spatial variabilities were evaluated. In order to highlight the potential impact of the Paris agglomeration, a monthly monitoring at 5 sites upstream and downstream Paris was carried out as well. This thesis mainly highlighted the ubiquity of fibers in all compartments. Fibers were predominant in comparison to fragments in all compartments. Combined sewer overflows exhibited particularly high amounts of fragments. On the other hand, the flux of microplastics in the Seine River proved to be negligible in terms of mass in comparison to macroplastics. This study is also the first one investigating the microplastic contamination of several urban sources.

Synthetic fibers in atmospheric fallout: a source of microplastics in the environment. R. Dris, J. Gasperi, M. Saad, C. Mirande, B. Tassin. *Marine Pollution Bulletin* 2016, 104(1–2), 290–293.

A first overview of natural and synthetic textile fibers, including microplastics, in indoor and outdoor environments. R. Dris, J. Gasperi, C. Mirande, C. Mandin, M. Guerrouache, V. Langlois, B. Tassin. *Environmental Pollution* 2017, 221, 453–458.

Integrated modelling of stormwater pollutant loads

Nowadays, the increasing use of separate stormwater systems causes a frequent transport of urban pollutants into receiving water bodies (lakes, rivers). However, current studies still lack the knowledge of urban build-up and wash-off processes. In order to address urban management issues, better understanding of physical mechanism is required not only for the urban surfaces, but also for the sewer systems. In this context, the modelling of hydrological transfer of urban pollutants can be a valuable tool.

Yi Hong (Paris-Est University/LEESU) defended his PhD thesis in which he developed and assessed the physically-based and distributed models to simulate the transport of traffic-related pollutants (suspended solids, hydrocarbons, heavy metals) in urban stormwater runoffs. This work is part of the ANR "Trafipollu" project, and benefitted from the experimental results for model calibration and validation. The modelling was performed at two scales of the urban environment: at the local scale and at the city district scale.

At the local scale of the urban environment, the code FullSWOF (second-order finite volume scheme) coupled with Hairsine and Rose model (1992a; 1992b) and detailed monitoring surveys is used to evaluate urban wash-off process. Simulations over different rainfall events represent promising results in reproducing the various dynamics of water flows and particle transfer on the urban surfaces. Spatial analysis of wash-off process reveals that the rainfall-driven impacts are two orders of magnitude higher than flow-drive effects. These findings contribute to a significant improvement in the field of urban wash-off modelling. The application of soil erosion model to the urban context is also an important innovation.

At the city district scale, the second step consists of coupling the TREX model (Velleux, England, et al., 2008) and the CANOE model, named "TRENNOE" platform. By altering different options of model configurations, the adequate numerical precision and the detailed information of landuse data are identified as the crucial elements for achieving acceptable simulations. Contrarily, the high-resolution topographic data and the common variations of the water flow parameters are not equally significant at the scale of a small urban catchment. Moreover, this coupling showed fundamental problems of the model structure such as the numerical scheme of the overland flow (only 4 directions), and the empirical USLE equations need to be complemented by raindrop detachment process.

To address these shortcomings, the LISEM - SWMM platform is developed by coupling the open-source LISEM model (De Roo, Wesseling, et al., 1996), which was initially developed for soil erosion simulations, and the SWMM model (Rossman, 2010). For the first time, the hydrological model is also supported by the simulations of atmospheric dry deposition of fine particles (PM10), hydrocarbons and heavy metals. The performance of water flow and TSS simulations are satisfactory with the calibrated parameters. Considering the hydrocarbons and heavy metals contents of different particle size classes, simulated event mean concentration of each pollutant is comparable to local in-situ measurements. Although the platform at current stage still needs improvements in order to adapt to the operational applications, the present modelling approach contributes to an innovative technology in the field of modelling the hydrological transfer of the traffic-related pollutants in urban environment.

Runoff contamination and source control

J r mie Sage (Paris-Est University/Cerema Ile-de-France) defended his PhD thesis "Hydrologic performance of stormwater source-control systems: optimization for on-site pollution control", in which he investigated the relation between the hydrological behaviour of pervious and vegetated runoff control solutions and their pollutant removal efficiency through a modelling approach, so as to provide elements to support their design. After a detailed examination of current practices regarding the definition of runoff and pollution control targets found in guidelines or regulations, a modelling system was developed to evaluate different stormwater management scenarios in terms of (1) runoff and pollutant emission behaviours and (2) source-control system design. A focus was placed on some of the relevant processes of the "catchment + facility" system. The temporal variability of pollutant concentrations in runoff was investigated through the example of two urban surfaces and corresponding contaminants: suspended solids washed-off from urban streets and zinc dissolved from metallic roofing materials. A generic runoff quality model was introduced to describe these two contrasting behaviours and implemented in the modelling system. Usual representations of infiltration and soil moisture redistribution within stormwater management facilities were also questioned, and a modelling scheme was implemented to better replicate the temporal variability of infiltration fluxes. The practical value of the modelling system was illustrated with the production of sizing diagrams relating pollutant reduction efficiencies to a limited number of design parameters, from which the relevance of a large variety of runoff control scenarios could be evaluated. Such results offer perspectives for the development of relatively simple tools to support the introduction of more rational stormwater management criteria and the implementation of efficient stormwater source-control systems.

Solids transport in combined sewers

Mohamad Rammal (Paris-Est University/LEESU) defended his PhD thesis, in which he compared different scenarios of suspended solids production in a combined sewer system using an adapted hydrodynamic model.

Despite their disappointing performance, urban stormwater quality models are still considered to be a potentially efficient decision making tool to control combined sewer overflows (CSOs) and thus are receiving ongoing investment to improve their quality. In this respect, in-sewer sediments are now widely recognized for their preponderant contribution to the pollution of CSOs assigning therefore a particular importance to mastering sewer processes module when refining these models. Recent studies conducted on in-sewer sediments in one of the extensively investigated urban catchments in Paris, Le Marais, highlighted new elements that could be critical when addressing this module: (1) the existence of a quasi-steady sediment type deforming sewer characteristics, the sewer grits, and thus suspected to modify sewer flow conditions; (2) the identification of the potentially eroded sediment type during wet-weather that is formed in the upstream reaches of the Marais main trunks, and the organic layer that showed a cohesive-like characteristic during flushing experiences. A site specific model for the Marais catchment was developed in this thesis adopting a semi-distributed configuration to examine the effect of integrating these field observations in its structure on the simulation of outfall discharges' quality.

Firstly, an evaluation of the impact of considering the sewer grits in the quantity module on the solid production processes in sewer system was carried out. To do so, a special modelling tool was necessary in order to handle sewer flow over a complex bathymetry. So, a well-balanced Godunov numerical scheme was developed and verified against some reference test cases before being extended to the Marais sewer scale. Results showed that ignoring these deposits induce significant error in solids production and a negligible one in solid transfer.

Secondly, before running the quality model, previous findings obtained in other combined sewer systems having no organic layer and high sewer contribution along with those obtained on the Marais were further investigated to identify the real role of this organic layer in sewer wet-weather production. Results showed that this latter is a product of double sewer stock erosion of a minor source, the organic layer, and another major one not yet identified. To identify this source, the same modelling framework used finally in the quality simulation was used to test several scenarios of sewer sediment localization. Although no conclusive preference of sediment localization stood out, simulated results were promising, and an acceptable agreement with the observations was obtained.

GERMANY (REPORTED BY MANFRED SCHÜTZE, GERMANY)

As in the earlier years, a wide range of projects related to urban drainage was carried out at German universities, research centres, water associations and industry. As elsewhere in the world, some of these projects are more of theoretical, fundamental nature, while others focus on practical application aspects. Many projects are carried out as joint endeavours of different partners. Therefore, many projects involve researchers, application experts and end-users in their teams.

One of the action areas of projects funded by the Federal Ministry of Education and Research – the family of thirteen projects related to "Smart and Multifunctional Infrastructural Systems for

Sustainable Water Supply, Sanitation and Stormwater Management” came to an end in 2016. Project outcomes were presented at a national conference held on April 19 and 20 (see <https://nawam-inis.de/veranstaltungen/inis-abschlusskonferenz> for details). Topic areas covered issues such as utilisation of the resources recovered from ‘wastewater’, the planning for the future, dealing with complexity in water management, multifunctional use of urban space, and issues of institutional arrangements beneficial to water management. The webpage <http://www.bmbf.nawam-inis.de/en> refers to webpages of individual projects (including their English language versions).

The year 2016 also has seen a number of smaller events, some of which related to individual projects from the group mentioned above. For example, on October 26, guideline documents of the KURAS project have been presented, which assist in planning of urban wastewater systems for the future and also contain in a concise form a catalogue of thirty potential measures, ranging from well-known SUDS systems to real-time control in drainage systems, and the measures applied in pumping stations and wastewater treatment plants. These materials are available from <http://www.kuras-projekt.de/downloads/erzeugnisse-abwassersysteme/>. A guideline document on water-sensitive development of urban space as a means to adaptation to climate change, developed in the SaMuWa project, can be found at http://www.samuwa.de/img/pdfs/leitfaden_wassersensible_stadtentwicklung.pdf, whilst other guideline documents on real time control of urban drainage systems, also assisting in adaptation to climate change and extreme events, will become available shortly.

Simulation of drainage systems, wastewater treatment plants and biogas plants formed the content of several meetings and smaller conferences, e.g. the Simba# simulation meeting in Havelberg.

Many more activities were going on in 2016 – and are expected to continue in 2017!

Manfred Schütze

JAPAN (REPORTED BY FUMIYUKI NAKAJIMA, AI MUGITA, AND TAKASHI SAKAKIBARA)

‘Seven Stars’ guidelines for inundation control

In 2016, Japan Ministry of Land, Infrastructure, Transport and Tourism formulated seven (tentative) guidelines (‘Seven Stars’) for local governments to promote new measures of inundation. The (tentative) guidelines are (1) Guideline for establishing Rain Water Management Comprehensive Plan, (2) Introduction to inundation measures with public-private collaboration, (3) Manual to establish Inundation Damage Mitigation Comprehensive Plan for Sewer Systems, (4) Technical information on sewerage system with water level sensing, (5) Manual to draw a map of inundation-assumed area, (6) Introduction to promoting water level sensing in sewer pipe system, and (7) (revised) Introduction to making flood hazard maps. The guidelines 4 and 6 will promote the on-line monitoring of water levels in sewer pipes, which provides an early-warning of inundation and leads to an efficient evacuation of the residents and an effective operation of stormwater facilities such as pumps and gates.

Torrential rain management in small urban areas

Newsletter No.29, published in March 2016, introduced ‘Operation Support System for Inundation Control by ICT’ as a government project (B-DASH Project) regarding stormwater management.

This article presents ‘Torrential rain management in small urban areas’, as another stormwater management technology in the project.

The technology forecasts intensity and distribution of rainfall using rainfall information observed with radar rain gauge, predicts water level change in sewer pipes and the inundation area up to 30 minutes in advance, and distributes this information. This project aims at promoting self and mutual help by residents and a more effective use of rainwater storage facilities with efficient operation of drainage pumps by providing the information before inundation occurs. XRAIN (eXtended RADar Information Network) or the multi-radar system composed of more than two compact X-band multi parameter radars are planned to be used as a radar rain gauge. As the rainfall prediction model calculates various types of predictive value based on a probabilistic approach, users can select predictive values according to their own purpose of use. The information can be obtained via e-mail and on a tablet. The experimental fields are located at the drainage district in the Fukui City (5.22 km²) and Toyama City (2.00km²) to verify multilaterally the general versatility of this technology. This system has collected data since 2016, and based on the obtained results, a Technical Guideline is being formulated.

XRAIN http://www.mlit.go.jp/river/pamphlet_jirei/pdf/xrain_en.pdf?0930
B-DASH project http://www.nilim.go.jp/lab/ecg/english/b_dash.htm

THE NETHERLANDS (REPORTED BY JEROEN LANGEVELD)

In the Netherlands, **the urban drainage research program**, funded and supported by the Dutch urban drainage sector for the period 2010-2015 has received new funding for the period 2016-2020. This means that at TU Delft, 3-4 PhD positions will be opened in 2016/2017 within the program. The program covers 4 themes:

Theme 1 Asset management. The research within this theme focuses on alternative sources of information (or ways of working) in order to organize the asset management in such a way that sewer system performance (serviceability) will be maintained at the desired level. In 2016/early 2017 four new projects started within this theme: development of combined platforms for sewer inspection, led by Mathieu Lepot, automatic pattern recognition of CCTV data, led by Lisa Scholten, leak detection of pressure mains and gravity sewer, led by Jeroen Langeveld, and sewer rehabilitation and infrastructure transitions by Eva Nieuwenhuis.

Theme 2. Operation and maintenance. The research projects within this theme provide knowledge on the relation between the operation and maintenance strategy applied and the overall system performance. This topic will be addressed by Mathijs Rietveld, who focuses on sediment management on streets, and in gully pots and main sewers.. In addition, Marco van Bijnen is doing research on the relation between the condition of the sewer system in terms of root intrusion and sediment beds and hydraulic performance.

Theme 3. Dynamics of sewer systems. Continuous monitoring of hydraulics and wastewater quality is applied at a number of locations in the Netherlands. These data open an enormous opportunity to study the dynamics of sewer systems themselves and in relation with WWTPs and the receiving waters, and to enhance the knowledge of in-sewer processes. Petra van Daal-Rombouts works on this topic, using the extensive database of Waterboard De Dommel developed within the KALLISTO project. As part of the EU-QUICS project (www.quics.eu), Antonio Rodenas studies the impact of uncertainties in integrated catchment studies, with a focus on spatial and temporal

variations in rainfall. This work nicely connects with the research done by Marie-Claire ten Veldhuis in the field of rain radar.

Theme 4. Sustainable urban water cycle. Theme 4 focuses on research on new concepts for the urban water cycle enabling energy recovery and reuse of materials. The main issues to be dealt with are the conveyance of black water. The transport of domestic slurries (black water, possibly including kitchen waste) is part of a comprehensive research project by PhD student Adithya Thota Radhakrishnan and combines pilot scale research with multiphase modelling. More information can be obtained via j.g.langeveld@tudelft.nl

The partners of the research program are (in alphabetical order): ARCADIS, Deltares, Evides, Gemeente Almere, Gemeente Breda, Gemeente's-Gravenhage, Gemeentewerken Rotterdam, Gemeente Utrecht, GMB Rioleringsstechnieken, Grontmij, KWR Watercycle Research Institute, Royal HaskoningDHV, Stichting RIONED, STOWA, Tauw , Vandervalk & De Groot, Waterboard De Dommel, Waternet and Witteveen+Bos.

The Dutch KALLISTO project (<http://www.samenslimschoon.nl>) is based on an integrated approach to cost effective and efficient water management of the catchment area of the City of Eindhoven. The involved municipalities, water boards and universities developed innovative solutions for a new approach in integrated water management, based on integrated modelling, large scale continuous monitoring and pilot plants for physical-chemical stormwater treatment. A combination of RTC measures, river aeration and WWTP optimisation has resulted in a cost effective solution complying with the integrated water resources management approaches required by the EU Water Framework Directive. The consortium has now received additional EU funding and will focus under the new project name Impakt on river aeration and the upstream discharges to the River Dommel across the Belgium border.

NEW ZEALAND (REPORTED BY ANNETTE SEMADENI-DAVIES)

Freshwater management policy change

Access to clean freshwater is at the heart of New Zealand's economic, social, cultural and environmental well-being and underpins our farming, manufacturing and tourism industries. Deteriorating river water quality and over-allocation of water resources in some catchments has driven reforms of freshwater management in New Zealand culminating in the National Policy Statement for Freshwater Management (NPS-FM) by the New Zealand Government in 2014. Under the legislation, councils are required to use regional management plans to establish freshwater objectives and enforceable limits on water use either regionally or by catchment with regards to both water resource allocation and to water quality. Moreover, the legislation provides opportunities for community collaboration with local and regional councils and other stakeholders, including Maori who have a special cultural and spiritual connection with water. Although much of the debate surrounding the reform and guidance material on how to implement the reform has focused on rural activities, notably agriculture, the NPS-FM also applies to urban centres. This means that there are likely to be changes in stormwater management in coming years including increased adoption of Water Sensitive Design. Indeed, last year's report from New Zealand highlighted the move in Auckland towards WSD. Much of the research and development of stormwater management tools in New Zealand over the past couple of years has been driven by the challenges arising from the implementation of the NPS-FM in urban centres.

NIWA stormwater management tools

Over the past four years, the National Institute of Water and Atmospheric Research (NIWA) has been part of the “Resilient Urban Futures” (RUF) research programme led by the University of Otago and funded by the NZ government. The programme, which has just reached its conclusion, has been a multi-disciplinary, multi-institutional collaboration to build and apply tools and knowledge for evaluating alternative forms of urban growth. NIWA’s contribution has included leading the development of a decision support system (DSS) for assessing the effects of urban development scenarios, including stormwater management options, on the environmental, economic, social and cultural values and resilience of urban water bodies. This work has been in partnership with the Cawtron Institute. Building on a pilot DSS developed under a predecessor programme (Urban Planning that Sustains Waterbodies (UPSW)), the research has developed an expanded set of indicators and tested the system through case-studies, leading to operational applications of the DSS to inform local government planning processes. More information is available at:

<https://www.niwa.co.nz/freshwater-and-estuaries/stormwater-management/urban-impacts>

(Contributed by Jonathan Moores, NIWA)

NIWA, with support from the Auckland Council, has also developed an online tool called the Urban Runoff Quality Information system (URQIS: <http://urqis.niwa.co.nz/>). URQIS is based on a database of stormwater and urban stream water quality data sourced from around the country. It allows users to generate statistical summaries of that data according to a set of criteria such as location, catchment land use and type of sampling. The summary data can then be used for modelling or stormwater management tasks. The online tool is in the process of being upgraded and a new version will be available mid-2017. The database already holds over 9000 individual data points and more data are being added this year.

(Contributed by Jennifer Gadd and Annette Semadeni Davies)

Student update from the HydroEco Research group at the University of Canterbury

The HydroEco Research group at the Department of Civil and Natural Resources Engineering, University of Canterbury, has continued to be very active in stormwater research in NZ.

In mid 2016, Frances Charters, successfully defended her PhD thesis on “Characterising and modelling urban runoff quality for improved stormwater management”. Dr Charters has focused on improving the Modelled Estimates of Discharges for Urban Stormwater Assessments (MEDUSA) event-based pollutant load model that predicts sediment and heavy metal loads from individual urban surfaces based on rainfall characteristics (pH, intensity, duration and antecedent dry period). The research has also furthered knowledge of pollutant generation processes in a low intensity rainfall climate and of particle size distribution variance in the sediment within untreated urban runoff. Dr Charters published her work in *Science of the Total Environment*, *Water Research* and *Journal of Environmental Management*, and presented at numerous international and New Zealand forums. An application of the MEDUSA model was also presented at IWA’s World Water Congress in October 2016.

Salina Poudyal, PhD candidate, has continued her work on collecting stormwater samples from carpark sumps to understand the dynamic nature of contaminant loadings (TSS, heavy metals, hydrocarbons and pathogens) and particle size distributions from three different land-use (residential, commercial and industrial) areas under different rain conditions. Findings are expected to contribute to a better understanding of a) the relationship among pollutants to particle size distribution, rainfall characteristics and land use and b) the selection of appropriate stormwater filter

devices. She was awarded best technical paper (*First Flush Stormwater Pollutants from Carparks in Different Urban Settings*) and best oral presentation at the 2016 New Zealand Water Conference. Fabio Cabral, ME student is nearing completion of his dissertation on assessing the source and transformation of nitrogen compounds in a low-lying urban stormwater drain network in Christchurch (Haytons Stream), which passes through industrial, residential and rural land uses. Knowledge gained from this project will be used to make recommendations as to best management practices to mitigate nitrogen compound impacts in stream. His research method has enabled an understanding of the sources, transformation, and potential treatment of nitrogen compounds along a heavily polluted urban stream.

(Contributed by Frances Charters and Tom Cochrane)

Raingardens and bioretention research

Raingardens and bio-retention units are becoming more common in New Zealand. One of the challenges has been to identify native plants and planting media suitable for local climatic conditions. To this end, Stormwater 360, with the support of Landcare Research, have undertaken lab and in situ trials of a rapid micro-bioretention unit to access media blends with high hydraulic conductivities able to cope with frequent high intensity rain falls in a limited space in Auckland. Initial results were presented at the Singapore International Water Week:

Cheah, J. & Hannah, M. (2016) Development of a test method for micro-bioretention treatment devices and media. Singapore International Water Week 2016. 8-12 July. Marina Bay Sands, Singapore.

These trials will be extended to Christchurch where the climate is drier and cooler.

In a related but separate study, the University of Canterbury HydroEco group, along with the Christchurch City Council, have initiated infiltration testing and water quality monitoring of trial raingardens that have been installed in the central city. Similar to the micro-bioretention unit trials, this study will provide feedback on effectiveness of different media composition and native plant species in the local Christchurch climate.

(Contributed by Mike Hannah, Robyn Simcock and Frances Charters)

SOUTH AFRICA (CONTRIBUTED BY Dr KEVIN WINTER, FUTURE WATER INSTITUTE, UNIVERSITY OF CAPE TOWN, kevin.winter@uct.ac.za)

The Water Hub: a research and training centre for integrating SuDS and water treatment

In the previous Urban Drainage newsletter (No. 29), I reported on the vision of a SuDS Centre located on a decommissioned wastewater treatment plant in Franschoek, a small town in the Western Cape, South Africa, about 110 km north of Cape Town. The concept for this centre has advanced considerably since then and is positioning itself as a premier training, development and research initiative in sub-Saharan Africa that will demonstrate a variety of options for treating contaminated surface water runoff and also showcase the re-use of treated water for irrigating urban food gardens; recovering resources from contaminated water; and extracting energy from water. The first of these research projects commenced in the latter half of 2016 and are focused on determining baseline datasets including hydraulics, water quality, and an assessment of biological and meteorological systems. Much of the data are being collected using digital sensors, loggers and telemetry that are capable of reporting high resolution continuous data. Most of this instrumentation is being developed and constructed locally owing to the high cost of importing machinery from

elsewhere. This development has been a steep learning curve, but has provided valuable experience and innovation. The Water Hub is led by the regional government with support from the University of Cape Town's Future Water Institute and local universities in the region. It is an exciting initiative that aims to provide research-led learning that will include an integrated understanding of SuDS and includes programmes and training materials for local authority officials, practitioners and students to experience the operations and management of biological treatment methods at scale. The project is making progress and a number of administrative matters have been completed in 2016. A long term land use agreement was reached with the local authority and a non-profit company was established to manage the research activities and fund raising. A 'for profit' company will drive the business end of the project. Investors are being invited to develop conference facilities, an innovation centre for demonstrating new technologies in water treatment, and also to landscape area into a public park. The idea is to change the old concept of a wastewater treatment works into a resource recovery centre. This project, with its emphasis on SuDS, is the first of its kind in Africa and is expected to be completed by 2019. It is set to inspire and train a new generation in integrated SuDS thinking and practice. Find out more about the vision and model at www.thewaterhub.org.za



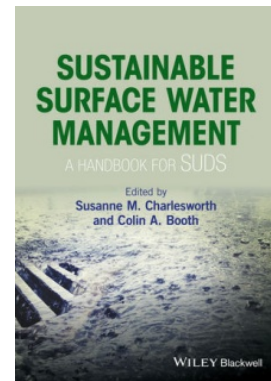
[1] Biofiltration cells in the foreground (previously drying beds) for treating stormwater and contaminated surface water



[2] An aerial view of the model - most of the infrastructure is already in place.

New book:

Sustainable Surface Water Management: a handbook for SUDS addresses issues as diverse as flooding, water quality, amenity and biodiversity but also mitigation of, and adaptation to, global climate change, human health benefits and reduction in energy use. Chapters are included to cover issues from around the world, but they also address particular designs associated with the implementation of SUDS in tropical areas, problems with retrofitting SUDS devices, SUDS modelling, water harvesting in drought-stricken countries using SUDS and the inclusion of SUDS in the climate change strategies of such cities as Tokyo, New York and Strasbourg.



SWITZERLAND (REPORTED BY JÖRG RIECKERMANN, EAWAG)

Measuring micropollutants in wet-weather discharges with passive samplers. A first Swiss-wide assessment of micropollutants in wet-weather discharges indicated that many combined and separate sewer overflows can be critical at a local assessment level (see Mutzner et al. 2016, doi:10.1016/j.watres.2016.08.003, Institutional Repository). Data for micropollutants in wet-weather discharges is still scarce. Therefore, we investigate urban areas with information on detailed catchment characteristics (land use) and wet-weather discharge points. Since April 2016, we are surveying two sites in the urban water observatory with conventional active water sampling and passive samplers. In 2017 we plan to monitor wet-weather discharges in a larger number of urban areas with the efficient passive sampler approach. The collected monitoring data will allow us to test the proposed Switzerland-wide model, which proposes a causal relation between discharge of specific micropollutants and land use.

More information: <http://www.eawag.ch/en/department/sww/projects/dimes2/>
Christoph.ort@eawag.ch

Predicting the release of substances from construction materials into the aquatic environment.

During rainfall, substances are leaching from construction materials and are subsequently emitted by stormwater runoff into the environment. The European Construction Products Regulation (CPR) set requirements for construction products regarding the protection of groundwater, surface water and soil. Under the Biocidal Products Regulation (BPR) and REACH similar requirements are defined for certain substances and product types, respectively. Process-based modelling is a promising tool to perform exposure and environmental risk assessments for such substances and respective application areas. However, in Europe suitable models and scenarios are lacking. The HSR Hochschule für Technik Rapperswil (University of Applied Sciences Rapperswil) developed the dynamic model COMLEAM (Construction Material Leaching Model), which predicts i) leaching of substances from vertical and horizontal material surfaces exposed to wind-driven rainfall, such as facades and roofs, as well as transport and discharge to surface waters. It integrates weather data, house geometry, and material emission functions to calculate the dynamics of water and substance flows that are related to the construction components. COMLEAM, which is implemented in Java/Angular, contributes to estimating the emissions to surface water, soil, or groundwater and enables science, authorities and industry to perform more reliable risk assessments. The tool consists of different modules (geometry, weather, emission) with sub-menus, is coupled to GIS and generates export data files for existing environmental fate models, e.g. for soil transport (PELMO, Pearl).

More information: www.hsr.ch/comleaminfo
Michael.Burkhardt@hsr.ch

Urban flood experiments and alternative data acquisition methods. The Urban Flood Risk Group at the Urban Water Management Department at EAWAG has recently carried out a series of controlled urban flash flood experiments in a real-scale facility. As a result, a large data set of water depth and flow velocity measurements obtained from approx. 15 conventional (e.g. ultrasonic, radar and pressure sensors) and alternative sensors (e.g. CCTV cameras and temperature sensors) both in sewers and overland has been created. The data set is going to be made publicly available, in order to allow other researchers to benefit from the data collection effort and also promote scientific collaborations. Making high-quality experimental data sets openly available hopefully contributes to “open science” and efficient use of resources in academia, where many research groups in different parts of the world repeat similar experiments, such as costly rainfall-runoff measurement campaigns, to develop general methods, such as efficient numerical solvers or calibration schemes. More information: <http://www.eawag.ch/en/departement/sww/projects/floodx/joaopaulo.leitao@eawag.ch>

UNITED KINGDOM (COMPILED BY LIAN LUNDY, MIDDLESEX UNIVERSITY)

Abertay University

Rebecca Wade (R.Wade@abertay.ac.uk) reports that the University’s Urban Water Technology Centre (UWTC) (www.uwtc.abertay.ac.uk) continues to work on research, consultancy and education in areas closely related to urban drainage. In the past year, UWTC have undertaken several projects for the Scottish Government under their Centre of Expertise for Waters (CREW) initiative. CREW aims to connect research and policy to support the implementation of water policy in Scotland. A recently completed project is the Rural SuDS design and build guidance for Scotland’s farmers and landowners (<http://www.crew.ac.uk/publication/rural-sustainable-drainage-systems-practical-design-and-build-guide-scotlands-farmers>). The guidance is delivered in a non-technical format designed to overcome ‘farmer fatigue’ regarding potential remediation solutions for diffuse pollution and erosion issues from steadings and fields.

The UWTC continue to work with industry partners to assess performance of new and existing urban drainage technology and green infrastructure including:

- Evaluating the performance of a SuDS treepit. Contact a.duffy@abertay.ac.uk.
- Long-term monitoring Highways SuDS. Contact a.duffy@abertay.ac.uk
- Monitoring source control SuDS within residential house-plots and collaboration with housing developers on application of raingardens. Contact r.wade@abertay.ac.uk

The UWTC team also continues to deliver training and capacity building to the public and private sectors:

- SUDS Online training delivery for industry professionals: SUDS Concepts and Design Principles, SUDS for Roads, SUDS Operation and Management, for more information: <http://uwtc.abertay.ac.uk/educationtraining/shortcoursesonlinetraining/>
- SUDS O&M capacity building within the private sector. Contact n.berwick@abertay.ac.uk

In 2016 Abertay staff Dr Rebecca Wade and Dr Ken Scott-Brown along with Middlesex University staff (Prof Lian Lundy, Prof Sarah Bradshaw and Dr Meri Junti) completed a Newton Funded project in collaboration with Prof Nilo Nascimento of UFMG in Belo Horizonte, Brazil. This project has investigated the multiple benefits (stormwater management, environmental quality

improvement, community benefits, and environmental equality issues) provided by green infrastructure provision in rapidly expanding urban areas in Brazil, also considering issues of gender equality with respect to access to the assets and services provided to communities from Green infrastructure.

SUDSnet (<http://sudsnet.abertay.ac.uk>), an international network for SUDS researchers, practitioners, agencies and developers, is coordinated jointly by Abertay University and Coventry University. In May 2016 SUDSnet supported and contributed to the CIWEM Scottish Branch & Urban Drainage Group Biennial Symposium & Annual Dinner event ‘SUDS; 20 Years on and Counting’. In November 2016, SUDSnet co-organised the Scottish Universities Green Infrastructure Research (SUGIR) Group event in Glasgow, hosted by Glasgow City Council (further information about SUGIR and the Scottish Green Infrastructure forum at: <http://www.sgif.org.uk/index.php/sugir>). In September 2016, Abertay University were partners for the launch of a new Scottish Government initiative – ‘Greener Gardens’ supporting housing developers to implement green infrastructure, including raingardens in residential house plots. More information can be found here: <https://blogs.gov.scot/planning-architecture/2016/12/19/greener-gardens/>. Collaborative work continues with monitoring of the units and working with community/residents and local schools.

UWTC staff have contributed to several academic, professional and industry meetings and publications in 2016 including: Cities in a Changing Climate - Preparing our cities for extreme weather (Prof Joe Akunna), a Liveable Cities event; SuDS and our landscapes: Seeking beautiful, and multi-functional places, (Dr Rebecca Wade) organised by Landscape Institute Scotland. Neil Berwick contributed a chapter on Sustainable Drainage Systems: Operation and Maintenance and Alison Duffy co-authored with Dr Stella Apostolaki (American College of Greece) a chapter on Amenity for the recently published: Sustainable Surface Water Management: A Handbook for SUDS (editors: Susanne M. Charlesworth and Colin A. Booth, ISBN: 978-1-118-89770-6). <http://eu.wiley.com/WileyCDA/WileyTitle/productCd-1118897706.html> . UWTC’s Alison Duffy was invited by the EC DG R&I Directorate to deliver a training session on Scotland’s experience with implementing Nature Based Solutions since the mid-1990’s. The objectives of the workshop were to: share knowledge and practical experiences; discuss challenges and barriers by responsible organisations and what had Scotland learned in terms of good and bad design. Alison invited Doug Buchan from Scottish Water and Gaye McKay from Tuil Solutions to deliver presentations from ‘responsible ‘organisations perspective and facilitate a workshop and useful debate.

British Water

Alex Stephenson (alex@h2o-intel.com), as convenor of the British Water Sustainable Water Management (SuWM) Focus Group, reports that the SuWM focus group has had an active year and continues to be well represented by a diverse range of organisations including regulators, consulting engineering practitioners, contractors, product suppliers and a range of expert guests and speakers. One of the aims of the group is to ensure and promote best practice and amongst several notable outputs during 2016 probably the most significant was the Code of Practice for the Assessment of Manufactured Treatment Devices Designed to Treat Surface Water Runoff. This was produced with input from academia, the Environment Agency and key members of the SuWM group and will be published on the British Water website in the near future. The already well established British Water “Guidance for Sustainable Drainage Products” is undergoing a revision and update process within the SuWM group, with the new version also expected to be published by British Water soon.

British Water held the well-attended ‘SuDS in London’ conference in May 2016 and the ‘Cost-effective water management for new developments’ conference organised in conjunction with the UK Rainwater Management Association (UKRMA) held in October 2016. In February 2017, British water will host the Innovation Exchange in conjunction with Highways England to support the organization (formerly the Highways Agency) identify the innovations, cost savings and advancements in health and safety and implementation on offer from amongst a whole range of suppliers and experts. Highways England is a government-owned company with responsibility for managing the motorways and major roads in England. It operates information services, liaises with other government agencies and provides staff to deal with incidents on the roads it manages.

Centre for Water Systems, University of Exeter

David Butler (D.Butler@exeter.ac.uk) reports that work at Exeter over the last year in the urban drainage arena has concentrated on resilience assessment and quantification, urban flood modelling, multi-purpose rainwater harvesting, wastewater system control and automation of fault detection in sewer systems. The Safe and SuRe (S&S; reliable, resilient, sustainable water management) project team led by Professor David Butler had an exciting year in 2016 with publications covering the updated S&S framework (Butler et al, 2016), global resilience analysis of urban drainage systems (Mugume et al, 2016a; 2016b), S&S wastewater treatment plant control (Sweetapple et al, 2016), and S&S rainwater harvesting social networks (Ward et al, 2016). All outputs from the project are available at www.safeandsure.info. A workshop on “Sustainable and Resilient Water Infrastructure: flood risk and resilience” was held at Loughborough University on 16th September 2016, as part of the EPSRC funded BRIM Network led by Professor Guangtao Fu. It gathered researchers from industry and academia to discuss the latest research outcomes and main challenges for a resilient urban drainage infrastructure in the UK. The presentations are available on the BRIM website: www.lboro.ac.uk/research/systems-net/brimnetwork/brimworkshops.

RESCCUE (RESilience to cope with Climate Change in Urban arEas) is a 4 year Horizon 2020 project that aims to deliver a framework enabling city resilience assessment, planning and management by integrating into software tools new knowledge related to the detailed water-centred modelling of strategic urban services performance into a comprehensive resilience platform. These tools will assess urban resilience from a multi-sectorial approach, for current and future climate change scenarios and including multiple hazards. The Exeter component is led by Professor Slobodan Djordjevic.

Rainwater harvesting (RWH) research focused on approaches that can enable RWH uptake in a range of settings demonstrating that RWH can be designed to provide stormwater attenuation benefits (Melville-Shreeve et al., 2016). The paper highlights that one size does not fit all, and that dual purpose approaches, such as drain down attenuation features can have significant benefits to receiving sewers where sustainable drainage features are desired. Qin et al. (2016) observed the existence of first, middle and final flushes in storm events in a rapidly urbanizing catchment in China, and developed a new parsimonious logistic wash-off model to simulate all the three types of flush. The commonly used exponential model can simulate the first flush process but fails to simulate the middle and final flush processes. However, the logistic wash-off model can effectively simulate all the three flushes, in particular, the middle and final flush processes. To minimise overall environmental impacts and move beyond the narrow focus on effluent water quality, an operational strategy-based permitting approach was proposed for urban wastewater management by Meng et al. (2016). Building on the latest computational techniques including integrated modelling, multi-objective optimisation and visual analytics, this approach can explicitly evaluate stakeholders’

interests, efficiently optimise and interactively identify high performing solutions, and thus facilitate transparent decision making on water quality management.

As a continuation of the CADDIES (Cellular Automata Dual DrainagE System) project led by Prof. Dragan Savic, Guidolin et al. (2016) have improved the cellular automata two dimensional flood model by developing weight-based transition rules (WCA2D) to achieve better stability and performance than its predecessor. Gibson et al. (2016) further investigated the accuracy and efficiency of WCA2D to determine modelling time step without significant loss in accuracy. As part of a Global Innovation Initiative project to develop flood risk modelling tools for megacities, Zhou et al. (2016) measured the blockage effects of buildings to flow propagation through flume experiments. This has provided abundant data for numerical model calibration and validation. Pyatkova et al. (2016) coupled a hydraulic model with a micro simulation traffic model to evaluate flood impact on a transportation network. Naso et al. (2016a, b) carried out a series of studies to establish the relationships between vulnerability and exposure for estimating flood risk. Powell et al. (2016) developed a system dynamic approach to identify the flood threat to an electricity substation, evaluate its preparedness, and propose appropriate adaptation measures. Professors Zoran Kapelan, Slobodan Djordjevic and Ed Keedwell have recently completed a two-year project with Welsh Water which focused on developing new data analytics type methods for detecting blockages in wastewater networks (Bailey et al. 2016a) and related issues at Combined Sewer Overflows (Bailey et al. 2016b). The project changed the way the company manages blockages from a reactive approach to a much more proactive approach leading to operational cost savings and improved levels of service. Prof. Kapelan is also currently developing new technology for real-time blockage detection in sewer systems by using wastewater level and flow sensor data collected in near real-time. The approach is based on the award winning Event Recognition System developed originally for water distribution systems. The technology is now being used companywide in United Utilities improving waters and reducing operational cost. Myrans et al. (2016a, 2016b) have developed a new methodology for automated detection of structural faults in sewer pipes. The new methodology utilises standard CCTV footage and newly developed data and has achieved high detection rates in real world pipe networks.

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Urban Pollution Research Centre (UPRC), Middlesex University

Lian Lundy (L.Lundy@mdx.ac.uk) reports that in 2016/17 the UPRC has undertaken research in a range of complimentary areas including the current status of SuDs implementation in light of the emerging regulatory framework within England and Wales (Ellis and Lundy, 2016), the impacts of misconnections on the organic and nutrient loadings to surface waters from specific household appliances (Revitt and Ellis, 2016) and the development and application of theoretical approach to assess the impact of swales on receiving waters (Revitt et al., 2017). A current study on the impact of an urban catchment on receiving water and sediment quality has reached its mid-way point with the completion of a two-year sampling programme involving the collection of water and sediment samples in the River Lee, Lee navigation channel and selected tributaries (North London, UK; paper in preparation) and their analysis for a range of organic and inorganic substances. The next stage of the project will involve the implementation of substance flow analysis within a GIS platform to

explore if land-use activities can be used to identify sediment hotspots within receiving water bodies.

Under the EU COST action NEREUS (<http://www.nereus-cost.eu/>), new and emerging challenges and opportunities in treated wastewater reuse are being explored using a risk assessment approach to inform the development of evidence-based policy (an EU Water Reuse Directive - which will include water quality standards - is currently under development), with a similar approach currently being applied to assess the risks associated with stormwater use in a range of applications. For information on the RC-UK NEWTON ADEPT urban ecosystem project and the on-going development of the ISO urban stormwater management standard, please see reports from Abertay University and Yorkshire Water, respectively.

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Portsmouth University

John Williams (john.williams@port.ac.uk) reports that the School of Civil Engineering and Surveying has several ongoing projects related to Sustainable Drainage. 'Providing Real World Opportunities for Sustainable Drainage (ProSuDS)' is a NERC Green Infrastructure Innovation Project that aims to increase the uptake of high quality SuDS designs by producing tools for developers to incorporate the costs and value of SuDS early in the master planning process. This will include a standardised costing tool for construction and maintenance. Guidance will also be produced for how property values and ecosystem services could be considered in financial decisions concerning initial site design and layout. This will be targeted at property professionals and surveyors. Partners and steering group members include:RICS, Hampshire County Council, Southern Water, First Wessex, Atkins, Mayer Brown, Grainger, Arcadis, CIRIA. For further information please see: www.port.ac.uk/prosuds/

Janine Robinson is also undertaking a PhD focused on investigating the fate of PAHs in swale systems. This combines field monitoring of pollutant levels in swales receiving road runoff combined with experiments on a 10 m long model swale in a greenhouse. This model study involves dosing storm events (1000 l over 1 hour) with a cocktail of PAHs to simulate road runoff. Fate studies of PAHs in the water and soil are then undertaken to derive pollutant attenuation profiles.

Thames 21

John Brydon (John.bryden@thames21.org.uk) reports that Thames 21 has been working with Enfield Council, the Environment Agency for England and Thames Water to improve the health of the Salmons Brook (North London) using a variety of SuDS systems at several locations throughout the catchment. Two reports on the water quality performance of these systems are available through the Thames 21 website (www.thames21.org.uk/salmons-brook/) as well as direct access to online

real time monitoring data. Findings of these studies were presented at the Constructed Wetland Conference held in October 2016 (<http://www.constructedwetland.co.uk>).

University of Cambridge

Dick Fenner (raf37@cam.ac.uk) reports that a new UK consortium funded by the EPSRC to look at Urban Flood Resilience was launched in Nottingham in January 2017. The project will run until the end of 2019 and build on the successful completion of the Blue Green Cities project (<http://www.bluegreencities.ac.uk/>). The new work will be delivered by the following Universities: Heriot Watt, Newcastle, Leeds, Nottingham, De Montfort, Cambridge, Exeter, West of England and the Open University. Through the development of coupled modelling tools the project will seek to identify the most appropriate mix of grey and blue-green infrastructure in specific locations and address the feasibility of using stormwater as a resource for a range of potential re-use and recovery options. Proposals from the work will be fully integrated with urban planning and will seek inter-operability with other urban assets as well as co-production of knowledge with beneficiary communities. From the outset the work will focus on two case study locations in Newcastle and Ebbsfleet and be supported by a Steering Advisory Board comprising of the Environment Agency, planners, engineering consultants, water utility companies, local authorities, Public Health England, HR Wallingford, CIRIA, UKWIR, SNIFFER and the water Industry Forum. A key objective of the work is to develop urban flood and water management systems with the adaptive capacity essential to keep flood risk at acceptable levels however climate changes. Further details can be found at the project web-site: <http://www.urbanfloodresilience.ac.uk/>

University of Sheffield (reported by Simon Tait)

The UK government has recently invested over £20M into new national laboratories to examine all aspects of urban water infrastructure. The development will be at sites in Cranfield, Newcastle and Sheffield Universities. At Cranfield existing laboratories will be extended to create the Urban Water Hub which will support research into urban water infrastructure and assets; the National Urban Water Laboratory, a dedicated experimental facility at the Science Central site in the heart of Newcastle-upon-Tyne will house urban transport, urban energy and urban ICT infrastructure facilities as well as the Newcastle Urban Observatory; and the Distributed Water Infrastructure Facility at the University of Sheffield will feature a containment chamber incorporating facilities to create, load and test infrastructure elements such as potable water pipes and sewer and drainage pipes/channels and chambers. The facilities will be managed by: Professor Paul Jeffrey, Cranfield University; Professor Richard Dawson, Newcastle University; and Professor Simon Tait, University of Sheffield. This investment is part of the UK's government UKCRIC (UK Collaboratorium for Research in Infrastructure in Cities) programme that has been established at 14 universities to conduct world-leading research through a network of collaborative experimental facilities and urban laboratories. More details can be found at <http://www.ukcric.com/>.

QUICs “Quantifying Uncertainty in Integrated Catchment Studies” is an EU Marie Skłodowska-Curie Initial Training Network (ITN) which is carrying out research on the development of methods to understand and quantify uncertainty in a range of water quality models commonly used in integrated catchment studies. The network contains 12 PhD projects based at 9 partners throughout the EU, with projects considering model uncertainty in the prediction of rainfall, run-off, wash-off, flows in networks and rivers. By looking at different scales across a catchment and their integration the outputs of the project aims to support the future implementation of the Water Framework Directive (WFD) and so improve water quality management by assessing the uncertainty of

integrated catchment model water quality predictions. Details of current projects and their progress is available on the project website and blog (<https://quicsblog.wordpress.com/>)

A EU-H2020 project CENTAUR - Cost Effective Neural Technique to Alleviate Urban flood Risk is developing new technologies to implement real time control at a local level to reduce urban flood risk. The concept behind the project is to use data driven approaches and the unused capacity in existing systems to enhance the sustainability of the approach. The team, consisting of the Universities of Sheffield, Coimbra and EAWAG, and SMEs Steinhardt, and Environmental Monitoring Solutions, and water utilities Aguas de Coimbra and Veolia, had already progressed to installing a full scale system for pilot testing and work continues on further computational and system developments. Further details are available at <http://sheffield.ac.uk/centaur>.

Welsh Government

Phil Chatfield (phil.chatfield@wales.gsi.gov.uk) reports that the Welsh Government recently commissioned a piece of research to help inform how it takes forward its SuDS policy for new developments. Following the publication of voluntary standards for SuDS early in 2016, options to improve uptake of the SuDS approach on new developments in Wales are now being considered. Possible options range from a continuation of the voluntary approach through to the implementation of Schedule 3 of the Flood and Water Management Act 2011, which would make the use of the SuDS approach for surface water management mandatory. The research was undertaken by EPC and aims to provide further information relating to the costs and benefits of using SUDS. In particular, evidence of the wider benefits, such as health and wellbeing, is being considered. This takes into account the new duties on public bodies in Wales under the 2015 Well-being of Future Generations Act, which aims to improve the social, economic, environmental and cultural well-being of Wales. These less tangible benefits have often been ignored in past studies because of the difficulty in evaluating them. The final report is now complete and should be available through the Welsh Government web site early in 2017. The report's recommendations will inform a consultation on SuDS policy in Wales due by the summer.

Yorkshire Water

Brian Smith (brian.c.smith@yorkshirewater.co.uk) reports that, as a member of British Standards, he has been co-opted to CB/503 for expertise on Urban Storm Water Management to represent the UK on the development of the International Standard for Urban Stormwater Management. He has formed a UK mirror panel consisting of the following representatives, providing the necessary technical breadth: Chris Digman (MWH), Nick Orman (WRc), Bridget Woods-Ballard (HR Wallingford), Phil Hulme (EA), Lian Lundy (JCUD). This international standard provides guidance to stormwater management authorities in cooperation with relevant stakeholders on the framework and processes relevant to establishing policies, planning and implementation of stormwater management including stormwater systems which comprise physical infrastructure and its control systems to prevent or mitigate the negative impacts of stormwater. It mainly deals with the processes to determine how the stormwater system achieves the objectives of stormwater management, including evaluation of the performance of the stormwater system as well as determining the requirements for its design. This standard can be applied to new stormwater systems and to the extension or improvement of existing systems. It excludes the limits of acceptability for the risks associated with stormwater, which are to be determined by the government or relevant authority. The standard includes unusually heavy rainfall but is not applicable to sanitary sewer systems, including misconnections, structural defects and water tightness issues. However, it is noted that events such as storm surges, dam breaks, tsunamis, etc.

can impact on stormwater management but will not form part of the standard. The working group has revised Working Draft 4. A revised schedule has been proposed with the next meeting scheduled for 26-30 June 2017

12th EWA conference on EU water policy and sustainable development - Held in cooperation with the DG Environment of the European Commission, the main objective of the 12th EWA conference was to establish a dialogue between the European Commission and European water professionals and stakeholders. The conference consisted of the sessions on: EU Water Policy and Sustainable Development, Water efficiency (whether the EU will meet the SDG-target of Water efficiency) and Sustainable Stormwater Management. Brian Smith and Don Ridgers presented on “Sustainable Stormwater Management - The need for standards” covering definitions, objectives, what impacts can be managed, how they can be managed, the role of standards, the role of European standards, what standards can't/can do in stormwater management, barriers to standardization and how these can be overcome, principles of storm water management and where do we go from here. Further standardisation would ensure more stormwater management systems will align with national and international good practice and we can continue to identify the common elements of current practices in different countries and the reasons for the differences and disseminate this knowledge to other countries. It will also help continue to develop guidance based on latest scientific knowledge to guide practitioners in producing solutions to meet these requirements. However, whatever standards are derived, costs, practicability and customer acceptability are all key.

Water UK and SuDS - Following the failure of government to implement the SuDS provisions of the Flood and Water Management Act (2010), the need for improved arrangements for the adoption of SuDS is widely recognised. Water companies have been exploring whether and if so how they can play a more active role in relation to the adoption of SuDS. Water companies have a considerable interest in reducing the amount of surface water entering the sewer network as climate change and urban creep place ever greater demands on the sewer network. Reducing sewer flooding and creating headroom for new housing development are key drivers. Water companies recognise the benefits of more integrated management of sewers and given the increased importance that is being placed on the use of sustainable systems to deal with surface water, see the benefits of taking greater control of those types of system. A number of water companies already have policies allowing adoption of certain SuDS assets but there is no consistency among companies either on the principle or on the detail of the assets to be adopted.

Water UK and 21st Century Drainage Programme (CDP) - John Spence (previously Southern Water) has now taken up the position of Programme Manager. John will work with all work stream chairs to develop project proposals each of which would add value and move us towards delivering our overall goal of providing ever more resilient drainage systems for our customers. October 5th 2016 saw the soft launch of the 21st CDP and specifically its Wet Wipe campaign through a number of media avenues including TV adverts, The One Show, BBC/IVV/Channel 4 etc. news, Radio interviews, Newspaper Articles (The Times, Daily Mail, The Sun etc). The work was also shared with Eureau, who have confirmed their support and were impressed by the success of the programme so far:

<https://hcpaw.cloud9vault.net/mobile/links/public/home?token=rHoKfJL6Cli-egp8&name=21CDP.pdf>

Progress continues on the seven 2st CDP work streams, with two new work streams added:

- WS8 - Support to EurEau2: The EU Water Industry Trade association group dealing with all waste water related matters
- WS 9 - Waste Water resilience metrics

The Programme Board continues to expand and gain wider support for its activities. For example, Blueprint, a coalition of NGO's under Wildlife & Countryside Link working mainly in England and Wales, are engaging with the water sector to influence the shape of PR19 investment. They have set up a list of environmental priorities of what they believe to be important for 2020-25 and will consult with 21st CDP to finalise these.

USA (REPORTED BY DR. ELIZABETH FASSMAN-BECK, efassman@stevens.edu)

The Environmental and Water Resources Institute (EWRI) of the American Society of Civil Engineers (ASCE) is home to 11 Technical Councils working on an array of issues related such as urban drainage, stormwater management, water, wastewater, and groundwater, etc. Additional councils serve to address student and professional engagement, develop standards, and organize the annual World Water and Environmental Congress (see conference section of this newsletter), among other activities. Using a recently launched platform called EWRI COLLABORATE, ASCE-EWRI members can **network, connect, engage and share** experiences, industry information and best practices, seek and share advice, exchange resources and build relationships. It is an online platform that readily connects to not only member posts, but also to easily accessible and archived technical documents, videos and comments, all from one platform! Visit <http://collaborate.ewrinstitute.org/>

Highlights of recent and ongoing activities from some of EWRI's Technical Councils are reported herein. Councils are generally served by task committees addressing specific topics.

Urban Water Resources Research Council. In 2016-2017, UWRRC committees have been working on topics such as Low Impact Development/Green Infrastructure, Stormwater Assets Operation and Maintenance (see the conference section of this newsletter for an upcoming event in November), and the International Stormwater Best Management Practice (BMP) Database. The International Stormwater BMP Database (BMPDB) is a publically-accessible repository for BMP performance, design, and cost information. The overall purpose of the project is to provide scientifically sound information to improve the design, selection and performance of BMPs. Since the initial development of the BMPDB in 1996, the Water Environment and Reuse Foundation (WE&RF) and various funding partners, including the Federal Highway Administration (FHWA), the Environmental and Water Resources Institute (EWRI) of the American Society of Civil Engineers, the US Environmental Protection Agency (EPA), and American Public Works Association (APWA) have contributed to its continued development and growth. As of the most recent release in November 2016, the BMPDB contains data sets from nearly 650 BMP studies through the U.S. and several other countries that are publicly accessible on the project website (www.bmpdatabase.org). Studies include traditional BMPs, green infrastructure practices (e.g., nearly 60 bioretention sites) and over 100 manufactured devices. Both conventional and innovative designs are represented in the database. During 2016, bioretention, low impact development, and wetland channels data sets were expanded significantly. New web-based statistical analysis tools and a new BMP performance summary report were also completed. The web-based analysis tools allow users to query a subset of BMP performance studies of interest and dynamically generate statistical summaries for the data set. The user can also download a data spreadsheet for the query and

conduct additional analysis independently. For more information on submitting data to the BMP Database, visit the project website or contact clary@wrightwater.com.

For more information on the UWRRC, please contact Jim Lenhart JLenhart@conteches.com

Sustainable Stormwater Infrastructure Council. The SSIC's mission is to provide a forum for Civil Engineers, Regulators and other Urban Infrastructure Professionals to explore the evolving practices of stormwater, stream and lake pollution treatment, conveyance, controls, modeling and management.

Guidelines for Certification of Manufactured Stormwater BMPs. A Final Report is being prepared for publication by ASCE Publications providing guidelines for the Certification of Manufactured Stormwater BMPs. The effort report is founded on research conducted over a ten year period and will be available in 2017.

Stormwater BMP Maintenance. The Stormwater BMP Maintenance Task Committee has prepared a report that includes detailed maintenance protocols for various stormwater control measures. The goal of the report and associated protocols is to assist property owners, facility managers, maintenance contractors and other individuals tasked with stormwater infrastructure upkeep. As part of the report preparation, a nationwide survey of a broad stakeholder group was initiated in order to identify the current state of stormwater infrastructure maintenance. The committee prepared a literature review, a background information section concerning the appearance and functional attributes of each BMP and concise maintenance protocols that are intended to serve as the basis for field inspection efforts. The report is under final technical review and plans to be released for publication by ASCE in Spring 2017.

Emergency Stormwater Response. In 2011, the US Department of Homeland Security distributed Presidential Policy Directive 8 on National Preparedness. This directive describes a framework to prepare infrastructure systems for disasters. Stormwater systems are critical infrastructure that are highly susceptible to both natural and man-made disasters, especially under changing climate conditions and rising seas. The Task Committee's mission is to advance the understanding of the impact of disasters on sustainable stormwater systems and to develop a framework for establishing risks, identify pre-disaster preparedness actions, consider alternatives to make stormwater systems more resilient, develop first response actions including backup systems and temporary drainage alternatives, and recommend post disaster recovery strategies including debris management. A report will be prepared that summarizes the consistencies and lessons learned as identified in the case studies and proposes revisions to sustainable stormwater design, policy, or management.

For more information on the SSIC, please contact Blaine Linkous blinkous@WBCM.com .

The Municipal Water Infrastructure Council (MWIC) is dedicated to evaluating the costs and performance of municipal water infrastructure and promoting findings to implementers nationwide. The Council currently has two active task committees working on stormwater-related deliverables:

1. Sustaining Commitments to Stormwater Infrastructure (SCSI) Task Committee (TC), and
2. Comprehensive Costs of Implementing and Maintaining Green Infrastructure (CCGI) TC

The SCSI TC has developed resources regarding long-term maintenance and operation of distributed stormwater infrastructure. The TC recently completed its primary deliverable, a report

that outlines requirements for long-term maintenance of various stormwater control measures. This report will be published in the near future and will be a resource for municipalities, special districts, and private industry in identifying equipment and personnel needs associated with the maintenance and operation of distributed (small-scale) stormwater control measures throughout an area, district, or citywide.

The CCGI TC will build upon the work of the SCSI TC to develop a dataset of whole-life costs for a suite of small-scale distributed stormwater green infrastructure technologies including permeable pavements (parking lots, green streets, green alleys), infiltration/filtering technologies (rain gardens, streetside and bumpout planters, green gutters, tree trenches and pits, infiltration basins and trenches, media filters), and green building technologies (green roofs, green walls, planter boxes, disconnecting downspouts, rainwater harvesting). The CCGI TC will work closely with other Councils and members to develop a dataset that can be used to assist with long-term budget planning for distributed (small-scale) stormwater control measures throughout an area, district, or citywide.

For more information about the MWIC, please contact Ruth Hocker, PE, D. WRE.
ruthahocker@gmail.com.

10. FUTURE MEETINGS AND CONFERENCES

A table listing the forthcoming conferences and workshops (as of February 24, 2017) appears below; as compiled by Dr Elizabeth Fassman-Beck. This table can be also used when planning future JCUD events to avoid conflicting schedules. Even though we strive for accuracy, please always check the primary sources of information for possible updates and changes.

Conference or Workshop Name	Location	Event Dates	Submission dates	URL	Other Contact
World Environmental and Water Resources Congress	Sacramento, CA, USA	21-25 May 2017	Abstract deadline has passed already	http://www.ewricongress.org/	registrations@asce.org
12 th IWA Specialized Conference on Instrumentation, Control and Automation (ICA)	Québec City/ Québec, Canada	11-14 June 2017	Abstract deadline has passed already	http://www.ica2017.org/	
IAHR World Congress	Kuala Lumpur, Malaysia	14-17 Aug. 2017	Abstract deadline has passed already	https://www.iahr.org/site/cms/contentCategoryView.asp?category=341	
15 th International Computing & Control for the Water Industry Conference	Sheffield, United Kingdom	05- 07 Sept. 2017	Abstracts: 01 Mar. 2017	https://www.sheffield.ac.uk/cwi/2017	

14 th Int. Conference on Urban Drainage (ICUD)	Prague, Czech Republic	10-15 Sept. 2017	Extended Abstracts: 10 Mar. 2017	www.icud2017.org	info@icud2017.org
Water Environment Federation's Annual Technical Exhibition and Conference (WEFTEC)	Chicago, IL, USA	30 Sept.-04 Oct. 2017		http://www.weftec.org/	
NORDIWA 2017, the Nordic Wastewater Conference 2017	Aarhus, Denmark	10-12 Oct. 2017	Abstracts: 06 Mar. 2017		psmi@env.dtu.dk
O&M 2017: Operation and Maintenance of Green and Gray Stormwater Control Measures	Denver, CO, USA	6-9 Nov. 2017	Abstracts: 31 Mar. 2017	www.omsconference.org	registrations@asce.org
11 th Int. Conference on Urban Drainage Modelling (UDM)	Palermo, Italy	23.-26.09.2018	TBA		Georgio.Mannina@unipa.it
NOVATECH	Lyon, France	2019			jean-luc.bertrand-krajewski@insa-lyon.fr
SPN9, 9 th Int. Conference on Sewer Processes and Networks	Aalborg, Denmark	27-30 Aug. 2019	TBA	spn9.dk	

11. WORKING GROUP CONTACTS

Int. Working Group on Data & Models (IWGDM) Web site: http://iwgdm.wikispaces.com	
Chair: Dr David McCarthy Environ. and Public Health Microbiology Lab Monash Water for Liveability Dept. of Civil Engineering, Building 60 Monash University Clayton, Vic 3800 AUSTRALIA Phone: +61 3 9905 5068, Fax: +61 3 9905 4944, E-mail: david.McCarthy@monash.edu	Secretary: Prof Manfred Kleidorfer Unit for Environmental Engineering University of Innsbruck Technikerstrasse 13 6020 Innsbruck AUSTRIA Ph.: +43 512 507 62134, Fax : +43 512 507 62199 E-mail : manfred.kleidorfer@uibk.ac.at
Real-Time Control of Urban Drainage Systems (RTCUDS)	

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